



Department
for Education

Technical Manual

Employer's requirements

**Technical requirements for the design and construction of
school and college buildings and outdoor environments**

January 2026

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Summary

The Department for Education (DfE) Technical Manual details the technical performance and functional requirements applicable to the design and construction of school and college buildings and outdoor environments.

This document forms part of the Employer's Requirements for the DfE Construction Framework 2025 (CF25)¹. It may also be used as the basis of similar documentation for other procurement routes using DfE's design and construction standards and guidance.

Review date

This document shall normally be reviewed at 12-month intervals however, DfE reserve the right to update it at any time².

Who is this publication for?

This guidance is for:

- local authorities (for community, voluntary-controlled schools, foundation schools and maintained nursery schools)
- academy trusts (for academies and free schools)
- governing bodies (for voluntary-aided schools)
- school/college leaders, staff and governing bodies in; further education colleges and designated institutions, sixth form colleges, maintained schools, academies and free schools, pupil referral units, City Technology Colleges, non-maintained special schools and maintained nursery schools
- technical professionals involved in the design, construction and maintenance of school and college premises.

Academy trusts with a religious character and the responsible bodies for voluntary-aided and voluntary controlled schools should engage with the land/site trustees for their land and buildings and the relevant religious body, most often their Diocese.

¹ When not using the DfE Construction Framework 2025, seek appropriate advice on how the DfE's Employer's Requirements can be incorporated into the relevant Contract(s).

² Where this document has been incorporated into a Scheme Contract, the version which is incorporated at the date of that Scheme Contract shall apply under the terms of that Scheme Contract, unless varied in accordance with the terms of the relevant Scheme Contract.

Document history

This table lists the key changes in each update

Revision code	Status code	Date	Amendment
C01	A	2026-01-12	GOV.UK publication

Introduction

Document suite

The Technical Manual is supported by the Department for Education's (DfE) Information Management Requirements, Pattern Book, General Conditions, Project Brief and supporting annexes as applicable to the Scheme, including any Special Conditions, and should be read in conjunction with these resources.

Purpose and scope

A good school and college estate supports the education, health and wellbeing of all users. Buildings and outdoor environments shall be healthy and productive, the right size, safe, secure and sustainable. They shall be simple to build, manage and maintain, and be easily adaptable. They shall be energy efficient, climate resilient, robust and long lasting, enhance biodiversity and increase access to and connection with nature.

This Technical Manual outlines the technical performance and functional requirements applicable to the design and construction of school and college buildings and outdoor environments by setting out the DfE's specific additions to statutory requirements or evidence-based best practice. Also see [Legislation, standards and best practice](#) overleaf.

For terms and acronyms reference should be made to [Annex A Glossary of defined terms](#) at the end of this document.

Document structure

The overall structure of this Technical Manual (Sections 1, 2, 3 etc) broadly follows construction sequencing and the structure used by [RICS NRM: New Rules of Measurement 1](#) with DfE-specific additions/variations.

With the exception of 9.1, each sub-section (1.1, 1.2, 2.1 etc) outlines its scope on the opening page and then adheres to the following structure:

- **General requirements** – are applicable to the 'theme' of the sub-section generally including the specific requirements
 - Summary
 - Technical Manual references (cross references to interrelated information contained in other sections of the Technical Manual)
 - Legislation, standards and best practice
 - Minimum life expectancy (shall be met following recommended maintenance regime without failure resulting from defects in design, material, manufacture or workmanship on/off-site)

- Additional sub-headings as applicable to each sub-section setting out further general requirements
- **Specific requirements** – are applicable to the specific elements, components and/or systems listed

Section 9.1 Fire safety, however, follows the structure of The Building Regulations 2010 (as amended) Fire safety: [Approved Document B \(AD B\) Volume 2](#). This gives clarity to navigate DfE's fire safety requirements, to ensure consistency of application and compliance. Also see [Fire performance requirements](#).

In respect of all sections and sub-sections of this Technical Manual where matters are set out as 'Requirements' (whether 'General', 'Specific' or otherwise), the Contractor shall ensure that their designs and Works in relation to all Scheme activity and delivery fully meet those requirements.

References

DfE has used reference to the following where it considers it necessary in order to make its requirements understood:

- (a) trademark, trade name, patent, design or type
- (b) place of origin, or
- (c) producer or supplier

Where any of the matters mentioned in (a) (b) or (c) are referred to, tenders and proposals demonstrating equivalent quality or performance will also be considered.

DfE has only used reference to a particular material or materials where it considers that its performance or functional requirements can only be met using that material or materials. Where the Contractor is able to demonstrate that another material or materials are equivalent and meet DfE's requirement in full, those equivalent materials will be considered.

Legislation, standards and best practice

The design and construction of school and college buildings and outdoor environments shall meet the requirements of this Technical Manual, including any referenced legislation, standards and best practice guidance and therefore must be read in conjunction.

A number of documents and files, in whole or in part, are referenced in this resource. Where a date is referenced, the edition cited applies. Where a date is not referenced the latest edition of the referenced resource, document or file (including any amendments) applies.

Where reference has been made to a British/United Kingdom standard, and that standard adopts an internationally recognised equivalent, that internationally recognised equivalent shall apply. If there is no such internationally recognised equivalent, then DfE will accept evidence that the tender or proposal meets the required standard if DfE

considers (having regard to the purpose in referring to the standard) that it satisfies an equivalent standard from another state, territory or organisation of states or territories. DfE may require certification, or other evidence, for the purpose of satisfying itself that a standard is satisfied or equivalent.

Products and materials shall not be specified that are:

- known at the time of specification to be deleterious to the environment and/or health and safety, or diminish the durability of other structures, finishes, plant and/or machinery
- listed as banned materials by Government departments and agencies including Cabinet Office, DEFRA and Health and Safety Executive
- contain substances that deplete the ozone layer as identified by the United Nations Development Programme

Fire performance requirements

Projects shall be designed and constructed in accordance with the requirements of [9.1 Fire safety](#) of this Technical Manual, except where there is an explicit requirement to follow particular parts of [Approved Document B \(AD B\) Volume 2](#) or BS 9999. The use of BB 100 (2007 version) is no longer required.

The adoption of a fire safety engineered approach following BS 7974 may provide an alternative route to compliance with Part B of The Building Regulations 2010 for more complex building situations. Where this approach is proposed and agreed with the Employer, all fire safety requirements outlined in 9.1 Fire safety of the Technical Manual shall also be met.

Projects using load bearing volumetric and panelised modern methods of construction (MMC) shall also be designed and constructed in accordance with the requirements of [9.2 Fire safety for MMC](#) of this Technical Manual in respect of Requirement B3 (Internal fire spread (structure)) to Schedule 1 of the Building Regulations 2010, and in addition to the requirements of [9.1 Fire safety](#).

[9.2 Fire safety for MMC](#) does not replace the fire performance and functional requirements set out in sub-section [9.1 Fire safety](#) or the requirements of the Building Regulations 2010. It sets out what DfE considers to be the best practice approach to demonstrating fire safety compliance for load bearing volumetric and panelised MMC systems. Alternative approaches to demonstrate compliance for these construction types are permitted provided suitable evidence is presented.

Security requirements

Projects shall identify site specific security requirements following the Security Overlay to the RIBA Plan of Work and

use the DfE risk assessment template located on GOV.UK here: [School and college security](#)

The template, or an existing security risk assessment (where applicable), is the approach to identify, assess and help develop the proportionate response to project specific security risks. The range of measures to be addressed are identified in this resource, the Technical Manual. The measures shall balance and complement the school or college's security management responsibilities reflected in the suite of school or college policies to ensure the health, safety and wellbeing of pupils/students, staff and visitors. The responses to the project specific security risks shall be recorded in the Project Brief.

The security risk assessment shall be updated to reflect the agreed project specific measures and management responsibilities to reduce or mitigate such risks. The school or college's policies shall reflect the balance between maintaining an open and welcoming environment for pupils/students, staff, parents/carers and the wider community and protecting them from harm.

Acoustic performance requirements

Projects shall be designed and constructed in accordance with the requirements of [Building Bulletin 93: Acoustic design of schools: performance standards](#), except where there is a

variation to these requirements against a specific space type in the Schedule of Spaces. Where this occurs, the requirements of the space type shall take precedence. The Institute of Acoustics (IoA) and Association of Noise Consultants' (ANC) [Acoustics of Schools: a design guide](#), which provides guidance for how to achieve the standards in BB 93, shall also be considered.

Healthy and inclusive environments

The design and construction of school and college buildings and outdoor environments shall provide a healthy and inclusive environment. This is to support all users' (pupils/students, staff and visitors) physical and mental health and to ensure people with special education needs and disabilities, including those using mobility equipment, blind people or people with low vision, or deaf people or people with hearing loss, are not disadvantaged.

Whole and Partial Schemes

Reference to Whole School/College Schemes (or projects) and Partial School/College Schemes (or projects) can be found in DfE's General Conditions document. Definitions can be found in [Annex A Glossary of defined terms](#).

Product and material testing

Tests and assessments on the performance of materials, products and structures to demonstrate compliance shall be

carried out by organisations with the necessary expertise e.g., organisations listed as 'approved bodies' in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020, or laboratories accredited by the United Kingdom Accreditation Service (UKAS).

All test data relied upon to demonstrate compliance shall be made available to the Employer or Employer's Representative on request.

0

Environmental design

0.1

Integrated environmental design

This sub-section outlines an integrated and sustainable approach to the design of school/college buildings and their outdoor environments to prioritise the health and wellbeing of users

0.1.1 Strategic aims

DfE is committed to responding to climate change through mitigation and adaptation and reducing carbon emissions, whilst prioritising the health and wellbeing of users.

Schemes shall be designed in accordance with the following environmental principles:

- **Healthy and productive spaces** – provide indoor and outdoor learning environments with good air quality, and thermal, acoustic and visual comfort
- **Reducing emissions** – reduce direct and indirect emissions considering both operational and whole life carbon
- **Nature-based solutions** – implement nature-based solutions that offer educational and health benefits to users, whilst supporting biodiversity and enhancing ecological resilience

0.1.2 Integrated environmental design

The strategic aims shall be met by following the integrated environmental design approach outlined in this section, whilst complying with the spatial requirements of the Pattern Book, the functional and performance requirements within the subsequent sections of this Technical Manual (as applicable), and the project specific requirements outlined in the Project Brief.

Designs and technical solutions will recognise the key climate risks facing UK schools of overheating, flooding and water scarcity by developing integrated solutions that support good education outcomes whilst ensuring projects are adapted to future climate scenarios³.

Designs shall be developed to ensure every element - from the outdoor environment and building envelope, to the internal spatial arrangement and servicing strategy, to the selection of finishes, furniture and equipment - contributes to an optimised, integrated environmental design solution that is comfortable, resilient, inspiring and conducive for learning and wellbeing.

³ Projects shall also redefine the climate action plans for their settings - see [Sustainability leadership and climate action plans in education - GOV.UK](https://www.gov.uk/government/publications/sustainability-leadership-and-climate-action-plans-in-education)

0.1 Integrated environmental design

The Contractor shall take full responsibility for the design and construction of both indoor and outdoor environments and ensure they are fully integrated and connected.

Projects shall recognise the local environmental conditions, natural landscape character and topography of the site, and their designs shall contribute to measurable biodiversity by supporting habitat connectivity, ecological resilience, and the long-term stewardship of natural assets as well as reducing water runoff and supporting flood alleviation on site and off.

Designs shall prioritise the use of natural and green infrastructure as the primary and first principle of tackling environmental design, followed by passive solutions such as orientation and building location, the use of external shading devices and cross ventilation, and high levels of thermal performance and airtightness.

Designs shall incorporate low carbon materials, construction techniques and technologies to minimise embodied, operational and whole life carbon emissions.

The completed project will be low energy, reducing reliance on fossil fuels and supporting the target to reach net zero emissions by 2050.

Renewable energy shall be generated on site, with the embodied carbon associated considered in system selection. Carbon emissions shall be considered holistically and account for the decarbonisation of the national grid.

As part of the design development process, the Contractor shall produce an Integrated Environmental Design Report⁴ to demonstrate how the indoor and outdoor design responds to the site specific climatic, environmental, topographical and ecological conditions, the Project Brief, and the technical requirements outlined in this resource. This process will ensure environmental design strategies are rigorously tested from the outset before being integrated into the final design.

⁴ Using DfE's 'Integrated Environmental Design Report' template.

Healthy and productive spaces

The Contractor's integrated environmental design shall deliver healthy and productive spaces where learners can thrive. This includes ensuring good air quality, natural light (without glare), comfortable temperatures, good acoustics and views out; all promoting mental and physical wellbeing.

0.1.3 Thermal comfort

- Horizontal external shading devices (brise soleil) shall be provided to south, south-east and south-west facing windows (i.e., within 45° of due south) to minimise peak solar gains and reduce the risk of overheating
Note: External shading shall be designed to not inhibit façade cleaning and maintenance, including to ancillaries such as rainwater hoppers
- The selection of external building materials and surfaces shall not contribute to an increased risk of overheating
- Dark coloured materials and synthetic surfaces shall not be situated within 10m of buildings
- The Contractor shall determine the optimum locations for trees and planting to provide shading to the building and outdoor environment. The Contractor shall demonstrate the impact of trees on reducing internal solar gains in their Integrated Environmental Design Report

- Designs shall reduce the risk of overheating and meet the requirements of the Overheating Risk Assessment (ORA) as outlined in [5.6 Ventilation systems and thermal comfort](#)
- The Contractor shall use the CIBSE DSY1, 50th Percentile Low Emission 2080, most appropriate to the location of the School/College building. This weather file is considered representative of a +2°C global warming scenario
- All new buildings shall be able to adapt to overcome overheating when assessed against a CIBSE DSY1 50th Percentile High emission 2080 weather file, without requiring alteration or modification to any of the building elements under [2 Superstructure](#). This weather file is considered representative of a +4°C global warming scenario
- Natural cross ventilation shall be provided to all teaching spaces, seminar rooms, fitness rooms, staff social rooms and sixth form social spaces, utilising the dedicated, enclosed service spines (see DfE's Pattern Book) for stack ventilation. Teaching spaces for music do not require cross ventilation
- Buildings shall be designed to avoid cold draughts as outlined in [5.6 Ventilation systems and thermal comfort](#)

0.1 Integrated environmental design

- All frequently used entrances/exits including the main visitor entrance shall have draught lobbies to minimise heat loss

0.1.4 Air quality

- Air quality assessments shall be carried out for all projects at site selection or feasibility stage
- Designs shall be developed in accordance with the site location and findings from the air quality assessment
- Green infrastructure shall be used to improve local ambient air quality, particularly adjacent to roads
- Buildings shall achieve the ventilation performance standards outlined in [5.6 Ventilation systems and thermal comfort](#)
- To protect occupants' health, all internal finishes and fittings provided shall ensure the levels of VOC (Volatile Organic Compounds) in the air do not exceed 300µg/m³ averaged over 8 hours

0.1.5 Acoustic comfort

- The impact of background noise shall be minimised through site organisation, consideration of building form, and the provision of natural noise attenuating barriers such as trees, landform, hedges and timber/planted acoustic fences

- Spaces shall comply with the standards for indoor ambient noise level, airborne and impact sound insulation, and reverberation time within BB 93⁵ through a holistic design approach to indoor and outdoor spatial adjacencies, material selection and detailing, and choice of ventilation system(s)
- The Contractor shall ensure an inclusive environment for deaf pupils/students, staff and visitors or people with hearing loss, sensory sensitivities and/or speech, language and communication needs

0.1.6 Visual comfort and connectivity

- Climate-based daylight modelling shall be carried out to ensure daylighting is optimised throughout the building(s), with natural light prioritised over electric light as outlined in [5.8 Daylighting and electrical lighting](#)
- The design of the building envelope and passive shading measures, shall address daylighting and glare alongside thermal comfort, air quality and energy
- Designs shall include internal glazed screens as outlined in [2.8 Internal doors and glazed screens](#) to provide internal visual connectivity and facilitate passive supervision from circulation routes and corridors

⁵ Unless varied for a specific internal space type in the Schedule of Spaces.

Reducing emissions

The Contractor's integrated environmental design shall reduce direct and indirect emissions, considering both operational and whole life carbon.

0.1.7 Operational energy and carbon

- Buildings shall:
 - Meet the Energy Use Intensity (EUI) requirements outlined in 0.1.8
 - Be provided with an onsite renewable energy source that generates at least 60% of the overall energy use and provides a minimum annual yield of 45 kWh/m² of the building footprint (this is not GIFA or available roof area)

Note: Where there are local energy export limits in place, the minimum yield requirement can be reduced to avoid generating electricity that will not be used on site and cannot be exported. Proposals shall be agreed with the Employer

Note: The overall energy use does not include out-of-hours consumption, energy use from electric vehicle (EV) charging, and energy use from swimming/hydrotherapy pools and associated pool

changing facilities, as per the EUI requirements outlined in 0.1.8

0.1.8 Energy Use Intensity (EUI)

- Buildings shall achieve or better the maximum Energy Use Intensity (EUI) values shown in Table 1 below
- Note:** These EUI values represent the maximum permissible in-use energy use and do not include the energy generated by onsite renewable sources

Typology	Energy Use Intensity (EUI) ⁶
Primary School	52 kWh/m ² maximum
Secondary School	60 kWh/m ² maximum
College	70 kWh/m ² maximum
Special School / Special College and Alternative Provision (AP)	52 kWh/m ² maximum

Table 1: Energy Use Intensity

- All project EUI figures shall include any energy consumption from systems in set-back or standby mode and from operations outside of occupied hours

⁶ Per m² of GIFA (kWh/m²) excluding unheated (transition) spaces.

that are required to maintain environmental conditions outside of occupied hours e.g., for night purging

- The EUI values in Table 1 are based on the following assumptions:
 - 8 kWh/m² for small power for Primary Schools
 - 10 kWh/m² for small power for Secondary Schools, Special Schools, Special Colleges and Colleges
 - 2 kWh/m² for exterior lighting energy consumption
 - 7 kWh/m² for electrical consumption in catering facilities

Note: The above figure for catering does not include any heating, ventilation and cooling consumption in these catering facilities

- Where the use exceeds these assumptions, the overall EUI limit can be adjusted accordingly
- The EUI requirements do not include:
 - Out-of-hours consumption e.g., the active use of building systems and small power outside of core hours for community use
 - Energy use from electric vehicle (EV) charging points
 - Energy use from swimming/hydrotherapy pools and associated pool changing facilities

Note: Out-of-hours consumption shall be considered as any energy consumption outside the core hours of 07:00 to 17:00, Monday to Friday

- The Contractor shall separately present the anticipated energy consumption from out-of-hours use, EV charging, and pools and associated pool changing facilities (as applicable) for the benefit of the School/College
- The Contractor shall present an energy use breakdown for the following end uses in kWh/m²:
 - Heating
 - Hot water
 - Internal lighting
 - Small power (to include Technology equipment, active infrastructure, CCTV and access control)
 - Catering
 - Fans and pumps
 - Cooling
 - Lifts
 - Exterior lighting
 - Other miscellaneous uses
- As outlined in [5.11 BMS, controls and performance monitoring](#), the Contractor shall develop a metering strategy that allows for the energy consumption for these end uses to be separately measured and reported
- EV charging points, and swimming/hydrotherapy pools and their associated changing facilities shall be separately metered with energy use also reported separately

0.1.9 Operational energy calculations

- An energy model shall be developed to demonstrate compliance with the energy performance requirements
- The energy model shall be developed through the design process to ensure the final energy model is a realistic representation of the final design
- The energy modelling calculations shall clearly outline all energy use, including any anticipated out-of-hours and community use
- The modelling process, including inputs and outputs, shall be clearly outlined in the Integrated Environmental Design Report
- Dynamic simulation models (DSM) shall be used for the energy model in accordance with CIBSE TM54
- The nearest or most appropriate CIBSE Test Reference Year (TRY) 2020 high weather file shall be used
- Renewable energy calculations shall be provided which:
 - Quantify the % of energy use by grid import and renewable generation
 - Quantify the % of renewable energy exported to the grid

0.1.10 Embodied carbon

- Buildings shall meet the A1-A5 embodied carbon requirement of 550 kgCO₂e/m² GIFA⁷, excluding foundations below 1m from finished floor level as set out in Table 2, and prioritise a lean design approach
- Embodied carbon reporting shall include all site and building elements and be reported against the targets for key elements as set out in the table
- Embodied carbon calculations/reporting shall reference RICS allowances for uncertainty at the relevant project stage as set out the RICS Professional statement
- Where projects meet DfE's requirements and the UK Net Zero Carbon Buildings Standard (UKNZCBS) then submission and certification to the standard is recommended
- Designs shall use natural materials to create a healthy learning environment, targeting biogenic carbon of -20kgCO₂e/m² from sequestration
- New buildings shall target 10% of materials (by mass) to be from post-consumer recycled sources and report on progress against this target
- Design and construction shall allow for 70% of materials (by mass) to be reused or recycled after the end of their lifespan/use

⁷ It is likely the A1-A5 embodied carbon requirements will be incrementally updated with reference to the UKNZCBS as follows: 470 kgCO₂e/m² GIFA by 2028 and 400 kgCO₂e/m² GIFA by 2030 and may include foundations in the calculations.

0.1 Integrated environmental design

- The Contractor shall minimise the volume of construction waste via considered design and efficient construction practices
- Composite products or materials which are difficult to remove, separate, recycle or reuse shall be avoided
- Construction relying on adhesives that do not allow deconstruction shall also be avoided
- The Contractor shall prepare maintenance information including details of how to replace building components as complete elements (e.g., window systems) and methods for maintaining fabric performance

0.1 Integrated environmental design

RICS NRM Group Element	Requirements (figures in kgCO ₂ e/m ² GIFA)	Expected proportion of embodied carbon
0.1-0.4 Facilitating works	Report only, excluded from target	n/a
1 Substructure	Included in target - note foundations 1m below finished floor level (FFL) reported but excluded from target	Included in 60% figure below
2.1-2.4 Frame, upper floors, roof and stairs and ramps	Included in target - elements including slab to target 350 kgCO₂e/m²	60%
2.5-2.6 External walls, external windows and doors	Included in target	15%
2.7-3.3 Internal partitions, internal doors and internal finishes	Included in target	10%
4.1 FF&E	Report only, excluded from target	n/a
5.1-5.14 Services (MEP)	Photovoltaic panels included in target	15%
6 Prefabricated buildings	Report only, excluded from target except where used to form targeted elements	n/a
7-8 Works to existing buildings and external works	Report only, excluded from target	n/a
Total (excluding sequestration)	550 kgCO₂e/m² GIFA (based on 95% of cost plan elements)	n/a
Biogenic carbon (sequestration)	Report only, target minimum -20 kgCO₂e/m²	n/a

Table 2: Embodied carbon requirements for new buildings

0.1.11 Whole life carbon

- The Contractor shall report on whole life carbon (WLC) in accordance with BS EN 15978 and the RICS Professional statement. Reporting shall be at the RIBA stages listed in Table 3, with reporting aligned to the methodologies outlined by the UK Green Building Council (UKGBC) and UKNZCBS
- Calculations shall report on 95% of cost plan elements and be supported by product-specific Environmental Performance Declarations (EPDs) – see minimum requirements at each RIBA stage in Table 3
- WLC represents the total greenhouse gas emissions associated with a building over its entire lifecycle, assessed over a standard 60-year reference period
- WLC shall be reported against the lifecycle A-C (Production to End of Building Life), and D (Circularity, beyond building life), and include evidence to show where up-front carbon (A1-A5) has been reduced to improve whole life carbon outcomes as referenced in the current version of the RICS Professional statement
- Whole life carbon and lifecycle cost analysis shall be used to inform product, material and finish selection
- Recycled content, recycling potential, global warming potential (GWP) and designing for deconstruction shall be assessed and reported via the Integrated Environmental Design Report

RIBA Stage	Whole life carbon (A-C, D)	Embodied carbon A1-A5 (kgCO ₂ e/m ²)	Minimum proportion of EPDs in measurement (by mass)
Stage 3	Report only	Report and meet targets	50%
Stage 4	Report only	Report and meet targets	75%
Stage 6	Report only	Report and meet targets	85%

Table 3: Carbon reporting requirements

Nature-based solutions

The Contractor's integrated environmental design shall prioritise nature-based solutions. This shall be achieved by implementing nature-based solutions that offer educational and health benefits to users, whilst supporting biodiversity and enhancing ecological resilience.

0.1.12 Direct access to nature

- Access to nature shall be universal, equitable and inclusive for all learners, and achieved through a diverse range of natural spaces located in the Entrance Landscape, Courtyard Gardens and Playscape to facilitate daily play, intrigue and imagination
- Where possible, natural materials shall be used to provide variable textures and sensory experiences
- Direct access to nature will be demonstrated through the landscape strategy and compliance determined by achieving 0.35 (minimum) Urban Greening Factor (UGF) (Natural England) and Biodiversity Net Gain (BNG) to meet the higher of national planning policy (10%) or local planning authority requirements (if different)
- All UGF and BNG obligations shall be delivered within the project's development boundary
Note: The delivery of BNG outside of the project boundary (i.e., offsite) will not be permitted unless the

statutory obligation is provided at an alternative, local education setting and only when expressly agreed with the Employer

- The Contractor shall work with the School/College to establish a Green Waste Management Plan to promote low carbon operations and the near elimination of biodegradable municipal waste to landfill. This will be supplemented with a separate storage area for the composting of green waste for use on site to improve soil health and contribute to a thriving ecosystem

0.1.13 Visual connections to nature

- Nature and natural systems (e.g., planting and nature-based SuDS) are to be situated near to buildings, and aligned with windows, viewpoints and entrances/exits
- Visual and other sensory connections to natural spaces and natural elements shall be provided to enhance wellbeing

0.1.14 Climate resilience

- Projects shall enhance climate resilience to overheating, flooding and water scarcity through nature-based solutions by demonstrating an increase of 0.25 to 2.5 points (out of 10) at 30 years for the

0.1 Integrated environmental design

following Natural England ecosystem targets⁸: Flood Regulation, Water Quality, Cooling and Shading, Air Quality Regulation, Carbon Storage, Interaction with Nature, Sense of Place, and Education

- A minimum of 20% of the total proposed tree canopy coverage, based on projected mature size, shall be in each of the following character areas: Courtyard Garden, Entrance Landscape (40% in Special Schools) and Playscape. Trees, willow structures and planting beds shall be located to maximise shade to buildings and adjacent outdoor places, lowering ambient temperatures
- The Contractor shall assess current and future flood risks to both buildings and the outdoor environment to inform the development of a site-wide drainage strategy in accordance with [5.2.9 Surface water system](#) and [8.7 External drainage \(nature-based SuDS\)](#), which shall prioritise nature-based sustainable drainage solutions

0.1.15 Formal and informal learning opportunities

- Daily access to nature with formal and informal learning opportunities shall be provided to promote climate education and knowledge of natural habitats. This shall include tree identification labels for all new trees and

interpretive signage for new nature habitats

Note: These interventions will support the [National Education Nature Park](#) empowering children and young people to build a connection to nature through discovery and learning

⁸ Using the Environmental Benefits from Nature Tool.

1 Substructure

1.1

Foundations and substructure

This sub-section outlines the performance and functional requirements of primary structure forming foundations or below ground structures for buildings, including earth-retaining structures that are integral to the building structural frame and in boundary situations. For landscaping structures independent of buildings, see [8.8 Structures in the landscape](#)

General requirements

1.1.1 Summary

- **Purpose:** Foundations and substructure/structures below ground transfer vertical and lateral building forces into the ground without causing unexpected movement or damage; whilst ensuring stability to the superstructure, surrounding ground and environment, and any adjacent structures
- **Performance:**
 - Load transfer: Capable of transferring the design forces and surcharges for all permanent and temporary conditions acting on structures to competent ground
 - Ground conditions: To be determined by ground investigation by a qualified geotechnical engineer
 - Installation: Construction methods, materials and equipment to minimise impact on surrounding ground and structures and support vertical and lateral loadings from works during all construction stages
 - Coordination: Clashes between substructure, buried services and existing construction shall be minimised by below ground coordination, construction methodology and protection measures
- Trees: Structural arrangements and construction methods shall avoid impact on retained trees and root protection areas
- Flood resilience: Design shall account for assessed site specific flood risk and agreed Site Drainage Schematic
- Drainage: All systems shall be accessible for maintenance and cleaning/clearing, including Type C waterproofing protection where applied

1.1.2 Technical Manual references

- **Sustainable design:** See [0.1 Integrated environmental design](#)
- **Ground floor structures:** See [1.2 Lowest floor construction](#)
- **Superstructure:** See [2.1 Structural frames](#)
- **Ties and fixings to foundations:** See [2.1 Structural frames](#)
- **Services and external drainage:** See [5 Services](#) and [8.7 External drainage \(nature-based SuDS\)](#)
- **Site preparation and remediation:** See [8.2 Topsoil, subsoil and ameliorants](#) and DfE's General Conditions
- **Trees:** See [8.3 Soft landscape](#)

- **Walls and structures in the landscape:** See [8.4 Boundary treatments, walls and fencing](#) and [8.8 Structures in the landscape](#)

1.1.3 Legislation, standards and best practice

- **Legal requirements:**
 - Building Regulations [Part A](#), [Part C](#) and [Regulation 7](#)
- **Statutory guidance:**
 - Foundations and substructure to comply with [AD A](#), [AD C](#) and [AD 7](#)
 - Earth retaining structures to comply with local planning and highways authority requirements
- **Standards:**
 - Foundations and substructure: To relevant BS EN standards, National Annexes and Non-Contradictory Complementary Information (NCCI)
 - Robustness: To BS EN 1991-1-7
 - Risks of external groundwater, surface/flood water, soil gases and contaminant ingress shall be prevented in accordance with BS 8102
- **Guidance:**
 - [Institution of Civil Engineers \(ICE\) Specification for Piling and Embedded Retaining Walls \(SPERWall\)](#)
 - [National Structural Concrete Specification \(NSCS\)](#)
 - [National Structural Steelwork Specification \(NSSS\)](#)
 - [NHBC Standards 2025: Part 4.2 Building near trees](#)

- [The Institution of Structural Engineers \(IStructE\) Standard method of detailing structural concrete](#)
- [IStructE Eurocode Manuals Volumes 1 to 7](#)
- Building Research Establishment (BRE) guidance including, but not limited to: [BR211 Radon: Guidance on protective measures for new buildings \(BRE\)](#) and [Special Digest SD3: HAC concrete in the UK](#)
- Construction Industry Research and Information Association (CIRIA) guidance including, but not limited to: [C760 - Guidance on embedded retaining wall design](#)

1.1.4 Minimum life expectancy

- **Foundation and substructure:** 50 years to meet design service life requirements within BS EN 1990 or higher if required by local authority approvals

1.1.5 Prohibited materials

- **Timber load bearing elements:** At or below ground level

1.1.6 Durability

- **Standard:**
 - To comply with all applicable BS EN standards for design and materials

- All substructure elements shall be designed with protection measures appropriate to the site specific ground conditions and groundwater levels to achieve the specified design life/minimum life expectancy
- **Below ground structure:** Ensure fixings and structure below ground level are assessed and protected against environmental effects for the intended lifespan of the building without maintenance

1.1.7 Material specification

- **Concrete:**
 - [National Structural Concrete Specification \(NSCS\)](#)
 - [Institution of Civil Engineers \(ICE\) Specification for Piling and Embedded Retaining Walls \(SPERWall\)](#)
- **Steelwork:**
 - [National Structural Steelwork Specification \(NSSS\)](#)
 - [Institution of Civil Engineers \(ICE\) Specification for Piling and Embedded Retaining Walls \(SPERWall\)](#)
- **Masonry:**
 - To designer's requirements in accordance with BS EN 1996 series
- **Timber:**
 - To designer's requirements in accordance with BS EN 1995 series

1.1.8 Movement and tolerances

- **Requirements:** To BS EN 1997 series
- **Guidance:** [Institution of Civil Engineers \(ICE\) Specification for Piling and Embedded Retaining Walls \(SPERWall\)](#)
- **Construction tolerances:** Allow sufficient tolerance in details to ensure there is no unintended movement or impact on internal space dimensions or performance of the structure or associated waterproofing, in part or as a whole

1.1.9 Robustness

- **Requirements:** To BS EN 1991-1-7
- **Ties and fixings:** All structures must be tied from foundations to roof level – see [2.1 Structural frames](#)

1.1.10 Thermal

- **U-value:** Where there are occupied spaces adjacent to substructure elements (e.g., basements), walls shall not exceed a U-value of 0.15W/m²K and may need to be bettered as part of a fabric first approach to meet DfE's energy performance requirements
- **Airtightness (at 50 Pa):** A maximum of 3 m³/h.m² for the building as a whole or lower as required to meet DfE's energy performance requirements

- **Continuity:** Thermal insulation shall be free from damage, and breaks in thermal continuity and integrity
- **Thermal bridges:** To be designed out where practical. Where not practical, their impact on heat loss shall be calculated in accordance with BR 443, BR 497 and BRE IP1/06, or calculated in accordance with BS EN ISO 10211, and provided to the Employer
- **Interstitial condensation/dewpoint:** Calculations in accordance with BS EN ISO 13788 or BS EN 15026 to be produced for all scenarios with any condensation risk fully mitigated

1.1.11 Resistance to moisture (waterproofing)

- **Extent:** To all earth retaining structures that are integral to the building structural frame and structures that serve as the primary barrier between the building interior and external contaminants, ground gases and groundwater
- **Standard:** To BS 8102
- **Design:** Two layers of defence/protection by a waterproofing specialist or Certificated Surveyor in Structural Waterproofing (CSSW)
- **Performance:** Grade 3 to BS 8102
- **Waterproofing protection:** Combined protection of two of the following: Type A Barrier Protection (e.g., tanking); Type B Structurally Integral Protection (e.g.,

waterproof concrete); Type C Drained Protection (e.g., cavity drainage)

- **Groundwater level:** To BS 8102 and BS EN 1997
- **Joints:**
 - Watertight: To prevent water ingress and achieve the required performance grade
 - Movement: Waterproofing system to allow for expected structural movement and tolerances

1.1.12 Resistance to contaminants (ground gases and radon)

- **Requirements:** To AD C, BS 8485 and BS EN 1997
- **Guidance:** [BR211 Radon: Guidance on protective measures for new buildings \(BRE\)](#)
- **Protection measures:** Detailing and material specification appropriate to the site specific ground conditions as determined by a thorough ground investigation and risk assessment carried out by a qualified geotechnical engineer

1.1.13 Design and execution

- **Design:**
 - Structure: To be certified by a chartered engineer registered with a recognised industry body (e.g., ICE or IStructE)

1.1 Foundations and substructure

- Waterproofing: To be provided by a waterproofing specialist or Certificated Surveyor in Structural Waterproofing (CSSW)
- **Execution class:** To BS EN 1990
- **Certification:** To confirm design has been carried out in accordance with Building Regulations and relevant BS EN standards and National Annexes
- **Waterproofing protection:** Product manufacturer to test and demonstrate performance in accordance with their relevant Code of Practice, BS EN standard, BBA Certification or Agrément Certification etc
- **Workmanship:**
 - Structure: To achieve movement and tolerance requirements
 - Waterproofing: To be carried out by a certified installer in accordance with manufacturer's requirements

1.2

Lowest floor construction

This sub-section outlines the performance and functional requirements for lowest floor construction, either ground bearing or suspended, forming part of the primary structure and interfacing with the ground. For floor finishes, see [3.2 Floor finishes](#)

General requirements

1.2.1 Summary

- **Purpose:**
 - Lowest floor construction transfers vertical and lateral building forces to substructure and supporting ground whilst ensuring structures remain stable and without causing unexpected damage to the superstructure
 - Lowest floor construction also serves as a barrier between the interior of a building and any external ground contaminants, ground gases and groundwater
- **Performance:**
 - Load transfer: Capable of transferring the design forces of the superstructure to substructure and competent ground
 - Ground conditions: To be determined by ground investigation by a qualified geotechnical engineer
 - Installation: Construction methods, materials and equipment to minimise impact on surrounding ground and structures and support vertical and lateral loadings from works during all construction stages
 - Coordination: Clashes between lowest floor structure and buried services to be minimised by below ground coordination, construction methodology and protection measures
- Maintenance: Lowest floor structures to require no maintenance
- Drainage: All systems shall be accessible for maintenance and cleaning/clearing, including to sub-floor voids
- Finishes: Lowest floor structures shall be recessed where covered with thicker floor finishes, such as sprung flooring in activity studios and sports halls, to create a level/flush floor finish throughout. Ramped internal thresholds are not acceptable in new buildings

1.2.2 Technical Manual references

- **Sustainable design:** See [0.1 Integrated environmental design](#)
- **Foundations and substructure:** See [1.1 Foundations and substructure](#)
- **Superstructure:** See [2.1 Structural frames](#)
- **Ties and fixings to foundations:** See [2.1 Structural frames](#)
- **Ground floor perimeter wall:** See [2.5 External walls](#)

1.2 Lowest floor construction

- **Services and external drainage:** See [5 Services](#) and [8.7 External drainage \(nature-based SuDS\)](#)
- **Walls and structures in the landscape:** See [8.4 Boundary treatments, walls and fencing](#) and [8.8 Structures in the landscape](#)
- **Site preparation and remediation:** See [8.2 Topsoil, subsoil and ameliorants](#) and DfE's General Conditions
- **Trees:** See [8.3 Soft landscape](#)
- **Structural fire resistance:** See [9 Fire Safety](#)

1.2.3 Legislation, standards and best practice

- **Legal requirements:**
 - Building Regulations [Part A](#), [Part B](#), [Part C](#) and [Regulation 7](#)
- **Statutory guidance:**
 - Lowest floor construction to comply with [AD A](#), [AD B](#), [AD C](#) and [AD 7](#)
- **Standards:**
 - Lowest floor construction and ground floor structures: To relevant BS EN standards, National Annexes and Non-Contradictory Complementary Information (NCCI)
 - Robustness: To BS EN 1991-1-7
- **Guidance:**
 - [National Structural Concrete Specification \(NSCS\)](#)
 - [National Structural Steelwork Specification \(NSSS\)](#)

- [The Institution of Structural Engineers \(IStructE\) Standard method of detailing structural concrete](#)
- [IStructE Structural robustness and disproportionate collapse in buildings](#)
- [IStructE Appraisal of existing structures](#)
- [IStructE Eurocode Manuals Volumes 1 to 7](#)
- Building Research Establishment (BRE) guidance including, but not limited to: [BR211 Radon: Guidance on protective measures for new buildings \(BRE\)](#) and [Special Digest SD3: HAC concrete in the UK](#)
- Construction Industry Research and Information Association (CIRIA) guidance including, but not limited to: [C760 - Guidance on embedded retaining wall design](#)
- The Steel Construction Institute (SCI) publications and technical guidance
- The Concrete Centre publications and technical guidance for concrete materials, design and construction

1.2.4 Minimum life expectancy

- **Lowest floor construction:** 50 years to meet design service life requirements within BS EN 1990 or higher if required by local authority approvals

1.2.5 Prohibited materials

- **Timber load bearing elements including suspended timber floor construction:** At or below ground level

1.2.6 Durability

- **Standard:**
 - To comply with all applicable BS EN standards for design and materials
 - All ground/lowest floor structures shall be designed with protection measures appropriate to the site specific environmental and ground conditions to achieve the specified design life/minimum life expectancy
- **Below ground structure:** Ensure fixings and structure below ground level are assessed and protected against environmental effects for the intended lifespan of the building without maintenance
- **Base of external cladding systems to walls (including curtain walling) below damp-proof course (DPC):** Where an external wall cladding system is proposed at ground level (see [2.5.15 Cladding systems](#)) the base of the cladding shall not be lower than DPC level (see [1.2.10 Resistance to moisture](#) for minimum height of DPC). Beneath the DPC shall sit an exposed fair faced masonry or concrete kerb extending to below external ground level. Where concrete is

used, it shall have a 'plain finish' in accordance with the National Structural Concrete Specification (NSCS)

- **Base of backing wall below damp-proof course (DPC):** Where an internal backing wall is proposed to support an outer leaf of masonry or an external cladding system at ground level (see [2.5.16 Backing walls to masonry and cladding systems](#)), the base of the backing wall shall not be lower than DPC level (see [1.2.10 Resistance to moisture](#) below). Beneath the DPC shall sit a concrete kerb. Where left exposed (e.g., with exposed Cross Laminated Timber (CLT)), it shall have a 'plain finish' in accordance with the National Structural Concrete Specification (NSCS)

1.2.7 Material specification

- **Concrete:**
 - [National Structural Concrete Specification \(NSCS\)](#)
 - For special finishes to exposed concrete floors – see [3.2.16 Polished concrete](#)
- **Steelwork:**
 - [National Structural Steelwork Specification \(NSSS\)](#)
- **Masonry:**
 - To designer's requirements in accordance with BS EN 1996

1.2 Lowest floor construction

- **Timber:**
 - To designer's requirements in accordance with BS EN 1995

1.2.8 Movement and tolerances

- **Requirements:** To BS EN 1990 and BS EN 1997
- **Deflections and vibration:** Design shall adopt limits to avoid audible and physical discomfort to building users and damage to structures and building elements

1.2.9 Thermal

- **U-value:** Ground floor build-ups shall not exceed a U-value of $0.12\text{W/m}^2\text{K}$ and may need to be bettered as part of a fabric first approach to meet DfE's energy performance requirements
- **Airtightness (at 50 Pa):** A maximum of $3\text{ m}^3/\text{h.m}^2$ for the building as a whole or lower as required to meet DfE's energy performance requirements
- **Continuity:** Thermal insulation shall be free from damage, and breaks in thermal continuity and integrity
- **Thermal bridges:** To be designed out where practical. Where not practical, their impact on heat loss shall be calculated in accordance with BR 443, BR 497 and BRE IP1/06, or calculated in accordance with BS EN ISO 10211, and provided to the Employer
- **Interstitial condensation/dewpoint:** Calculations in accordance with BS EN ISO 13788 or BS EN 15026 to

be produced for all scenarios with any condensation risk fully mitigated

1.2.10 Resistance to moisture

- **Requirements:** To AD C, detailing and material specification shall prevent the ingress of ground and surface water, and as requirements below
- **Ground below suspended floors:** Exposed ground shall be finished with a surface treatment of over-site concrete to a minimum depth of 100mm thickness and treated to prevent ingress of water. See [5.2.7 Below ground drainage](#) for requirements for sites sloping towards the building
- **Damp-proof course (DPC) and damp-proof membrane (DPM):**
 - The wall DPC shall be continuous with the floor DPM
 - The DPC in the outer face of the wall shall be positioned at a minimum of 150mm above adjacent internal finished floor level or external ground level, whichever is higher, to prevent the penetration of ground moisture
 - In a masonry cavity wall construction, the DPC to the inner masonry leaf shall be no lower than the DPC to the outer masonry leaf
 - In a cladding system with backing wall, including the use of Structural Insulated Panels (SIPs) or

1.2 Lowest floor construction

Cross Laminated Timber (CLT) to the inner leaf, the DPC shall sit on the outer and inner kerbs in accordance with [1.2.6 Durability](#) above, as well as [2.5.15 Cladding systems](#) and [2.5.16 Backing walls to masonry and cladding systems](#)

- Level thresholds shall be damp proofed at main fabric junctions

- Cavity voids and sub-floor voids shall be linked/detailed to provide continuous airpaths and cross-ventilation
- Designed to prevent the deposit of debris into cavity voids and sub-floor voids i.e., no maintenance shall be required to cavity voids and sub-floor voids

1.2.11 Resistance to contaminants (ground gases and radon)

- **Requirements:** To AD C, BS 8485 and BS EN 1997
- **Guidance:** [BR211 Radon: Guidance on protective measures for new buildings \(BRE\)](#)
- **Protection measures:** Detailing and material specification appropriate to the site specific ground conditions as determined by a thorough ground investigation and risk assessment carried out by a qualified geotechnical engineer

1.2.12 Ventilation

- **Requirements:**
 - To AD C to provide adequate ventilation to concealed voids and suspended ground floors of all types of construction (e.g., light steel framing, concrete) to limit the risk of condensation developing

2

Superstructure

2.1

Structural frames

This sub-section outlines the performance and functional requirements for the primary structure forming the building frame, including structural walls, beams and columns, upper floor construction and roof structures. Any buildings or structures that are required to be designed to Part A of the Building Regulations shall meet the requirements of this sub-section

General requirements

2.1.1 Summary

- **Purpose:** Structural frames transfer vertical and lateral building forces by designed load paths to support structures and substructure whilst ensuring structures remain stable and without causing unexpected damage
- **Performance:**
 - Load transfer: Capable of transferring the design actions to robust supporting structures and substructures
 - Installation: Construction methods, materials and equipment to minimise impact on surrounding ground and structures and support vertical and lateral loadings from works during all construction stages
 - Coordination: Detailing to allow for expected movement of structural frame(s) and construction tolerances. Structure and details for support elements and building fabric to be coordinated to avoid clashes
 - Spatial: Ensure internal spaces including circulation but excluding the service spine, as required in DfE's Pattern Book, are free from piers and columns. Building services shall be fully coordinated with structure to provide 'open' and

'clear' height requirements (as outlined in the Schedules of Spaces)

- Finishes: Upper floor structures shall be recessed where covered with thicker floor finishes, such as sprung flooring in activity studios, to create a level/flush floor finish throughout. Ramped internal thresholds are not acceptable in new buildings

2.1.2 Technical Manual references

- **Sustainable design:** See [0.1 Integrated environmental design](#)
- **Foundations and substructure:** See [1.1 Foundations and substructure](#)
- **Ground floor structures including U-values:** See [1.2 Lowest floor construction](#)
- **Roof build-ups including U-values:** See [2.3 Roofs](#)
- **Non load bearing structure:** See [2.5 External walls](#) and [2.7 Internal walls and partitions](#)
- **Services and external drainage:** See [5 Services](#) and [8.7 External drainage \(nature-based SuDS\)](#)
- **Site preparation and remediation:** See [8.2 Topsoil, subsoil and ameliorants](#) and DfE's General Conditions
- **Trees:** See [8.3 Soft landscape](#)

- **Walls and structures in the landscape:** See [8.4 Boundary treatments, walls and fencing](#) and [8.8 Structures in the landscape](#)
- **Structural fire resistance:** See [9 Fire safety](#)

2.1.3 Legislation, standards and best practice

- **Legal requirements:**
 - Building Regulations [Part A](#), [Part C](#) and [Regulation 7](#)
- **Statutory guidance:**
 - Structural frames to comply with [AD A](#), [AD C](#) and [AD 7](#)
- **Standards:**
 - Structural frames, upper floor construction, roof structures and external structures: To relevant BS EN standards, National Annexes and Non-Contradictory Complementary Information (NCCI)
 - Robustness: To BS EN 1991-1-7
- **Guidance:**
 - [National Structural Concrete Specification \(NSCS\)](#)
 - [National Structural Steelwork Specification \(NSSS\)](#)
 - [The Institution of Structural Engineers \(IStructE\) Standard method of detailing structural concrete](#)
 - [IStructE Structural robustness and disproportionate collapse in buildings](#)
 - [IStructE Appraisal of existing structures](#)
 - [IStructE Eurocode Manuals Volumes 1 to 7](#)

- Building Research Establishment (BRE) guidance including, but not limited to: [Special Digest SD3: HAC concrete in the UK](#)
- Construction Industry Research and Information Association (CIRIA) guidance including, but not limited to: [C766 – Control of cracking by restrained deformation in concrete](#)
- The Steel Construction Institute (SCI) publications and technical guidance
- The Concrete Centre publications and technical guidance for concrete materials, design and construction

2.1.4 Minimum life expectancy

- **Structure:** 50 years to meet the design service life requirements within BS EN 1990 or higher if required by local authority approvals

2.1.5 Durability

- **Standard:**
 - To comply with all applicable BS EN standards for design and materials
 - All structure shall be designed with protection measures appropriate for the given material, exposure and environmental conditions to achieve the specified design life/minimum life expectancy

- **Exposure conditions:** Ensure fixings and structure are assessed and protected against environmental and chemical effects for the intended lifespan of the building without maintenance
- **For existing structures:** See [2.1.14 Refurbished structures](#)

2.1.6 Material specification

- **Concrete:**
 - [National Structural Concrete Specification \(NSCS\)](#)
- **Steelwork:**
 - [National Structural Steelwork Specification \(NSSS\)](#)
- **Masonry:**
 - To designer's requirements in accordance with BS EN 1996
- **Timber:**
 - To designer's requirements in accordance with BS EN 1995

2.1.7 Movement and tolerances

- **Requirements:** To comply with acceptable limits of relevant BS EN design and material standards
- **Deflections and vibration:** Design shall adopt limits to avoid discomfort to building users and damage to structures and building elements

- **Construction tolerances:** Allow sufficient tolerance in details to ensure there is no unintended movement or impact on the performance of the structure, in part or as a whole

2.1.8 Robustness

- **Standard:** Design and detailing to comply with BS EN 1991-1-7 requirements for robustness and to prevent disproportionate collapse over the specified design life
- **Ties and fixings:** All structures must be tied from foundations to roof level and shall have a method of connecting to the substructure
- **Restraints to masonry:** To ensure safety and stability of masonry elements and be coordinated with allowances in detailing for movement
- **For existing structures:** See [2.1.14 Refurbished structures](#)

2.1.9 Thermal

- **Thermal breaks to structure:** Thermal bridges within structural elements to be designed out. Thermal breaks shall be provided between structural elements projecting into or out of a building as part of a fabric first approach to meet DfE's energy performance requirements and positioned without risk of interstitial condensation

2.1.10 Vibration and sound transmission

- **Upper floor construction:** Design to minimise structure borne vibration and airborne sound transmission to occupied rooms e.g., from upper floor D&T/practical workshop spaces, sports halls, dance studios and building services equipment
- **Acoustic performance:** All upper floors shall comply with [Building Bulletin 93: Acoustic design of schools: performance standards](#) to identify flanking paths and provide appropriate acoustic isolation
- **Dynamic deflection:** All floors limited to a minimum fundamental natural frequency of 5Hz or the floor structure shall be justified by other means (e.g., response factors or analysis as described in The Steel Construction Institute publication [P354 - Design of Floors for Vibration: A New Approach](#))

2.1.11 Design and execution

- **Design:** To be certified by a chartered engineer registered with a recognised industry body (e.g., ICE or IStructE)
- **Execution class:** To BS EN 1990
- **Certification:** To confirm design has been carried out in accordance with Building Regulations and relevant BS EN standards and National Annexes

- **Testing:** All testing relied upon shall be carried out by a UKAS accredited body and made available to the Employer
- **Specialist and proprietary installations:**
 - Installation: To product manufacturer's requirements
 - Performance: To be certified by UK Conformity Assessed (UKCA) marking, European Technical Assessment (ETA), BBA Agrément Certificate or other approved independent technical assessment authorities

Specific requirements

2.1.12 Timber structures

- **Standards:** To comply with BS EN 1995 and relevant BS EN materials standards for timber properties, strength, grading, treatment and durability
- **Durability and protection:**
 - Timber to be kept dry for use in internal spaces and concealed building elements
 - The minimum angle from horizontal for CLT panels used as roof structure shall be 10°
 - Treatment, finishes and coatings including to fixings, bolts and connectors to ensure the minimum specified life expectancy of the building element is achieved
- **Materials:** Condition to ensure required strength grade is achieved
- **Glues and epoxies:** Installed as per manufacturer's recommendations to achieve performance requirements for the specified minimum life expectancy

2.1.13 Modern Methods of Construction (MMC)

- **Definition:** For the purposes of this section Modern Methods of Construction (MMC) are defined as Category 1 and 2 of [Modern Methods of Construction working group: developing a definition framework](#)

- **Standards:** To comply with Building Regulations AD A, AD C and Regulation 7
- **Guidance:**
 - [IStructE Structural robustness and disproportionate collapse in buildings](#)
 - [International Code Council and Modular Building Institute \(2021\) ICC/MBI 1200-2021 - Standard for Off-site Construction: Planning, Design, Fabrication, and Assembly](#)
- **Testing:** Provide to demonstrate compliance with Building Regulations
- **Load transfer:** Structures, component parts and connections shall be capable of transferring design forces to substructures and site-built elements to the performance requirements of a fully assembled building
- **Durability:**
 - Protection measures for structures and components to be appropriate for exposure conditions, to avoid the trapping of moisture/moisture damage during storage, transportation and installation

2.1 Structural frames

- Subfloor and concealed steelwork: Avoid damage and apply protection measures for the specified design life
- **Robustness:**
 - Foundation level: All structures shall have a method of connecting to the substructure. Details shall account for provision of protection measures interfacing with the ground for resistance to moisture and contaminants
 - All elements contributing to the stability system shall have positive fixings to the substructure at each end for resistance to uplift and sliding actions
 - Adverse effects from the notional removal of a load bearing wall panel, pairs or clusters of elements such as structural steel columns, or loss of whole off-site elements (e.g. full module loss of a volumetric unit) to be avoided
- **Installation:** Construction methods shall allow for inspection and verification of critical elements and fixings, and avoid damage to elements that will adversely affect the performance of the completed building
- **Coordination:** Design of all structural components (e.g., foundations, MMC and site-built elements, specialist secondary structures including canopies, lift shafts etc) shall be coordinated by the project structural engineer

- **Quality assurance:** Records to be maintained to demonstrate the installation and verification of designed structures and fixings
- **Maintenance:** Ensure structural elements and services are accessible and maintainable without compromising the performance of structures and building elements as required for the specified design life

2.1.14 Refurbished structures

- **Standards:** Existing structural frames and load bearing structure shall be capable of transferring the design actions of current BS EN standards to robust supporting structures and substructures
- **Guidance:**
 - [IStructE Appraisal of existing structures](#)
 - [IStructE Assessing higher-risk buildings under the Building Safety Act: a compendium of structural typologies](#)
- **Design:**
 - To include a structural appraisal of the condition of the existing structural frame and building elements to ensure frame and elements are capable of transferring design actions
 - Alterations, repairs and interventions shall be compatible with, and not adversely affect, existing building elements

2.1 Structural frames

- **Testing:** Provide to verify uncertainties in existing building condition and capacities and to demonstrate compliance with Building Regulations
- **Durability:** Existing structures and fixings shall be assessed for protection measures appropriate to the level of exposure and expected environmental conditions
- **Robustness:** A project specific risk assessment of existing ties and restraints shall be completed to ensure the safety and stability of retained elements

2.2

Upper floors

Not used – see [1.2 Lowest floor construction](#) and [2.1 Structural frames](#)

2.3

Roofs

This sub-section outlines the performance and functional requirements for roof build-ups above primary structure and structural decks. For canopies and shelters, living structures, and storage facilities for outdoor equipment and waste, see [8.8 Structures in the landscape](#)

General requirements

2.3.1 Summary

- **Purpose:**
 - Roofs include all coverings, material build-ups, fixings and any secondary structure necessary to meet the required performance on supporting, load bearing primary structure and structural decks
 - Roofs shall efficiently discharge rainwater from the roof area to minimise the risk of water ingress and damage, and slow the flow of surface water runoff via a sustainable drainage system outside of the building footprint to futureproof for a changing climate
- **Performance:**
 - Structure: To transfer design loads to support structures whilst ensuring structures remain stable and without causing unexpected damage. This includes wind loads and additional loads from rooftop enclosures, roof mounted plant and equipment (e.g., PV panels), extensive green roofs and/or ballast, and rainwater retained within extensive green roofs/ballasted areas during high levels of precipitation and saturation
 - Weathertight: To satisfactorily resist the passage of moisture due to rain and snow to the inside of the building, and to materials which might be adversely affected by such moisture
 - Thermal: See [2.3.5 Thermal](#)
 - Fire: See [2.3.8 Fire performance](#)
 - Surface water drainage from roofs: See [2.3.17 Rainwater drainage from roofs](#)
 - Materials: Corrosion resistance and protection of steel structures to BS EN ISO 12944 series
 - Lightning protection: Class of lightning protection to be determined by risk assessment in accordance with BS EN 62305 series – see [5.7 Electrical infrastructure](#)
 - Coordination: The design of roofs shall fully coordinate positions of rooflights, vent pipes, rainwater outlets, weirs, hoppers, scupper/chute outlets, overflows and downpipes with external wall elevations or service spines, plant and equipment (e.g., PV panels), and safe and practical access for maintenance including guarding etc as required

2.3.2 Technical Manual references

- **Sustainable design:** See [0.1 Integrated environmental design](#)

- **Services:**
 - Extensive green roof irrigation: See [5.3 Water installations](#)
 - Ventilation and thermal comfort: See [5.6 Ventilation systems and thermal comfort](#)
 - Exterior lighting: See [5.8 Daylighting and electrical lighting](#)
 - Fire alarm and call points: See [9 Fire safety](#)
- **Parapets and rainwater drainage penetrations through external walls:** See [2.5 External walls](#)
- **Rooftop enclosures:** See [2.5 External walls](#) and [5 Services](#)
- **Access stairs to roofs:** See [2.4 Stairs, ramps and lifts](#)
- **Door thresholds at roof level:** See [2.6 External windows and doors](#)
- **Photovoltaic panels and mounting systems:** See [5.7 Electrical infrastructure](#)
- **External structures including canopies and equipment stores:** See [8.8 Structures in the landscape](#)

2.3.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Statutory guidance:**

- Roof build-ups and rainwater management from roofs to comply with [AD B](#), [AD C](#), [AD E](#) (reference to [BB 93](#)), [AD H](#), [AD K](#), [AD L](#) and [AD 7](#)
- **Standards:**
 - All roofs to comply with BS 5250
 - Flat roofs: To BS 6229, BS 8579 (Balconies and terraces), BS 8217, BS 8218, BS 8747 and BS 5427
 - Pitched roofs: To BS 5534
 - Pitched roof ventilation: To [NHBC Standards, chapter 7.2 Pitched roofs](#)
 - Roof drainage systems:
 - Gravity drainage systems to BS EN 12056-1, -3 and 5
 - Siphonic drainage to BS EN 12056-1 and BS 8490
 - Structural design: To relevant BS EN standards, National Annexes and Non-Contradictory Complementary Information (NCCI)
 - Wind loads: To BS EN 1991-1-4 and National Annexes for the given exposure and environmental conditions
 - Balconies: To BS 8579
 - Green roofs: To Green Roof Organisation (GRO) guidelines and FLL Roof Guidelines for the Planning, Construction and Maintenance of Green Roofs

2.3.4 Minimum life expectancy

- **Roof structure:** 50 years to meet design service life requirements within BS EN 1990
- **Roof covering:** 30 years
- **Rooflights, smoke vents and access hatches:** 25 years
- **Rainwater pipes, hoppers and gutters:** 25 years

2.3.5 Thermal

- **U-values:**
 - Roofs (flat or pitched) shall not exceed a U-value of $0.12 \text{ W/m}^2\text{K}$ and may need to be bettered as part of a fabric first approach to meet DfE's energy performance requirements
 - Rooflights shall not exceed $2.2 \text{ W/m}^2\text{K}$; smoke vents shall not exceed $3.0 \text{ W/m}^2\text{K}$; and access hatches shall not exceed $1.6 \text{ W/m}^2\text{K}$, all may need to be bettered as part of a fabric first approach to meet DfE's energy performance requirements
- **Airtightness (at 50 Pa):** A maximum of $3 \text{ m}^3/\text{h.m}^2$ for the building as a whole or lower as required to meet DfE's energy performance requirements
- **Continuity:** Thermal insulation in roofs shall be free from damage, and breaks in thermal continuity and integrity

- **Thermal bridges:** To be designed out where practical. Where not practical, their impact on heat loss shall be calculated in accordance with BR 443, BR 497 and BRE IP1/06, or calculated in accordance with BS EN ISO 10211, and provided to the Employer
- **Interstitial condensation/dewpoint:** Calculations in accordance with BS EN ISO 13788 or BS EN 15026 to be produced for all scenarios with any condensation risk fully mitigated (see [2.3.7 Ventilation](#))
- **Compressive strength:** Roof build-ups shall be of sufficient compressive strength to fully support all anticipated roof mounted plant (including PV mounting systems) without penetration, indentation or damage

2.3.6 Resistance to moisture

- **Surface condensation prevention:** Provide ventilation to concealed voids and cavities formed within the external fabric of walls, roofs and suspended floors
- **Interstitial condensation prevention:** To be designed and constructed so that structural and thermal performance are not adversely affected by interstitial condensation
- **Precipitation resistance:** To be designed and constructed to resist the penetration of precipitation to the inside of the building, not be damaged by it, or

permit its penetration into any part of the building resulting in damage

- **Frost resistance:** All materials and fixings shall be designed and constructed using frost-resistant materials
- **Detailing:** All materials shall be detailed to:
 - Shed water away from vulnerable junctions
 - Avoid uneven weathering, staining and streaking due to rainwater, airborne pollutants and wind

2.3.7 Ventilation

- **Pitched roofs:** To be designed and constructed to BS 5250 with adequate ventilation to limit the risk of interstitial condensation. The ventilation strategy shall be selected to suit the type of roof covering i.e., air permeable or air impermeable, underlay, the type of roof i.e., cold or warm roof, pitch and ceiling below, and shall comply with NHBC Standards, chapter 7.2 Pitched roofs

2.3.8 Fire performance

- **Roof as an element of structure:** To AD B, Table B3 in Appendix B. Roofs not considered as elements of structure shall comply with AD B, clause 7.3
- **External surfaces:** Tested to achieve B Roof(T4) to BS EN 13501-5

- **Internal surfaces:** Tested to achieve Class C-s3, d2 (Class B-s3, d0 for circulation spaces) as a minimum

2.3.9 Acoustic

- **Sound transmission:** Minimise structure borne vibration and airborne sound transmission to occupied rooms below
- **Discharge of rainwater:** Internal rainwater pipework shall be well insulated to mitigate discharge noise and meet BB 93 indoor ambient noise levels. See 'Enclosed internal downpipes' on page 58
- **Rain noise on roofs and rooflights:** To not be greater than 25 dB above appropriate indoor ambient noise level given in Table 1 of [Building Bulletin 93: Acoustic design of schools: performance standards](#)

2.3.10 Glazing

- **Selection:** The specification of glass shall be in accordance with the BS 6262 series. A specific assessment shall be carried out in accordance with Figure 1 of BS 6262-1 to determine the correct glass for the application and area
- **Performance generally:**
 - All components of the design shall be easy to clean and maintain
 - Glass shall remain in-situ if broken/damaged

- Glazing shall be transparent, resistant to UV degradation, thermal creep and sun bleaching, and provide UV light protection
- **Standards:**
 - CIRIA Guidance on glazing at height (C632F)
 - CWCT Technical Note 65: Thermal fracture of glass
 - CWCT Technical Note 66: Safety and fragility of overhead glazing: guidance on specification
 - CWCT Technical Note 67: Safety and fragility of overhead glazing: testing and assessment
 - CWCT Technical Note 92: Simplified method for assessing glazing in Class 2 roofs
 - ACR [M] 001: Test for non-fragility of large element roofing assemblies
- **Laminated glass:**
 - Standard: To BS EN 14449
 - Continuous frame support system: Required in accordance with BS 6180
- **Prohibited materials:** Polycarbonate to rooflights due to the impact of rain e.g., noise (see [Building Bulletin 93: Acoustic design of schools: performance standards](#))

2.3.11 Flashings

- **Standard:** To BS 5534 as appropriate for the roof design, build-up, covering and abutment detailing with adjacent building elements

2.3.12 Deterrents

- **Animals/insects/pests:**
 - Designed to prevent infestation, nesting and/or sheltering under or within overhanging eaves, verges or projections
 - Designed to deter birds from roosting and damaging materials such as insulation to external pipework
- **Intruders:** Designed to prevent unauthorised access to roofs, canopies, high level windows and rooflights including the climbing of canopy structure and external downpipes by pupils/students

2.3.13 Rooftop enclosures

- **Extent:** Rooftop enclosures shall be provided to:
 - Internal stairs to provide roof access to personnel for maintenance purposes – see [2.4.13 Roof access and maintenance stairs](#)
 - Ventilation equipment should there be insufficient space in internal plant rooms

- **Requirements:**

- Rooftop enclosures for roof access stairs shall meet the performance requirements for external walls, roofs and (vertical) external doors within this Technical Manual
- Rooftop enclosures for ventilation equipment shall have a solid roof, provide protection from inclement weather and adequate clear height for maintenance personnel to stand

- **Materials:**

- External stair and plant enclosures shall be designed to complement the main external elevations subject to any local planning authority requirements or planning conditions
- Any solid roof element or part of a roof pitched at an angle of more than 70 degrees to the horizontal shall be treated as an external wall and meet the DfE's performance and functional requirements as [2.5 External walls](#)

2.3.14 Roof access and egress

- **Maintenance access stairs:**

- Permanent means of access to roofs shall be provided for Planned Preventative Maintenance in the form of AD K compliant stairs – see [2.4 Stairs, ramps and lifts](#) – leading to a vertical, external door (not a hatch) – see [2.6 External windows and doors](#)

- Permanent means of access to roofs via a stair or ladder arrangement leading to an access hatch is not permitted
- Doors shall be easy to open and close
- Ironmongery, locks and handles to be positioned to avoid finger traps and potential injury to users
- **Emergency escape from roofs:**
 - Permanent emergency egress from roofs shall be via an alternative access stair or an alarmed emergency escape hatch with fixed escape ladder for authorised use only – see [2.4 Stairs, ramps and lifts](#)
 - Escape hatches shall be designed to provide ease of use, inspection and maintenance considering both manual and/or automated mechanisms
 - Escape hatches to have edge protection with a self-closing gate, be weathertight and able to be operated safely in high winds and stormy conditions
 - Fixed ladder to be located in a designated secure area, providing access directly onto a protected escape route without compromising the means of escape from other areas and/or impacting on refuge areas within stair enclosures

2.3.15 Maintenance and access

- **Maintenance access strategy:**
 - Roofs shall be designed/coordinated to provide safe access for all future maintenance with sufficient space provided around plant and equipment in accordance with manufacturer's recommendations
 - Rooflights, plant and equipment (including photovoltaic panels) and rainwater outlets shall be coordinated to limit the traversing of roof coverings (noting locations of access stairs) and be located in readily and safely accessible areas for regular inspection, cleaning and maintenance
 - Provide 600mm minimum width protected walkways with anti-slip and corrosion resistant finish to BS EN 16165 as a continuous route from access/egress stairs to any element on the roof requiring cleaning and maintenance and linking to emergency hatches (if applicable). See [2.4.14 Emergency escape for maintenance personnel from roofs](#) for emergency hatch requirements
 - The risk of trip, cut, collision and trapping hazards shall be designed out
 - 'Step over' platforms with handrails shall be provided over external plant and equipment (e.g., external ductwork) wherever necessary to ensure a

safe and continuous, maintenance and escape route around the roof that is free from dead ends

- The replacement of roof coverings at the end of their design life shall not affect the roof structure below
- The presence of rooftop plant and service runs shall not inhibit the repair of roof coverings

2.3.16 Edge protection

- **Flat roofs:**
 - Where guarding is required and is visible i.e., to all visible elevations with flat roof construction, permanent edge protection shall be via a 1100mm high parapet to match/as a continuation of the external wall
 - Guarding to be measured from highest point of finished roof level
 - Permanent galvanised mild steel balustrade in lieu of a 1100mm high parapet shall only be permitted in non-visible locations i.e., is not acceptable to principal elevations nor any elevation visible in close proximity or at a distance either from the ground or a surrounding external window
 - Non-permanent, free-standing, weighted or collapsible type barriers are not permitted
 - Fall arrest and fall restraint systems are not permitted

- **Pitched roofs:**
 - Access for maintenance to pitched roofs shall comply with CDM Regulations and be appropriate for roof type, pitch, extent, features (e.g., PVs, rooflights etc) and access requirements

2.3.17 Rainwater drainage from roofs

- **Extent:** To all roofs and terraces to buildings (see [8.8 Structures in the landscape](#) for canopies)
- **Design:**
 - To suit roof construction and to BS EN 12056-3
 - Return period calculated on the advised building life of 60 years and risk factors as follows:
 - Gutters and downpipes sized to Risk Factor 2.0, Table 2
 - Consideration to be given to sizing using Risk Factor 3.0, Table 2 for Special Schools and AP
- **Roof pitch:** Laid to manufacturer's recommendations to prevent ponding of water (standing water)
- **Layout:** Free flowing, short and direct routes fully accessible for maintenance
- **Rainwater discharge:** Rainwater from roofs shall be discharged by one of the following methods subject to an agreed Access, Cleaning and Maintenance Strategy and Planned Maintenance Plan:
 - Exposed external downpipes

- Enclosed internal downpipes
- Siphonic drainage for sports halls only

Note: Leaf guards shall be mechanically fixed to all rainwater outlets, hoppers, gutters and downpipes to protect against blockages from balls, vegetation, birds' nests and other objects. Outlet capacity due to reduction in flow from leaf guards shall be calculated to BS 12056-3

- **Overflows / emergency outlets:** Shall be provided on flat roofs with parapets and in non-eaves gutters to reduce the risk of leaks and to alert maintenance staff of a potential blockage
- **External perimeter gutters:** Shall:
 - Only be accepted for pitched roofs
 - Flow to external faces with no back soaking/staining of the external fabric of the building
 - Have a uniform finish with no signs of oxidation on external surfaces
- **External downpipes:** Shall:
 - Be safe and easy to flush and maintain (roddable)
 - Have a uniform finish with no signs of oxidation on external surfaces
 - Be detailed to prevent climbing
 - Be robust enough to withstand both vandalism and accidental impact during use

- Not be built into external walls or behind external cladding panels
- **Parapet and external wall penetrations:** All drainage, including scupper/chute outlets, weirs, overflows/emergency outlets and pipe penetrations passing through external walls shall be coordinated with hoppers and downpipes to enable free flow, prevent back soaking/staining of the external fabric of the building, and be purpose-made, joint-free and sealed to prevent water ingress into the external fabric or building
- **Prohibited items:** Traps with internal outlets
- **Enclosed internal downpipes:** Shall:
 - Be safe and easy to flush and maintain (roddable)
Note: Inspection chambers, manholes and rodding points shall be positioned externally to the building but not where they could impact outdoor learning and means of escape (during maintenance)
 - Be well insulated
 - Be routed to avoid noise sensitive areas
 - Not be built into external walls or located in classrooms, offices or pastoral spaces – use service spine(s) (see DfE's Pattern Book)
- **Maintenance:**
 - All rainwater drainage shall be easily and safely accessible for inspection, cleaning and maintenance from the roof, external elevations, external manhole(s), inspection chamber(s), rodding point(s) and/or internally as applicable, particularly at changes in direction
 - Access points shall be provided at ground level for maintaining all drainage systems including siphonic drainage
- **Below ground drainage connections:** See [5.2 Drainage](#)

Specific requirements

2.3.18 Flat roofs generally

Onsite (in-situ) constructed flat roof build-ups shall be one, and not a combination, of the following in Table 4 below:

Roof	Structural deck	Flat roof build-up with or without PV	BioSolar flat roof build-up (PV + green roof)
Inverted	Concrete	PV mounting system (as applicable) Finish layer Water flow reducing layer (WFRL) Insulation Waterproofing	PV mounting system (as applicable) Extensive green roof Insulation Waterproofing
Warm	Timber / Concrete / Profiled metal deck	PV mounting system (as applicable) Waterproofing Insulation Air and vapour control layer (AVCL)	PV mounting system (as applicable) Extensive green roof Waterproofing (may be root resistant) Insulation Air and vapour control layer (AVCL)

Table 4: Onsite flat roof requirements

2.3 Roofs

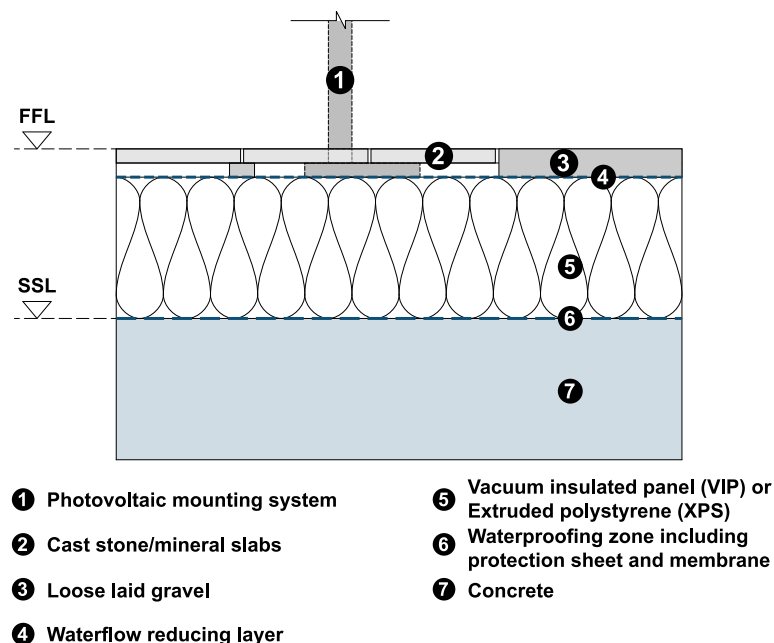
Offsite constructed flat roof build-ups shall be one of the following in Table 5 below:

Roof	Structural deck	Flat roof build-up with or without PV	BioSolar flat roof build-up (PV + green roof)
Warm	Timber / Concrete panels / Profiled metal deck	PV mounting system (as applicable) Waterproofing Insulation Air and vapour control layer (AVCL)	PV mounting system (as applicable) Extensive green roof Waterproofing (may be root resistant) Insulation Air and vapour control layer (AVCL)

Table 5: Offsite flat roof requirements

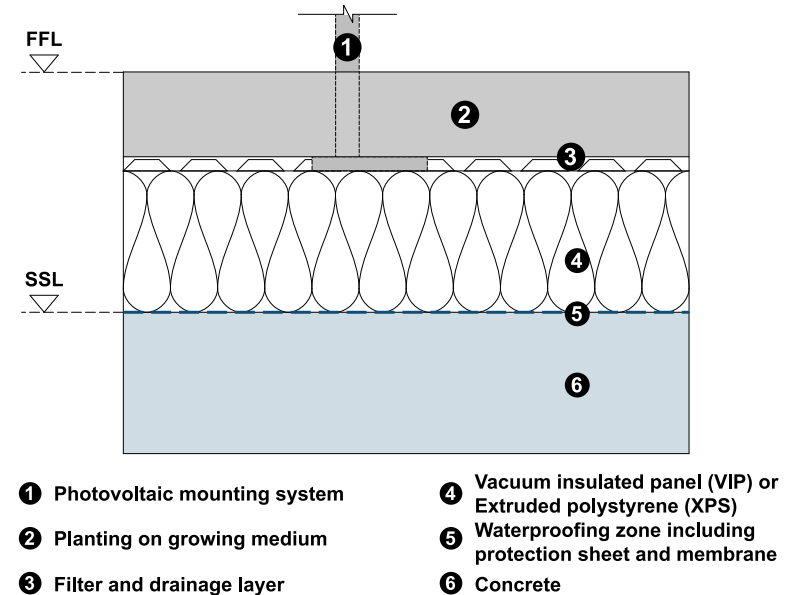
2.3.19 Onsite (in-situ) constructed inverted flat roof

- **Falls:**
 - Designed fall taking into account deflection and construction tolerance: 1:40
 - Minimum finished fall: 1:80
- **Finish layer:** Natural stone or mineral slabs, or loose laid gravel
- **Water flow reducing layer:** To BS EN ISO 12572
- **Insulation:** Thickness to meet required U-value:
 - Expanded polystyrene to BS EN 13163 with third party assessment for use in inverted warm roofs, or
 - Extruded polystyrene to BS EN 13164
- **Waterproofing:** Bituminous protection sheet on bituminous membrane to BS EN 13707
- **Structural deck:** Concrete
- **Installation:**
 - Site survey of structural deck required prior to installation of waterproofing layer
 - Carried out by approved specialist subcontractor
 - Electronic integrity test results and photographic record of waterproofing layer to be provided
- **Guarantee:** 30-year guarantee for the full build-up, excluding PV panels and mounting systems
- **PV provision:** Where PVs are required, see [5.7 Electrical infrastructure](#)



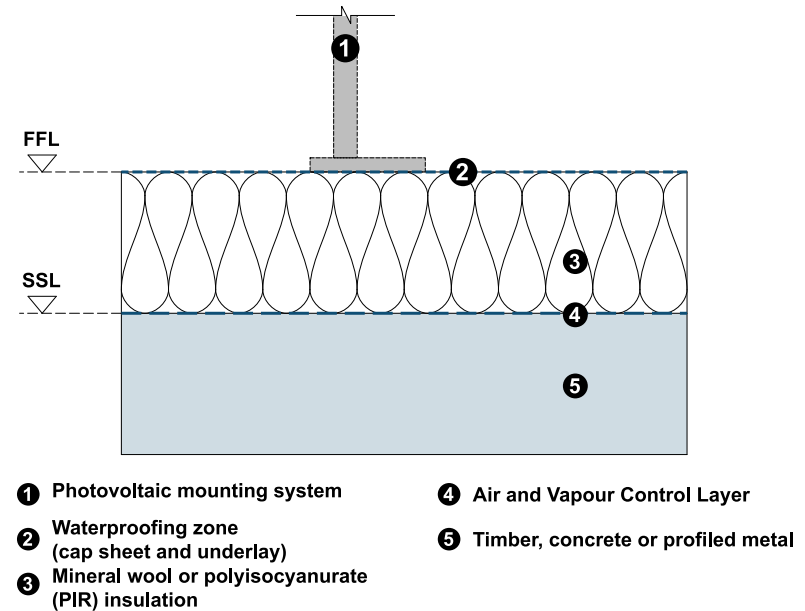
2.3.20 Onsite (in-situ) constructed inverted (extensive) BioSolar flat roof

- **Falls:**
 - Designed fall taking into account deflection and construction tolerance: 1:40
 - Minimum finished fall: 1:80
- **Finish layers:** See [2.3.25 BioSolar roofs](#)
- **Prohibited materials:** Lightweight sedum blanket systems
- **Insulation:** Thickness to meet required U-value:
 - Expanded polystyrene to BS EN 13163 with third party assessment for use in inverted warm roofs, or
 - Extruded polystyrene to BS 13164
- **Waterproofing:** Bituminous protection sheet on bituminous membrane to BS EN 13707
- **Structural deck:** Concrete
- **Installation:**
 - Site survey of structural deck required prior to installation of waterproofing layer
 - Carried out by approved specialist subcontractor
 - Electronic integrity test results and photographic record of waterproofing layer to be provided
- **Guarantee:** 30-year guarantee for the full build-up, excluding PV panels, mounting systems and planting
- **PV provision:** See [5.7 Electrical infrastructure](#)



2.3.21 Onsite (in-situ) constructed warm flat roof

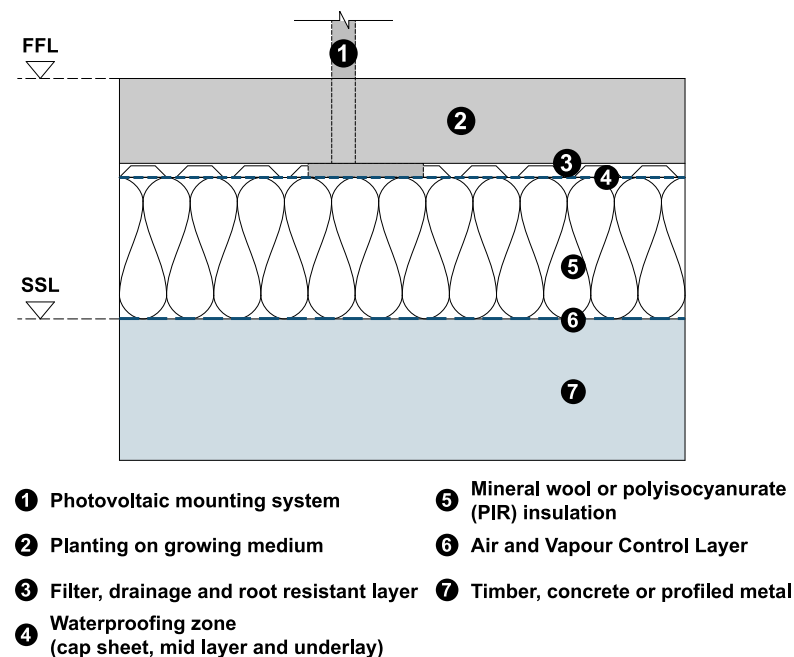
- **Falls:**
 - Designed fall taking into account deflection and construction tolerance: 1:40
 - Minimum finished fall: 1:80
- **Waterproofing:** Bituminous cap sheet on bituminous underlay to BS EN 13707
- **Insulation:** Thickness to meet required U-value:
 - Mineral wool thermal insulation board to BS EN 13162, or
 - PIR to BS EN 13165
- **Air and vapour control layer (AVCL):** Bituminous membrane to BS EN 13970
- **Structural deck:**
 - Timber
 - Concrete
 - Profiled metal
- **Installation:**
 - Carried out by approved specialist subcontractor
 - Electronic integrity test results and photographic record of waterproofing layer to be provided
- **Guarantee:** 30-year guarantee for the full build-up, excluding PV panels and mounting systems
- **PV provision:** Where PVs are required, see [5.7 Electrical infrastructure](#)



2.3.22 Onsite (in-situ) constructed warm (extensive) BioSolar flat roof

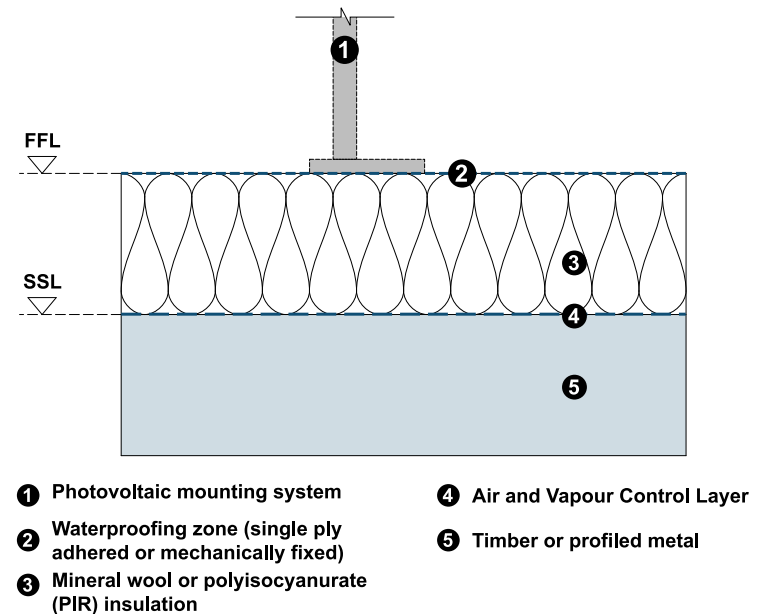
- **Falls:**
 - Designed fall taking into account deflection and construction tolerance: 1:40
 - Minimum finished fall: 1:80
- **Finish layers:** See [2.3.25 BioSolar roofs](#)
- **Prohibited materials:** Lightweight sedum blanket systems
- **Waterproofing (may be root resistant):** Bituminous cap sheet on bituminous mid layer on bituminous underlay all to BS EN 13707
- **Insulation:** Thickness to meet required U-value:
 - Mineral wool thermal insulation board to BS EN 13162, or
 - PIR to BS EN 13165
- **Air and vapour control layer (AVCL):** Bituminous membrane to BS EN 13970
- **Structural deck:**
 - Timber
 - Concrete
 - Profiled metal
- **Installation:**
 - Carried out by approved specialist subcontractor

- Electronic integrity test results and photographic record of waterproofing layer to be provided
- **Guarantee:** 30-year guarantee for the full build-up, excluding PV panels, mounting systems and planting
- **PV provision:** See [5.7 Electrical infrastructure](#)



2.3.23 Offsite constructed warm flat roof

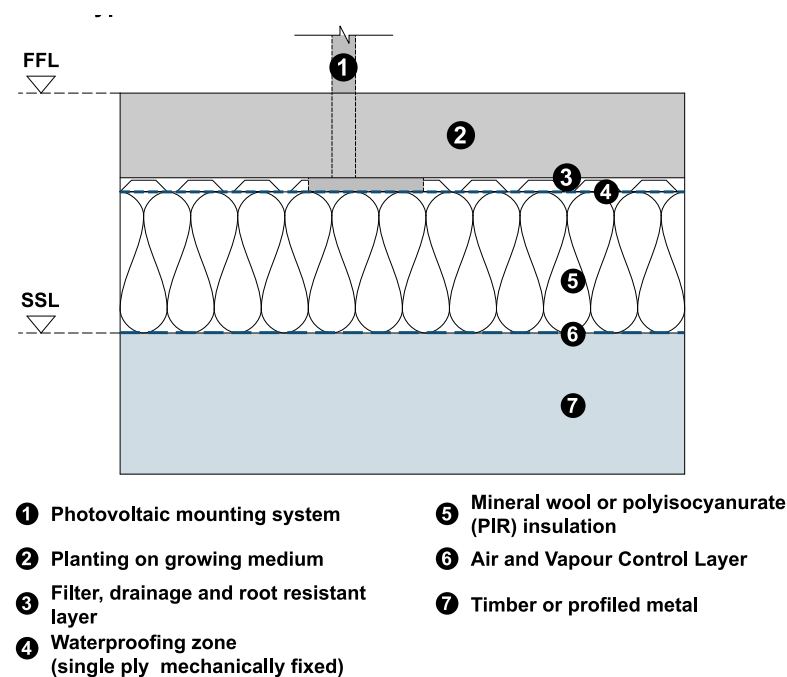
- **Falls:**
 - Designed fall taking into account deflection and construction tolerance: 1:40
 - Minimum finished fall: 1:80
- **Waterproofing:** Single ply membrane adhered or mechanically fixed to BS EN 13956
- **Insulation:** Thickness to meet required U-value:
 - Mineral wool thermal insulation board to BS EN 13162, or
 - PIR to BS EN 13165
- **Air and vapour control layer (AVCL):** Bituminous membrane to BS EN 13970
- **Structural deck:**
 - Timber
 - Profiled metal
- **Installation:**
 - Carried out by approved specialist subcontractor
 - Electronic integrity test results and photographic record of waterproofing layer to be provided
- **Guarantee:** 30-year guarantee for the full build-up, excluding PV panels and mounting systems
- **PV provision:** Where PVs are required, see [5.7 Electrical infrastructure](#)



2.3.24 Offsite constructed warm (extensive) BioSolar flat roof

- **Falls:**
 - Designed fall taking into account deflection and construction tolerance: 1:40
 - Minimum finished fall: 1:80
- **Finish layers:** See [2.3.25 BioSolar roofs](#)
- **Prohibited materials:** Lightweight sedum blanket systems
- **Waterproofing:** Single ply membrane adhered or mechanically fixed to BS EN 13956
- **Insulation:** Thickness to meet required U-value:
 - Mineral wool thermal insulation board to BS EN 13162, or
 - PIR to BS EN 13165
- **Air and vapour control layer (AVCL):** Bituminous membrane to BS EN 13970
- **Structural deck:**
 - Timber
 - Concrete panels
 - Profiled metal
- **Installation:**
 - Carried out by approved specialist subcontractor
 - Electronic integrity test results and photographic record of waterproofing layer to be provided

- **Guarantee:** 30-year guarantee for the full build-up, excluding PV panels, mounting systems and planting
- **PV provision:** See [5.7 Electrical infrastructure](#)



2.3.25 BioSolar roofs

- **Extent:**

- Extensive green roofs shall be installed on flat roofs where required to meet Biodiversity Net Gain (BNG) and Urban Greening Factor (UGF) requirements
- Where photovoltaic (PV) panels are also required, roofs shall become 'BioSolar roofs' as defined by The Green Roof Organisation (GRO). Refer to [The GRO Green Roof Code](#) and [The GRO BioSolar Best Practice Design Guide](#)
- BioSolar roofs shall incorporate purpose-made integral support frame systems for the PV panels, fixed to the drainage layer and ballasted by the extensive green roof, avoiding fixings penetrating the waterproofing and structure
- The extent of vegetative cover for BioSolar roofs shall include the area beneath the PV panels to maximise the vegetated area

- **Finish layers:**

- Suitable planting – see [8.3 Soft landscape](#)
- Lightweight growing material tested to BS 8616 – see [8.3 Soft landscape](#)
- Filter layer to BS EN ISO 10319 and BS EN ISO 11058
- Drainage/reservoir layer to BS EN 13252

- Moisture retention/protection layer to BS EN 12224, BS EN ISO 12236, BS EN ISO 10319, BS EN ISO 11058 and BS EN ISO 13438

- Root resistant layer

- **Waterproofing:** To be certified to FLL Guidelines against root resistance and/or covered by British Board of Agrément certificate

- **Waterproof detailing:**

- Around pipe penetrations, rooflight upstands etc shall take into account the overall depth of the extensive green roof
- Waterproofing shall finish a minimum of 150mm above the top of the growing medium at its highest point (where undulating) and not the surface level of the waterproofing to the roof build-up

- **Fire breaks:**

- Required at all vertical abutments (e.g., perimeters), and penetrations (e.g., rooflights, soil pipes, rainwater outlets etc)
- Minimum 500mm wide and 75mm deep
- Additionally, on large roofs, a 1 metre wide fire break should be installed at 40 metre intervals across the roof with no encroachment of PV panels – see [The GRO Green Roof Code](#)

- **Coordination with photovoltaic (PV) panels:**

- PV panels shall be positioned, oriented and spaced to optimise PV output and ensure the planting thrives
- PV panels shall be positioned to allow sufficient space between each row to allow for safe and practical maintenance of both the PV panels and the extensive green roof in accordance with manufacturer's recommendations⁹– See [5.7 Electrical infrastructure](#)
- A minimum distance of 200mm shall be provided between the low point of each PV panel and the top of the growing medium
- A minimum clear distance of 1000mm is required between PV panels and either parapets, rooflights (including guarding), atrium features or plant
- There should be no encroachment of PV panels over fire breaks on the roof
- The base board of the PV support shall not be positioned within the pebble vegetation margin
- Shading of PV panels from vegetation or other roof features shall be avoided

- **Maintenance:**

- Provide external bib taps at roof level(s) for irrigation – see [5.3 Water installations](#) and [8.6 External furniture](#)
- Ongoing maintenance shall consider any dry spells that could impact on the volume of dry vegetative material on the roof and appropriate action taken to ensure no significant volume of dry material is left on the roof

⁹ Whilst meeting the requirements of the wind load calculations.

2.3.26 Warm pitched roofs with tile, slate or metal sheet coverings

- **Scope:** Pitched roofs (duo- and mono-pitched) at a pitch of 10 degrees to the horizontal or greater
- **Standard:** To BS 5534
- **Roof coverings:** Durable and weathertight:
 - Clay tiles to BS EN 1304
 - Concrete tiles to BS EN 490 and BS EN 491
 - Natural slates to BS EN 12326 series
 - Fibre cement tiles to BS EN 492
 - Zinc and zinc alloys to BS EN 988
 - Copper to BS EN 1172
 - Stainless steel to BS EN 508-3
 - Aluminium to BS EN 508-2
- **Prohibited materials:** Lightweight sedum blanket systems
- **Ventilation:** To BS 5250
- **Air and vapour control layer (AVCL):** To BS EN 13788
- **Guarantee:** Pitched roof systems to be guaranteed. Submit details of guarantee for approval
- **PV provision:** Where PVs are required, see [5.7 Electrical infrastructure](#) ensuring compatibility with roof build-up
- **Maintenance:** Method of cleaning external gutters safely where PVs are installed and the PVs themselves

shall be subject to an agreed Access, Cleaning and Maintenance Strategy and Planned Maintenance Plan

2.3.27 Warm pitched green roofs

- **Scope:** Pitched roofs (duo- and mono-pitched) at a pitch of between 10 to 30 degrees to the horizontal
- **Standard:** To BS 5534
- **Roof coverings:** Durable and weathertight:
 - Zinc and zinc alloys to BS EN 988
 - Aluminium to BS EN 508-2
- **Prohibited materials:** Lightweight sedum blanket systems
- **Ventilation:** To BS 5250
- **Air and vapour control layer (AVCL):** To BS EN 13788
- **Guarantee:** 30-year guarantee for the full build-up
- **PV provision:** Where PVs are required, see [5.7 Electrical infrastructure](#) ensuring compatibility with roof build-up
- **Green roof finish layers:**
 - Suitable planting – see [8.3 Soft landscape](#)
 - Lightweight growing material tested to BS 8616 – see [8.3 Soft landscape](#)
 - Filter layer to BS EN ISO 10319 and BS EN ISO 11058
 - Drainage layer to EN 13252
 - Root resistant layer
- **Waterproofing in addition to roof covering:** To be certified to FLL Guidelines against root resistance and/or covered by British Board of Agrément certificate
- **Anti-shear measures:** Shall be considered during the structural design phase of the pitched roof and installed in accordance with green roof system manufacturer's recommendations to prevent slippage of the green roof finish layers
- **Irrigation:** Provision of irrigation shall be in accordance with the green roof system manufacturer's details and recommendations to prevent plant failure due to faster rainwater runoff on pitched roofs and prolonged periods of drought
- **Maintenance:** Method of cleaning external gutters safely where PVs are installed, and the PVs themselves shall be subject to an agreed Access, Cleaning and Maintenance Strategy and Planned Maintenance Plan

2.3.28 Glazed rooflights (fixed and openable)

- **Requirements:**

- Designed and positioned to benefit the internal space where permitted, and for ease of inspection, cleaning and maintenance for both manual and/or automated mechanisms
- To be able to be safely cleaned (from inside the building where practicable) subject to an agreed Access, Cleaning and Maintenance Strategy and Planned Maintenance Plan
- For thermal performance and general building airtightness requirements, see [2.3.5 Thermal](#)

- **Controls to electrically operated rooflights:**

- Provide rain sensors
- Operable by staff via wall mounted key operated override controls not accessible to pupils/students which automatically resets to the closed position

- **Glazing:** See [2.3.10 Glazing](#)

- **Solar gain and glare:** Rooflights shall be positioned to minimise the impact of solar gain and glare e.g., shall not be positioned over the performance area(s) of a hall or performance suite, or the marked courts of a sports hall

Guarding:

- Rooflights on flat roofs shall have permanent guarding such as a wall, parapet, permanent balustrade or similar obstruction
- Guarding to BS EN 1991-1-1

2.4

Stairs, ramps and lifts

This sub-section outlines the performance and functional requirements for stairs (including for roof access), ramps, guarding, balustrading, barriers and handrails, and lifts. For fire safety requirements, see [9 Fire safety](#). For external steps and ramps, see [8.1 Surfaces for play, sport, paths and roads](#)

General requirements

2.4.1 Summary

- **Purpose:** Stairs, ramps and lifts shall provide safe, inclusive and free-flowing circulation for all users (pupils/students, staff and visitors) on a day-to-day basis whilst ensuring their safe, effective escape in an emergency
- **Performance:**
 - Movement and wayfinding: The siting of lifts, stairs and ramps shall be considered at the outset of a building's design as part of an inclusive movement and wayfinding strategy for the Site for both day-to-day and out of hours/community use
 - Accessibility: Evacuation lifts shall be provided to enable users with limited mobility and/or disabilities vertical access to all areas and to distribute furniture and equipment
 - Escape: The siting and design of lifts, stairs, refuges and ramps shall ensure the safe, effective escape of all users in an emergency. Escape routes shall be protected from the effects of fire, heat and smoke during evacuation
 - Safety: Guarding, balustrades, barriers and handrails shall be provided to protect users from falls including from height. Any additional requirements for the height/specification of the guarding based on a project specific risk assessment to meet the needs of the pupils/students in the Project Brief shall be met; this includes being designed and signed off by a chartered structural engineer. Floor finishes shall be anti-slip and chosen to contrast with nosings, skirting and walls finishes
- Passive supervision: The design of stair enclosures and protected lobbies to evacuation lifts shall include an internal glazed screen
- Acoustics: Sound absorbent materials shall be provided in corridors, entrance halls and stairs to comply with BB 93 (AD E section 8)
- Heating and ventilation: All internal stairs including those associated with lifts shall be located within the thermal line of the building. Isolated secondary stairs without lifts in 'knuckles' (see DfE's Pattern Book) shall be trace heated and ventilated to meet the safety requirements of the users
- Smoke control systems: To be provided if required by the project specific fire strategy
- Materials: Durable and resilient and able to withstand daily use within an education

2.4 Stairs, ramps and lifts

environment including accidental and potential malicious or physical abuse

- Fixings: For handrails, balustrades and guarding, and associated substrates, shall be designed to meet the loading requirements specified in BS EN 1991. Also refer to BS 6180
- Clear widths: To stairs and ramps shall be measured between two walls (including skirtings and projecting handrails of up to 100mm both sides), between wall and balustrade, or between balustrades to voids
- Maintenance: Materials and components shall be easy to clean, maintain and repair/replace

2.4.2 Technical Manual references

- **Finishes:**
 - Internal walls: See [3.1 Wall finishes](#)
 - Internal floors: See [3.2 Floor finishes](#)
 - Internal ceilings: See [3.3 Ceiling finishes](#)
- **Services:**
 - Heating: See [5.5 Heating and cooling systems](#)
 - Ventilation: See [5.6 Ventilation systems and thermal comfort](#)
 - Lighting and daylighting: See [5.8 Daylighting and electrical lighting](#)
 - Fire alarm: See [9 Fire safety](#)

- **Emergency escape and refuge:** See [2.3 Roofs](#), [2.6 External windows and doors](#) and [9 Fire safety](#)
- **Rooftop enclosures:** See [2.3 Roofs](#), [2.5 External walls](#) and [5 Services](#)

2.4.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - [The Lifts Regulations 2016](#)
- **Statutory guidance:**
 - Stairs, ramps and lifts, guarding, balustrades and barriers to comply with [AD A](#), [AD B](#), [AD E](#) (reference to [BB 93](#)), [AD K](#), [AD M](#) and [AD 7](#)
- **Standards:** Except where DfE requirements differ within this sub-section (2.4):
 - Stairs and ramps to comply with BS 8300-1 and BS 8300-2
 - Guarding, balustrades and barriers to comply with BS 8300-1, BS 8300-2 and BS 6180
 - Lifts to comply with BS 8300-2
 - Evacuation lifts to comply with Annex G of BS 9999, BS EN 81-20, BS EN 81-70, BS 7671, BS EN 50171
 - Lift landing doors to comply with BS EN 81-58
 - All permanently fixed ladders to comply with BS 4211

2.4.4 Minimum life expectancy

- **Stair and ramp structure:** 50 years
- **Guarding, balustrades, barriers and handrails to internal/external walkways, stairs and ramps:** 20 years
- **All lifts:** 20 years

2.4.5 Stairs generally

- **Standards:**
 - Precast concrete stairs to BS EN 14843
 - Reinforced concrete stairs to BS EN 1992-1-1
 - Steel stairs to BS EN 1993-1-1
 - The design of new stairs shall be provided by a chartered structural engineer or BSI kitemark registered for stairs manufacturer
- **Treads:**
 - To be consistent throughout a flight
 - 280mm depth (minimum)
 - 25mm gap (maximum) where treads meet a wall
 - Offset treads to accommodate continuous handrails (handrails shall not be stepped – see [2.4.7 Handrails](#))
- **Risers:**
 - To be consistent throughout a flight
 - 160mm height (maximum)
 - 12 risers per flight (maximum)
- **Landings:**
 - Minimum length: Equivalent to clear width of the stair
 - Level landing: To be provided at the top and bottom of flights
- **Clear widths:** See [Specific requirements](#) from [2.4.11](#) onwards
- **Fire safety and escape stairs:**
 - To be enclosed with an appropriate fire rated construction as required by the project specific fire strategy, providing level exit directly to outside of the building
 - To be sited to provide compliant means of escape for day-to-day and out of hours/community use
 - To allow carry-down evacuation for mobility equipment users (where necessary). See Width and capacity of escape stairs in [9 Fire safety](#)
 - 900mm x 1400mm (minimum) wheelchair refuges to meet requirements shall not reduce the required widths for circulation or escape
- **Nosings:**
 - Permanently contrasting material 55mm wide on both the tread/going and riser required
 - Nosing shall project no more than 25mm over the tread below

2.4 Stairs, ramps and lifts

- **Low soffits:** Areas below stairs and landings with a soffit height of 2.1m or less from finished floor level shall be fully enclosed, not just barriered
- **Building services:**
 - The routing of services shall avoid stair enclosures
 - Wall-mounted heat emitters and light fittings in stair enclosures shall be robust and tamper proof, easy to maintain, and not create obstructions or hazards

2.4.6 Ramps

- **Gradient:** The lowest practicable gradient compliant with Building Regulations
- **Landings:** Minimum length, equivalent to clear width of the ramp
- **Clear width:** 1500mm (minimum)

2.4.7 Handrails

- **For stairs and ramps:**
 - To be continuous and without vertical steps
 - To be made of a self-finished material, not highly reflective, and chosen to contrast with the background/wall behind the handrail
 - To both sides of a stair flight at a height of 900mm above the nosing line
 - To both sides of a ramp at a height of 900mm above the gradient

- Where required by a risk assessment, guarding shall be higher – see [2.4.8 Guarding, balustrades and barriers](#)
- If specified in the Project Brief, an additional lower handrail to both sides of a stair flight or a ramp at a height of 600mm above the nosing/gradient line shall be provided in a Primary School or Special School
- To extend 300mm horizontally beyond the top and bottom nosings of a flight or the top and bottom of a ramped access without projecting into an access route or causing a safety hazard; the latter can be achieved by the adjacent wall following the projection of the handrail

2.4.8 Guarding, balustrades and barriers

- **Heights of guarding:**
 - To the edge of walkways, stairs or internal ramps used solely for circulation with voids on one or both sides shall be:
 - 1250mm high in schools and colleges
 - 1500mm high for Special Schools, AP or Special Colleges except to the centre of stairs and at landings where it shall be full height
 - To furnished mezzanines and seating/study areas with fixed or loose furniture and voids on one or both sides shall be:

2.4 Stairs, ramps and lifts

- A minimum of 1500mm high adjacent to any void in schools and colleges
- Full height in Special Schools, AP or Special Colleges
- To external ramps shall comply with Building Regulations
- **Design and installation:**
 - To permit passive supervision but limit the potential for upskirting through translucency
 - To ensure a 100mm sphere cannot pass through any opening in the guarding
 - To prevent children from climbing the guarding
 - To be manufactured and installed by a BSI kitemark registered manufacturer

2.4.9 Glazing to guarding, balustrades and barriers

- **Selection:** The specification of glass shall be in accordance with the BS 6262 series. A specific assessment shall be carried out in accordance with Figure 1 of BS 6262-1 to determine the correct glass for the application and area
- **Performance generally:**
 - All components, including edges, of the design shall be easy to clean and maintain
 - Glass shall remain in-situ if broken/damaged

- Glazing when used to protect users from falls, including from height, shall be a combination of laminated and toughened glass of appropriate thickness and specification to meet the required horizontal UDL (uniformly distributed load) at a notional height of 1.1m above floor level. Glazing shall comply with AD K and BS 6180
- Glazing shall be assessed in accordance with CIRIA's Guidance on glazing at height (C632F) and CWCT Technical Note 65 (and any other relevant TNs)
- **Infill glass panel systems:**
 - Fixed with bolt-through fixings in all locations in compliance with Annex B of BS 6180
- **Safety glass:**
 - Standard: To BS 6206
 - Extent: To all critical locations as defined in AD K, K4 Section 5 to mainstream schools, colleges and residential accommodation and to all locations in Special Schools, Special Colleges and AP
 - Certification: Third party certificated and indelibly marked in accordance with BS 6262-4
- **Toughened glass:**
 - Standard: To BS EN 12150 series
 - Quality: Heat soak tested to minimise the extent of NiS (Nickel Sulphide Inclusion) and other impurities

2.4 Stairs, ramps and lifts

- **Laminated glass:**
 - Standard: To BS EN 14449
 - Continuous frame support system: Required in accordance with BS 6180
- **Manifestation:** In accordance with AD K, K5 Section 7

2.4.10 Lifts generally

- **Lift type:**
 - In multi-storey buildings/blocks, evacuation lifts shall be provided rather than standard passenger lifts – see [2.4.15 Evacuation lifts](#) and the further requirements set out in [9 Fire safety](#)
 - Evacuation lifts need not be provided, subject to an assessment on an individual project basis, in:
 - Small, two storey buildings/blocks with no more than 120 pupils/students on the first floor (excluding Special Schools, Special Colleges, AP and residential accommodation which default to minimum requirements as [2.4.15 Evacuation lifts](#)), or
 - Temporary accommodation
- **Number and size of lifts (for each building/block):**

Shall be calculated following the requirements below

and any other requirements specified in the Project Brief:

- The expected occupancy of the individual multi-storey building/block (pupils/students, staff and visitors). When calculating this figure, occupants on the ground floor are not to be discounted
 - The anticipated number of pupils/students, staff and visitors who will be using wheelchairs and other mobility aids, the size of these aids and the level of personal assistance required
- Note:** Lift cars and lift doors shall be large enough for the expected use and to ensure wheelchair users enter and leave the lift independently or be assisted by staff as required
- The use of the lift in the event of an emergency, including a fire or security incident
 - The maintenance strategy/impact in the eventuality of a lift breakdown/period of repair
- **Location of lifts:**
 - Within easy access of the main entrance(s), and adjacent to main circulation and an internal stair
 - Where two or more lifts are provided, they shall be adequately separated on plan to provide the shortest possible travel distance to a lift from any point in the building(s)
 - **Controls and communication devices for lifts:**
 - To have stand-alone local controls

2.4 Stairs, ramps and lifts

- To be capable of being restricted for use by disabled pupils, staff and visitors, and maintenance staff only using a close proximity fob or key operation
- To have an emergency evacuation mechanism operable by a trained member of staff to lower it to floor level and open the lift door
- To contain alarm communication devices compliant with BS EN 81-28 via a direct link to a 24-hour help line – see [5.12 Internet connectivity](#)
- **Landing zone:**
 - 1500mm x 1500mm manoeuvring zone in front of every lift and at each floor level
 - Manoeuvring zone shall not obstruct or reduce the minimum width requirements for circulation or escape
 - Internal glazed screen (minimum 600mm wide) to allow for passive supervision of waiting areas in front of lifts

Specific requirements

2.4.11 Internal stairs

- **All internal stairs for circulation:** Shall:
 - Be protected by appropriately fire rated construction if an escape stair, as required by the project specific fire strategy
 - Have double doors leading onto the stair enclosure comprising two equal width door leaves, each providing an effective clear width of 825mm from the door stop on the door closing side to any obstruction on the hinge side e.g., projecting ironmongery
 - Include in all cases a 600mm (minimum) wide internal glazed screen (fire rated as required by the project specific fire strategy) for passive supervision
 - Provide a minimum clear width of 1650mm or wider as required by the project specific fire strategy

2.4.12 External stairs

- **External stairs¹⁰ are generally not permitted except when:**
 - They are isolated secondary stairs not associated with lifts in 'knuckles' – see DfE's Pattern Book

¹⁰ Not including external steps in the landscape – see [8.1.16 Steps](#)

- Refurbishing existing buildings
 - Providing maintenance only access between changes in roof level
 - Providing secure and enclosed maintenance only access to roofs of single storey buildings
- Note:** External stair enclosures shall be clad to provide ventilation and finished in either hit and miss brickwork, timber or perforated metal, subject to the approval of the Employer

2.4.13 Roof access and maintenance stairs

- **Maintenance access stairs to roofs:** Shall:
 - Provide access from inside the building to roof level for maintenance personnel only
 - Be via a stair only; access to a roof via a hatch (with or without a drop-down ladder arrangement) or fixed vertical ladder is not permitted
 - Be a minimum of 800mm in width, with the design of treads and risers following the guidance in AD K for private stairs in dwellings (maximum angle if this is to avoid a steep rise) and the uppermost step positioned level with the landing
 - Be secure, easily accessible and with an anti-slip surface

2.4 Stairs, ramps and lifts

- Have continuous handrails to both sides

Note: Rooftop stair enclosures shall be designed to follow the design of the main external elevations and meet the DfE's performance and functional requirements for [2.3 Roofs](#) and [2.5 External walls](#)

2.4.14 Emergency escape for maintenance personnel from roofs

- **Emergency escape from roofs:**
 - Shall be via the primary maintenance access stair to the roof, however, as this stair may not be available due to fire, a secondary means of escape in the form of an openable, alarmed flat exit hatch shall be provided to an alternative protected escape route
 - Emergency escape hatch shall have edge protection with a self-closing gate, a safe landing area between the gated edge protection and hatch, and secure and continuous handrail support to an easy to reach fixed ladder for emergency egress
 - All escape hatches and any other enclosures are to be weathertight and able to be operated safely in high winds and stormy conditions
 - Fixed escape ladders shall comply with BS 4211
 - The fixed escape ladder shall be located in a designated secure area, providing access directly onto a protected escape route

- The door from the designated secure area to the protected escape route shall not compromise the means of escape from other areas and/or impact on refuge areas within protected stair enclosures
- The designated secure area shall be accessible by authorised personnel only
- In the event of an emergency, escape shall be possible without use of a key

2.4.15 Evacuation lifts

- **For multi-storey School and College buildings/blocks:** The default minimum number of evacuation lifts and the minimum inner dimensions of lift cars shall be related to the number of building users (calculated in accordance with [2.4.10 Lifts generally](#)) and applied to each building/block as follows:
 - 749 pupils/students or fewer, a single evacuation lift of 1400mm x 1100mm
 - 750 pupils/students or more, a single two wheelchair evacuation lift of 2000mm x 1400mm, or two evacuation lifts of 1400mm x 1100mm
 - 1500 pupils/students or more, two evacuation lifts of 2000mm x 1400mm
- **Multi-storey Special School and Special College buildings/blocks:** The evacuation lift provision shall be determined on an individual project basis but subject to a default minimum of:

2.4 Stairs, ramps and lifts

- For each multi-storey special school or special college building/block, a lift of 2000mm x 1400mm (internally), or
- For each multi-storey non-ambulant special school or non-ambulant special college building/block, a two wheelchair lift of 2400mm x 1400mm (internally)

Note: In non-ambulant special schools/non-ambulant special colleges, the lift car and lift doors shall be sized to accommodate a pupil/student plus their Mobility Equipment (e.g., horizontal learning stations) and accompanying staff

- **Multi-storey AP and residential buildings/blocks:**
The evacuation lift provision for these settings shall be determined on an individual project basis but subject to a default minimum of a single evacuation lift of 1400mm x 1100mm (internally)
- **Additional evacuation lifts:** May be required to satisfy local planning authority requirements as specified in the Project Brief
- **Firefighting lifts:** Should a firefighting lift be required, further guidance on the required standards is given in BS EN 81-72 and BS 9999

2.4.16 Platform lifts

- **In general:**
 - To not be used in multi-storey Special School or Special College buildings
 - To not be used in multi-storey mainstream School or College buildings other than in exceptional circumstances and only with the prior agreement of the Employer
 - Where expressly agreed to be used, a platform lift shall:
 - Be compliant with BS EN 81-41 or Machinery Directive 2006/42/EC
 - Have an enclosed lift car
 - Be operated by a once applied control, not a continuous hold operation
 - Have an emergency evacuation mechanism operable by school staff

2.5

External walls

This sub-section outlines the performance and functional requirements for external wall build-ups from outside to inside a building and from the lowest floor construction to roof level, including masonry walls, cladding systems, backing walls like Structural Insulated Panels (SIPs) and curtain walling. For external walls in the landscape, see [8.4 Boundary treatments, walls and fencing](#)

General requirements

2.5.1 Summary

- **Purpose:**

- External walls (i.e., both internal and external skins) include all surface coverings, material build-ups, fixings, parapets and primary/secondary structure as necessary to meet the required performance and ensure the element is structurally sound
- External walls safeguard the interior of the building and its occupants from external threats
- External walls regulate indoor temperatures by insulating against heat or cold, and resist fire spread via surface coverings, build-ups and methods of construction
- The colour, scale, material and composition of external walls largely define a building's external appearance and architectural style

- **Performance:**

- Structure: To transfer design loads for the given operational, exposure and environmental conditions to support structures and substructure whilst remaining stable and without unexpected damage
- Weathertight: To satisfactorily resist the passage of moisture due to rain, snow and groundwater to the

inside of the building, and to materials which might be adversely affected by such moisture

- Weathering: The Contractor shall demonstrate to the satisfaction of the Employer's Representative that the selected external surface material(s) is suitable for its geographical location and will weather uniformly across the elevations to which it is applied
- Thermal: See [2.5.8 Thermal](#)
- Fire: See [2.5.10 Fire performance](#)
- Moisture: To be corrosion resistant
- Acoustics: To comply with BB 93 to meet internal acoustic requirements in consideration of external noise levels (from sources including, but not limited to, road, rail and air traffic, industrial and commercial premises)
- Safety: Materials and elements shall not have small openings that could trap fingers or sharp edges
- Coordination: The design of external walls shall fully coordinate positions of windows, doors, louvres/brise soleil, rainwater outlets and downpipes (where applicable), exterior lighting and other services as required, whilst ensuring safe and practical access for maintenance

2.5.2 Technical Manual references

- **Sustainable design:** See [0.1 Integrated environmental design](#)
- **Foundations and substructure:** See [1.1 Foundations and substructure](#)
- **Ground floor structures:** See [1.2 Lowest floor construction](#)
- **Superstructure:** See [2.1 Structural frames](#)
- **Windows, louvres and external doors:** See [2.6 External windows and doors](#)
- **Walls in the landscape:** See [8.4 Boundary treatments, walls and fencing](#)
- **Fire compartmentation, fire-stopping and surface spread of flame:** See [9 Fire safety](#)

2.5.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Statutory guidance:**
 - External walls to comply with [AD A](#), [AD B](#), [AD C](#), [AD E](#) (reference to [BB 93](#)), [AD F](#) (reference to [Building Bulletin 101: Guidelines on ventilation, thermal comfort and indoor air quality in schools](#)), [AD K](#), [AD L](#) and [AD 7](#)

- **Standards:**

- Structural design: To relevant BS EN standards, National Annexes and Non-Contradictory Complementary Information (NCCI)
- Wind loads: To BS EN 1991-1-4 and National Annexes for the given exposure and environmental conditions

2.5.4 Minimum life expectancy

- **Structure:** 50 years to meet the design service life requirements within BS EN 1990 or higher if required by local authority approvals
- **External walls/cladding:** 40 years

2.5.5 Prohibited materials/systems

- **Homogeneous materials including render:** Not acceptable for use as an external surface material below 2.5m above external ground level
- **Concrete blocks:** As an exposed external wall finish. Architectural masonry/decorative concrete fine grade facing blocks are permitted – see [2.5.14 Masonry walls](#)
- **Aluminium composite material (ACM) cladding panels**
- **Non fire rated High Pressure Laminate (HPL) cladding panels**
- **All types of Magnesium Oxide/Magnesium Oxychloride:** As a sheathing board is not acceptable

in the construction of walls e.g., in SIPS panels, prefabricated off-site wall panel systems etc

- **Modular green walls:** For external walls/facades. See [8.3.15 Climbing plants](#) for acceptable options
- **Fibre cement construction board:** As an external cladding material including below damp-proof course (DPC), to roof upstands and the rear of parapets. Fibre cement cladding panels as part of a proprietary cladding system above DPC may be used - see [2.5.15 Cladding systems](#)
- **Composite assemblies of windows with lateral joints instead of curtain walling**

2.5.6 Structural performance

- **Design:** To be certified by a chartered engineer registered with a recognised industry body (e.g., ICE or IStructE)
- **Standard:** To BS EN 1990 and all applicable BS EN standards for design and materials
- **Robustness:** Design and detailing for structural wall and panel systems to comply with BS EN 1991-1-7 requirements for robustness and to prevent disproportionate collapse over the specified design life/minimum life expectancy
- **Certification:** To confirm design has been carried out in accordance with Building Regulations and relevant BS EN standards and National Annexes

- **Testing:** All testing relied upon shall be carried out by a UKAS accredited body and made available to the Employer
- **Specialist and proprietary installations:**
 - Installation: To product manufacturer's requirements
 - Performance: To be certified by UK Conformity Assessed (UKCA) marking, European Technical Assessment (ETA), BBA Agrément Certificate or other approved independent technical assessment authorities

2.5.7 Movement and tolerances

- **Standard:** To comply with acceptable limits of relevant BS EN design and material standards
- **Movement:** Allow sufficient tolerance in details to accommodate anticipated movement, ensuring there is no unintended movement or impact on the performance of the external wall, in part or as a whole
- **Construction tolerances:** Allow sufficient tolerance in details to ensure there is no unintended impact on the alignment or aesthetics of external materials, in part or as a whole

2.5.8 Thermal

- **U-values:**
 - External walls shall not exceed a U-value of 0.15 W/m²K and may need to be bettered as part of a fabric first approach to meet DfE's energy performance requirements
 - Curtain walling shall not exceed an average U-value of 1.1 W/m²K and may need to be bettered as part of a fabric first approach to meet DfE's energy performance requirements
- **Airtightness (at 50 Pa):** A maximum of 3 m³/h.m² for the building as a whole or lower as required to meet DfE's energy performance requirements
- **Continuity:** Thermal insulation in external walls shall be free from damage, and breaks in thermal continuity and integrity
- **Thermal bridges:** To be designed out where practical. Where not practical, their impact on heat loss shall be calculated in accordance with BR 443, BR 497 and BRE IP1/06, or calculated in accordance with BS EN ISO 10211, and provided to the Employer
- **Interstitial condensation/dewpoint:** Calculations in accordance with BS EN ISO 13788 or BS EN 15026 to be produced for all scenarios with any condensation risk fully mitigated

2.5.9 Resistance to moisture

- **Standard:** To AD C, detailing and material specification shall prevent the ingress of ground and surface water, and as requirements below
- **External wall penetrations:** All drainage penetrations including scupper/chute outlets, weirs and overflows passing through external walls shall be purpose-made, fully welded and sealed to prevent water ingress into the external fabric or building
- **Copings to parapet walls:** Shall:
 - Be provided, spanning the full depth of the external wall as single piece
 - Have a minimum overhang of 45mm and drips
 - Be securely and mechanically fixed to the parapet to prevent wind uplift
 - Not be flat; copings shall be angled to fall water onto the roof (not down external walls)
 - Have a fully supported DPC under, sealed at all joints and laps
- **Damp-proof course (DPC) and damp-proof membrane (DPM):**
 - The wall DPC shall be continuous with the floor DPM
 - The DPC in the outer face of the wall shall be positioned at a minimum of 150mm above adjacent internal finished floor level or external ground level,

- whichever is higher, to prevent the penetration of ground moisture
- In a masonry cavity wall construction, the DPC to the inner masonry leaf shall be no lower than the DPC to the outer masonry leaf
 - In a cladding system with backing wall, including the use of Structural Insulated Panels (SIPs) or Cross Laminated Timber (CLT) to the inner leaf, the DPC shall sit on the outer and inner kerbs in accordance with [1.2.6 Durability](#), [2.5.15 Cladding systems](#) and [2.5.16 Backing walls to masonry and cladding systems](#)
 - Level thresholds shall be damp proofed at main fabric junctions
 - **Sloping sites:** See [5.2.7 Below ground drainage](#) for requirements for sites sloping towards the building
 - **Surface condensation prevention:**
 - Provide ventilation to concealed voids and cavities within the external fabric of walls e.g., to rainscreen cladding systems
 - Use external walls to provide ventilation to adjacent enclosed elements e.g., roofs via ventilated eaves details and suspended floors via periscopic ventilators within external wall cavities
 - Surface moisture/condensation shall not form on internal surfaces over the building's life

- **Interstitial condensation prevention:** To be designed and constructed so that structural and thermal performance are not adversely affected by interstitial condensation
- **Precipitation resistance:** To be designed and constructed to resist the penetration of precipitation to the inside of the building, not be damaged by it, or permit its penetration into any part of the building resulting in damage
- **Frost resistance:** All materials and fixings shall be designed and constructed using frost-resistant materials
- **Detailing:** All materials shall be detailed to:
 - Shed water away from vulnerable junctions e.g., projecting drip details
 - Avoid uneven weathering, staining and streaking due to rainwater, airborne pollutants and wind

2.5.10 Fire performance

- **Standard:** In accordance with BS EN 13501-2
- **Fire resistance of external walls:**
 - If affected by a design for horizontal and/or vertical escape or the proximity of another building, the fire resistance of external walls shall meet the requirements in AD B Volume 2 and [9 Fire safety](#)
 - In all projects, including refurbished buildings, non-combustible, Class A1 rated insulation shall be

2.5 External walls

specified and installed to external walls above DPC level(s) to meet the required thermal performance – see [2.5.8 Thermal](#)

- Insulation below DPC level(s) shall meet the same thermal requirements and have suitable third party certification for use in this location
- The impact of penetrations e.g., airbricks, vent covers, ducts and waste pipes on the fire resistance of external walls shall be assessed with any risk fully designed out/mitigated
- **Fire compartmentation and fire-stopping:** Cavity barriers within voids to external walls shall be specified and located to meet the requirements of the project specific fire strategy in accordance with AD B Volume 2 and [9 Fire safety](#), and fitted in accordance with manufacturer's instructions. These shall not restrict the general ventilation requirements to any void – see [2.5.9 Resistance to moisture](#)
- **Reaction to fire performance of external surface of walls:** External walls shall not provide a medium for fire spread. Depending on the school/college typology and building height (measured from the ground level on the lowest side of the building to the top of the floor surface of the top storey), one or more of the following shall apply:
 - External surface materials on buildings less than 18m above ground level, including all elements of

the sub-framing/substrate and fixings forming the external wall, shall achieve Class B-s1, d0 or better with the exception of the insulation which shall be Class A1

- External surface materials on buildings 18m or higher above ground level, including all elements of the sub-framing/substrate and fixings forming the external wall, shall achieve Class A2-s1, d0 or better with the exception of the insulation which shall be Class A1
- External surface materials on buildings prone to vandalism, where identified as a specific risk in the Project Brief, including all elements of the sub-framing/substrate and fixings forming the external wall, shall achieve Class A2-s1, d0 or better with the exception of the insulation which shall be Class A1
- External surface materials to residential areas of boarding schools, including all elements of the sub-framing/substrate and fixings forming the external wall, shall achieve Class A2-s1, d0 or better with the exception of the insulation which shall be Class A1
- External surface materials to ground floor accommodation within Special Schools and Special Colleges, including all elements of the sub-framing/substrate and fixings forming the external

wall, shall achieve Class A2-s1, d0 or better with the exception of the insulation which shall be Class A1

Note: The above requirements shall not apply to those materials listed in Regulation 7(3) of the Building Regulations

2.5.11 Impact resistance

- **Design:**
 - External walls shall be positioned to prevent the potential for damage due to vehicular impact/overrun
 - Durable and resilient and able to withstand daily use within an education environment including accidental and potential malicious or physical abuse. Materials vulnerable to impact damage e.g., by people or balls, shall not be used where pupils/students come into close contact with them e.g., on main access routes, games areas and social spaces
 - To resist impact without sustaining damage or change to the surface appearance and/or texture, and without deterioration of performance
 - Supplementary measures to protect the façade from damage in areas subject to vehicular movement in accordance with BS 6180

- **Materials and cladding systems up to 2.5m above ground level:** Minimum Category I rating for hard and soft body impact in accordance EAD 090062-01-0404 for mechanically fixed cladding systems
- **Materials and cladding systems at heights over 2.5m above ground level:** Minimum Category II rating for hard and soft body impact in accordance with EAD 090062-01-0404 for mechanically fixed cladding systems and EAD-040083-00-0404 for insulated render systems
- **Testing:** Resistance to hard and soft body impact to be demonstrated by reliable test data and, if accepted, installed in accordance with manufacturer's recommendations

2.5.12 Deterrents

- **Animals/insects/pests:** Designed to prevent infestation and nesting within concealed voids
- **Intruders:** Designed to prevent unauthorised access to roofs, canopies, high level windows and restricted areas including the climbing of shadow gaps and external downpipes by pupils/students
- **Recessed doorways and alcoves:** Avoid/minimise to deter anti-social behaviour and ensure passive supervision

2.5.13 Maintenance

- **Materials and components:** Select to minimise maintenance and cleaning, and disruption to the School/College in the event of repair
- **Access:** Safe access to be provided to building perimeter for maintenance
- **Cleaning:** Materials shall:
 - Mitigate the impact of weathering
 - Resist abrasion from routine cleaning methods without any noticeable change in surface appearance
 - Allow the removal of graffiti without damaging the surface of the material

Specific requirements

2.5.14 Masonry walls

- **Standards:**
 - Masonry units to BS EN 771-1 and BS EN 771-3
 - Mortar to BS EN 998-2 and PD 6678
- **Restraints and ties to masonry:** To ensure the safety and stability of masonry elements and coordinated with allowances in detailing for movement
- **Installation:**
 - Frost-resistant brickwork (F2): Below DPC level
 - Masonry support systems: To product manufacturer's requirements
- **Fair faced architectural masonry/decorative concrete fine grade blocks to external walls:**
 - Flush pointed architectural masonry/decorative blockwork (unpainted) shall be uniform in texture, finish and colour
 - Blocks shall comply with BS EN 771-3 and be capable of supporting proposed loads when used in cavity wall construction
 - Blocks shall have a compressive strength greater than 7.3N/mm² or have a density of at least 1,500kg/m³
 - Mortar joints shall not be beaded or extruded

- **Fair faced blockwork to inner leaf of external walls:**

- Flush pointed blockwork with a paint grade finish (and painted) – see Types W01, W02, W03 and W07 in [3.1 Wall finishes](#)
- Flush pointed architectural masonry/decorative blockwork (unpainted) – see Types W07 and W08 in [3.1 Wall finishes](#)

2.5.15 Cladding systems

- **Cladding panels including render systems, sub-framing/substrate and fixings:**
 - To meet fire resistance requirements as [2.5.10 Fire performance](#)
 - Panels to be individually and independently removable and replaceable without compromising the integrity and fire performance of the system in part or as a whole
 - Strategy to be developed and agreed for expressed and/or concealed joints and fixings to ensure a coherent and consistent approach to the envelope design
 - To be entirely mechanically fixed. All panels, slips and tiles irrespective of the material shall be mechanically fixed to backing panels and rails/sub-

framing without the use of, or reliance upon, adhesive

- All fixing methods for cladding shall adhere to the same robust performance of the cladding material itself
- Where face fixing methods are used, they shall match the visual appearance of the cladding material and be tamper proof
- Where a metal supporting subframe/substrate is proposed it shall be stainless steel or an independently tested and certified alternative corrosion resistant material for the minimum life expectancy in the site specific environmental conditions
- Where a timber supporting subframe/substrate is proposed it shall be tanalised timber impregnated with a preservative solution under high vacuum pressure to meet the fire resistance as [2.5.10 Fire performance](#), and minimum life expectancy in the site specific environmental conditions
- **Base of external cladding systems to walls below damp-proof course (DPC):** Where an impact resistant external wall cladding system is proposed at ground level, the base of the cladding shall not be lower than DPC level (see [2.5.9 Resistance to moisture](#)). Beneath the DPC shall sit a fair faced masonry or concrete kerb

extending to below external ground level – see [1.2.6 Durability](#)

- **Electrical continuity:** To comply with BS 7671 and BS EN 62305 series

2.5.16 Backing walls to masonry and cladding systems

- **Type:** Backing walls to masonry (see [2.5.14 Masonry walls](#)) and cladding systems (see [2.5.15 Cladding systems](#))
- **Structural Insulated Panels (SIPs):**
 - Pre-insulated (with full fill, Class A1 rated insulation to meet required thermal performance – see [2.5.8 Thermal](#)) and boarded, closed panels
 - Structural: To BS EN 594, BS EN 1990, BS EN 1995-1-1 and BS EN 12369-3
 - Fire resistance: To BS EN 13501-1 and -2, tested in accordance with BS EN 1365-1
 - Timber: Treated with weather-resistant, toxicologically safe, long-term protection against fungi and insects
 - Photographic evidence of insulation fill prior to closing up panel as part of factory quality assurance procedures and audit trail
- **Cross Laminated Timber (CLT):**
 - Structural: To BS EN 594, BS EN 1990, BS EN 1995-1-1 and BS EN 12369-3

2.5 External walls

- Fire resistance: To BS EN 13501-1 and -2, tested in accordance with BS EN 1365-1
- Timber: Treated with weather-resistant, toxicologically safe, long-term protection against fungi and insects
- **Light Steel Frame (LSF):**
 - Structural: To BS EN 1991-1-1, BS EN 1991-1-3 and BS EN 1991-1-4
 - Fire resistance for both load bearing and infill walls: To BS EN 13501-1 and -2, tested in accordance with BS EN 1365-1
 - Steel: Pre-galvanised to BS EN 10346
- **Base of backing wall below damp-proof course (DPC):** Where an internal backing wall is proposed to support an outer leaf of masonry or an external cladding system at ground level, the base of the backing wall shall not be lower than DPC level (see [2.5.9 Resistance to moisture](#)). Beneath the DPC shall sit a concrete kerb – see [1.2.6 Durability](#)

2.5.17 Curtain walling systems

To be reviewed with [2.6.13 Glazing](#)

- **Standards:** To BS EN 13830, BS EN 14019 and CWCT standard for systemised building envelopes (all parts) including air and water tested offsite and onsite

- **Performance:**
 - To resist the passage of airborne and impact sound within the building
 - To meet barrier loading requirements
 - Mullions and transoms shall be the same depth
- **Thermal:** See [2.5.8 Thermal](#). Thermal breaks and a continuous vapour control layer shall be provided
- **Resistance to moisture:** All curtain walling shall have a drained and ventilated cavity at each interface, and drained and ventilated glazing rebates
- **Below damp-proof course (DPC) level generally:** Curtain walling at DPC level to sit on a fair faced concrete kerb beneath – see [1.2.6 Durability](#)

2.6

External windows and doors

This sub-section outlines the performance and functional requirements for external windows and doors (glazed and louvred) and security shutters, grilles and bars

General requirements

2.6.1 Summary

- **Purpose:**
 - External windows include all opening lights, fixed lights, frames, beads, linings, glazed units, louvred/solid spandrel panels, and ironmongery as necessary to meet the required performance
 - External doors include all entrance doors and screens, final exit doors and doors to external storage and plant, door frames, beads, linings, glazed units, louvred/solid spandrel panels, and ironmongery as necessary to meet the required performance
- **Performance:**
 - Structure: All external windows and doors and their component parts shall be capable of transferring design forces appropriate to the operational and environmental conditions to support structures for the intended design life/minimum life expectancy whilst retaining dimensional stability
 - Weathertight: To satisfactorily resist the passage of moisture due to rain, snow and surface water on the ground to the inside of the building, and to materials which might be adversely affected by such moisture
 - Thermal: See [2.6.6 Thermal](#)
 - Daylight: Positions of external doors and windows and glazing specification shall comply with requirements in [5.8 Daylighting and electrical lighting](#)
 - Ventilation: Positions of external doors, windows and louvred vents to be coordinated with the ventilation strategy – see [5.6 Ventilation systems and thermal comfort](#)
 - Fire: See [2.6.8 Fire performance](#)
 - Acoustics: To comply with BB 93 to meet internal acoustic requirements in consideration of external noise levels (from sources including, but not limited to, road, rail and air traffic, industrial and commercial premises)
 - Security: Offers reasonable resistance to unauthorised entry, or exit where required for pupil/student safeguarding purposes
 - Maintenance: To be able to be safely cleaned (from inside the building where practicable) subject to an agreed Access, Cleaning and Maintenance Strategy and Planned Maintenance Plan

2.6.2 Technical Manual references

- **Sustainable design:** See [0.1 Integrated environmental design](#)
- **Ground floor structures:** See [1.2 Lowest floor construction](#)
- **Superstructure:** See [2.1 Structural frames](#)
- **Rooflights, smoke vents and access hatches to roofs:** See [2.3 Roofs](#)
- **Blinds and curtains:** See [4 Fittings, furniture and equipment \(FF&E\)](#)
- **Ventilation and thermal comfort:** See [5.6 Ventilation systems and thermal comfort](#)
- **Exterior lighting and daylighting:** See [5.8 Daylighting and electrical lighting](#)
- **Access control:** See [5.10 Security and communication systems](#)
- **Fire:** See [9 Fire safety](#)

2.6.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Statutory guidance:**
 - External windows and doors to comply with [AD A](#), [AD B](#), [AD C](#), [AD E](#) (reference to [BB 93](#)), [AD F](#) (reference to [Building Bulletin 101: Guidelines on](#)

[ventilation, thermal comfort and indoor air quality in schools](#)), [AD K](#), [AD L](#) and [AD 7](#)

- **Standards:**
 - All external windows and doors: To BS EN 14351-1, BS EN 1191, BS EN 16034, BS 8300-2
 - Glazing: To BS 6262 series
 - Wind loads: To BS EN 1991-1-4 and National Annexes for the given exposure and environmental conditions

2.6.4 Minimum life expectancy

- **External windows and doors (including glazed/louvred components):** 25 years
- **External shutters, grilles and bars:** 20 years

2.6.5 Prohibited materials

- **Composite assemblies of windows with lateral joints instead of curtain walling** – see [2.5.17](#) for curtain walling requirements
- **Annealed float glass**

2.6.6 Thermal

- **U-values:**
 - All external windows shall not exceed an average U-value of 1.2 W/m²K and may need to be bettered as part of a fabric first approach to meet DfE's energy performance requirements

2.6 External windows and doors

- All external doors shall not exceed an average U-value of 1.6 W/m²K and may need to be bettered as part of a fabric first approach to meet DfE's energy performance requirements
- **G-value:** Maximum 0.4 to east, west and southern facing glazed elements
- **Airtightness (at 50 Pa):** A maximum of 3 m³/h.m² for the building as a whole or lower as required to meet DfE's energy performance requirements
- **Thermal bridges:** To be designed out where practical. Where not practical, their impact on heat loss shall be calculated in accordance with BR 443, BR 497 and BRE IP1/06, or calculated in accordance with BS EN ISO 10211, and provided to the Employer
- **Interstitial condensation:** All external doors and windows to comply with BS 5250

2.6.7 Resistance to moisture

- **Standard:** To AD C, detailing and material specification shall prevent any external moisture passing into the internal environment of the building. Level thresholds to be damp proofed at main fabric junctions
- **Window openings in walls:** Shall:
 - Be protected by a continuous cill spanning the full width of the opening as single piece, and sealed at abutments

- Include a cill that is securely and mechanically fixed, angled to fall water away from the window frame, and have a minimum overhang of 45mm (from the face of the external wall) with a drip

2.6.8 Fire performance

- **Standard:** In accordance with BS EN 13501-2
- **Fire resistance of external windows and doors:**
 - If affected by horizontal and/or vertical escape or the proximity of another building, the fire resistance of external windows and doors shall meet the requirements in AD B Volume 2 and [9 Fire safety](#)
 - The positions of external windows and doors shall not compromise fire compartmentation and stopping e.g., the fitting of cavity barriers within voids of external walls

2.6.9 Safety

- **Requirements:** Designs shall:
 - Prevent obstruction on walkways
 - Be safe in closed or open positions and not hazardous to users passing by, internally or externally – also see technical requirements for door guards/barriers in [8.6 External furniture](#)
 - Prevent falls from height
 - Ensure glass remains in-situ if broken/damaged
 - Be operated readily and safely by users

Specific requirements

2.6.10 External windows

- **Standard:** To BS 14351-1
- **Framing:** Thermally broken and self-draining with fixings to suit Pascal rating and prevent cold bridging
- **Maximum cill heights:**
 - Early Years, KS1, KS2 teaching spaces and group rooms: No higher than 750mm above FFL
 - Secondary teaching spaces and group rooms: No higher than 1050mm above FFL
- **Glazing line (to the lowest edge of the glass):**
 - Early Years, KS1, KS2 teaching spaces and group rooms: Maximum 800mm above FFL
 - Secondary teaching spaces and group rooms: Maximum 1100mm above FFL
- **Louvred inserts:** Where permanently open (e.g., in plant rooms), shall have integral insect mesh to prevent infestation and entrance
- **Ventilation openings:** Designs shall:
 - Be fully and safely operable by staff
 - Position manual window openers (e.g., espagnolettes) within easy reach of finished floor level. Where this cannot be achieved or is compromised, e.g., due to window height or the presence of fitted/fixed furniture and/or equipment,

other devices e.g., teacher-controlled window winders or BMS demand controlled electrically operated window actuators shall be provided

- Ensure openable windows and vents avoid inhibiting the effective use of blinds to control solar glare
- Incorporate fly screens to D&T food rooms and catering kitchens where a ventilation system relies on natural ventilation via opening lights
- **Restrictors to openings:**
 - Extent: Fitted to windows below 1500mm above finished floor level (FFL) or from the top of adjacent fitted furniture, whichever is higher, in areas used by pupils/students
 - Type: Strap fitting that can only be removed with a key
 - Clear opening: Maximum 130mm

2.6.11 External doors generally

- **Standard:** To BS 14351-1
- **Security:** To PAS 24 - Product Assessment Specification or independently certified to Loss Prevention Standard LPS1175 Security rating classification B3 (SR2)

2.6 External windows and doors

- **Framing:** Thermally broken and self-draining with fixings to suit Pascal rating and prevent cold bridging
- **Safety:**
 - Effective clear widths (from the door stop on the door closing side to any obstruction on the hinge side e.g., projecting ironmongery) shall meet with the requirements of the project specific fire strategy for escape and/or to accommodate anticipated large equipment and sheet materials (e.g., to plant rooms, D&T and engineering prep rooms, construction workshops and externally accessed stores)
 - Leaf and a half doorsets in lieu of double doorsets are not permitted, except to are kitchens, D&T spaces and site/facilities staff workrooms
 - Door guards to be provided adjacent to all outward opening external doors to prevent impact and trapping in accordance with AD K, K6 Section 10
 - Outward opening doors to Early Years classrooms and dining areas, and any other external doors to meet the operational requirements in the Project Brief, shall be provided with a robust means of securing them in an open position (e.g., low shoot bolt into a ground fixed and concealed socket, cabin hook and eye latch etc)
 - External doors used by pupils/students to spaces within Early Years and KS1, Special Schools and

Special Colleges (and SEN Units if specified in the Project Brief) shall be fitted with anti-finger trap protection

- **Glazing line:** Early Years playroom/classroom to Early Years outdoor playspace: Fully glazed such that the glazing line is a maximum of 450mm above FFL to permit views out when children are sitting on the floor
- **Louvred inserts:** To match the performance requirements of the doorset in terms of robustness and where permanently open (e.g., in plant rooms) shall have integral insect mesh to prevent infestation and entrance
- **Thresholds:**
 - Level in accordance with BS 8300-2, permitting wheelchair access
 - Self-draining
 - Insulated and damp proofed – see [2.6.7 Resistance to moisture](#)
- **Opening force:** To BS 8300-2 and suitable for the age and the needs of the pupils/students operating the doors in consideration of the weight of each door leaf when glazed
- **Hardware and ironmongery:**
 - Grade 316 satin/brushed stainless steel through-fixed pull handles to be securely fitted to the pull side of doors only, with matching push plates fitted to the push side to cover the through-fixings

2.6 External windows and doors

- Door closers (adjustable) to BS EN 1154, with resistance to suit age and abilities of pupils/students, weight of door leaf and speed of closure
- Suitable locking mechanisms shall be provided for external escape doors to prevent unauthorised egress/entrance out of hours and when the premises is unoccupied. The design shall be fully coordinated with the project specific fire strategy and form part of the School/College's daily management plan
- Lockdown procedures shall be agreed with the Employer and School/College if not stated in the Project Brief
- The number and complexity of lock suites shall be agreed with the Employer and School/College
- All secured areas shall have access control (e.g., fob or card readers) fitted to external doors interlinked to the fire alarm system and fitted with an emergency manual override to meet the operational requirements in the Project Brief

2.6.12 Principal external entrance doors

- **Extent:** To the main visitor and/or community entrance and to any other entrances specified in the Project Brief
- **Requirements:**

- Minimum effective clear width of an individual leaf shall be 1000mm
- For Security, Framing, Safety and Thresholds all as 2.6.11
- For Glazing as 2.6.13
- **Hardware and ironmongery:**
 - Power-operated (open and close) activated either manually by push pad or automatically by movement sensors, with 'hold open' and manual override, and interlinked to the fire alarm system to ensure safe means of escape
 - Grade 316 satin/brushed stainless steel through-fixed pull handles to be securely fitted to the pull side of doors only, with matching push plates fitted to the push side to cover the through-fixings
 - Suitable locking mechanisms shall be provided for external escape doors to prevent unauthorised egress/entrance out of hours and when the premises is unoccupied. The design shall be fully coordinated with the project specific fire strategy and form part of the School/College's daily management plan
 - Lockdown procedures shall be agreed with the Employer and School/College if not stated in the Project Brief
 - The number and complexity of lock suites shall be agreed with the Employer and School/College

- All secured areas shall have access control (e.g., fob or card readers) fitted to external doors interlinked to the fire alarm system and fitted with an emergency manual override to meet the operational requirements in the Project Brief
- Letterbox style and type (to be anti-arson) to be agreed with the Employer and School/College

2.6.13 Glazing

- **Selection:** The specification of glass shall be in accordance with the BS 6262 series. A specific assessment shall be carried out in accordance with Figure 1 of BS 6262-1 to determine the correct glass for the application and area
- **Performance generally:**
 - All components, including edges, of the design shall be easy to clean and maintain
 - Glass shall remain in-situ if broken/damaged
 - Glazing to screens/windows when used to protect users from falls, including from height, shall be a combination of laminated and toughened glass of appropriate thickness and specification to meet the required horizontal UDL (uniformly distributed load) at a notional height of 1.1m above floor level. Glazing shall comply with AD K and BS 6180
- **Safety glass:**
 - Standard: To BS 6206
- Extent: To all critical locations as defined in AD K, K4 Section 5 to mainstream schools, colleges and residential accommodation and to all locations in Special Schools, Special Colleges and AP
- Certification: Third party certificated and indelibly marked in accordance with BS 6262-4
- **Toughened glass:**
 - Standard: To BS EN 12150 series
 - Quality: Heat soak tested to minimise the extent of NiS (Nickel Sulphide Inclusion) and other impurities
- **Laminated glass:**
 - Standard: To BS EN 14449
 - Continuous frame support system: Required in accordance with BS 6180
- **Security glass:**
 - Standard: To BS EN 356
 - Extent: To external doors required to resist actions of force to meet the requirements in the Project Brief
- **Manifestation:** In accordance with AD K, K5 Section 7
- **Spandrel panels:** Glazed spandrel panels where required shall be insulated and finished internally with a PPC panel fitted flush with internal face of mullions/transoms

2.6.14 Security shutters, grilles and bars

- **Standards:** To BS 8220-3 or have Loss Prevention Certification Board (LPCB) approval
- **Shutters, grilles and bars:** Provide where identified in the Project Brief

2.7

Internal walls and partitions

This sub-section outlines the performance and functional requirements for non-structural internal partitions and walls, including stud partitions, movable partitions, toilet and shower partition panels and doors, and Integrated Plumbing Systems (IPS). For backing walls to external wall cladding, see [2.5 External walls](#). For finishes to internal walls, see [3.1 Wall finishes](#)

General requirements

2.7.1 Summary

- **Purpose:**
 - Internal walls and partitions (fixed and movable) work with other building elements to define internal spaces and rooms, and to provide visual and acoustic separation
 - Where toilet and shower cubicles are permitted, their systems shall provide visual separation as appropriate to their purpose, and the age and needs of the user
 - Integrated Plumbing Systems (IPS) conceal water, electrical and public health services in toilet cubicles/rooms permitting authorised maintenance access only
- **Performance:**
 - Privacy: A view from adjacent circulation or a play/teaching space into a run of toilets when the doors are open is prohibited
 - Structure: Although often non-structural to the building frame, internal walls and partition systems shall be structurally sound and detailed to accommodate anticipated structural deflection as required
 - Moisture: To be durable and resistant to moisture
 - Fire: To resist the effects of fire and surface spread of flame to meet the requirements of the project specific fire strategy
 - Safety: Materials and elements shall not have small openings that could trap fingers or sharp edges
 - Materials: Durable and resilient and able to withstand daily use within an education environment including accidental and potential malicious or physical abuse. Materials vulnerable to impact damage e.g., by people or balls, shall not be used where pupils/students come into close contact with them
 - Quality: To have surfaces suitable to receive a range of finishes
 - Cleaning: To resist abrasion from routine cleaning methods without any noticeable change in surface appearance

2.7.2 Technical Manual references

- **Junctions and abutments:** See [3 Internal finishes](#)
- **Internal wall finishes and acoustic wall panelling:** See [3.1 Wall finishes](#)
- **FF&E:** See [4 Fittings, furniture and equipment \(FF&E\)](#)
- **Services:** See [5 Services](#)

- **Sanitaryware:** See [5.1 Sanitaryware and ancillaries](#)
- **AV systems:** See [6.3 AV systems and fixed equipment](#)
- **Surface spread of flame and fire resistance:** See [9 Fire safety](#)

2.7.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Statutory guidance:**
 - Internal walls and partitions to comply with [AD A](#), [AD B](#), [AD E](#) (reference to [BB 93](#)), [AD M](#) and [AD 7](#)
- **Standards:**
 - To BS 5234-1 and -2
 - Joint Council for Qualifications (JCQ) - Instructions for conducting examinations - Table 1 Secure Room ("The Box")

2.7.4 Minimum life expectancy

- **Non load bearing fixed internal walls and partitions:** 30 years
- **Movable partitions:** 15 years
- **Toilet/shower partition panels and doors:** 15 years
- **Integrated Plumbing Systems (IPS):** 15 years

2.7.5 Prohibited materials/systems

- **Toilet facilities provided in a 'room' (not cubicle):** Securable from the inside and intended for use by one person shall not be constructed from cubicle partition panels. The door shall have an acoustic rating of 30 dB Rw or greater. The acoustic performance of the surrounding wall construction shall be at least equivalent (or greater) to the door. Walls shall also be acoustically sealed at the soffit
- **Integrated Plumbing Systems (IPS):** In shower cubicles/rooms. IPS are permitted in toilet cubicles/rooms
- **Movable partitions:** If fire rated e.g., forming a fire compartment. Movable partitions located in non-fire rated locations are permitted

2.7.6 Strength and robustness of internal partitions

- **Requirements in accordance with BS 5234-2:**
 - All areas within Special Schools, Special Colleges and AP (and SEN Units if specified in the Project Brief): 'Severe duty' to withstand impact damage from use, including from equipment
 - Circulation areas/corridors within mainstream schools and colleges: 'Severe duty' to withstand impact damage from use, including from equipment

2.7 Internal walls and partitions

- All other spaces within mainstream schools and colleges: 'Heavy duty'
- Tests to be carried out on whole partition assemblies (including pattressing/reinforcement) and not individual components in accordance with Annexes A to F of BS 5234-2 for the proposed height of partitions. All testing relied upon shall be carried out by a UKAS accredited body and made available to the Employer
- **Crowd loading:**
 - The loading requirements of internal partitions shall be risk assessed considering their proposed location(s). Where there is a risk of failure due to crowd loading i.e., where an internal partition on an upper floor is acting as a barrier, balustrade or parapet, the partition shall achieve a minimum crowd loading of 1.5kN per metre in accordance with Annex G of BS 5234-2
- **Door openings in internal partitions:**
 - Where additional studs within 150mm of door structural openings are required to meet the duty rating in accordance with Annex F of BS 5234-2 test data, these shall be installed and recorded through photographic evidence during installation

2.7.7 Health and safety

- **Pattressing for fixtures and fittings:**
 - Where fixtures, fittings, furniture and equipment will be fixed to internal stud walls/partitions, pattressing (with evidence to demonstrate that it is sufficient for the design intent) shall be installed behind the surface applied boarding
 - The pattressing shall ensure fixings are capable of the following loads:
 - 100N for pull out (in accordance with Annex H of BS 5234-2)
 - 250N for pull down (in accordance with Annex J of BS 5234-2)**Note:** Test data or design calculations shall be provided to demonstrate fixings will withstand these loads
 - Where AV equipment is to be installed, the pattressed section shall span from floor to ceiling and no less than 3 metres in width and meet a minimum total loading of 125kg mounted with a 300mm offset. There shall be a visible mark at high level on the surface boarding over the pattressed section showing the dimensions and supported weight of the pattress

2.7 Internal walls and partitions

- All pattrassing shall be coordinated with power and data sockets concealed within or behind furniture and/or equipment
- Walls within hygiene rooms shall be designed to support track and hoist systems, and wall mounted height adjustable changing benches and/or hand wash basins where required, including anticipated in-use loads and appropriate factors of safety
- Movable partitions to have the minimum $D_{nT,w}$ of 45dB between a studio and a hall (e.g., to create, when combined, a multi-purpose hall)

2.7.8 Fire performance

- **Fire resistance:** Of fixed internal walls/partitions (not movable partitions) including penetrations shall meet the requirements of the project specific fire strategy and [9 Fire Safety](#)
- **Surface spread of flame requirements:** For fixed internal walls/partitions and movable partitions as [9 Fire Safety](#)

2.7.9 Acoustics

- **Requirements:**
 - To comply with BB 93 to adequately resist the passage of sound between internal spaces
 - Door openings shall be avoided in fixed internal walls/partitions between rooms requiring sound insulation values of 35 dB R_w or above

Specific requirements

2.7.10 Masonry walls

- **Masonry units:** To BS EN 771-3 and BS EN 771-4
- **Mortar:** To BS EN 998-2 and PD 6678
- **Fair faced blockwork:**
 - Flush pointed blockwork with a paint grade finish (and painted) – see Types W01, W02, W03 and W07 in [3.1 Wall finishes](#)
 - Flush pointed architectural masonry/decorative blockwork (unpainted) – see Types W07 and W08 in [3.1 Wall finishes](#)

2.7.11 Exam store walls

- **Requirements:**
 - In accordance with the Joint Council for Qualifications (JCQ) – Instructions for conducting examinations – Table 1 Secure Room (“The Box”) or as specified in the Project Brief if different requirements are to apply
 - Unless a wall is solid masonry e.g., brick, it shall be reinforced to the full extent of the room with metal sheeting or strong, heavy duty metal mesh beneath the surface applied boarding
- Note:** MDF is not considered sufficiently robust and shall not be used for this purpose

2.7.12 Movable partitions

- **Standards:**
 - Acoustic testing to BS EN ISO 10140-3
 - Fire classification of wall linings to BS 13501-1
- **Requirements:**
 - Provide rated pass doors where required
 - Identify and coordinate location(s) for panels to be positioned when in stacked/open position
 - Shall not have small openings that could trap fingers or sharp edges
- **Locking mechanisms:**
 - To not be of spring-loaded type, to avoid injury when released
 - To have locks with removable keys to prevent unauthorised dismantling or tampering

2.7.13 Toilet and shower partition panels and doors

- **Material:** Toilet and/or shower partition panels and doors shall be waterproof solid grade laminate (SGL)
- **Size:**
 - Standard toilet: Minimum 1500mm deep x 800mm wide (clear, excluding space for IPS). Door shall have a minimum 650mm effective clear width

2.7 Internal walls and partitions

- Standard shower: Minimum 1800mm deep x 800mm wide (clear). Door shall have a minimum 650mm effective clear width
- Ambulant and enlarged cubicles/rooms including doors: To AD M and BS 8300-2
- **Height of toilet partitions and doors (from finished floor level):**
 - Partitions to Early Years: Minimum 1200mm
 - Doors to Early Years: Minimum 1200mm
 - Partitions to KS1/Infant: Minimum 1500mm
 - Doors to KS1/Infant: Minimum 1300mm
 - Partitions to KS2/Junior, KS3 & KS4/Secondary, KS5/Post-16, College and adult provision: Full height unless a minimum of 1950mm is specified in the Project Brief
 - Doors to KS2/Junior, KS3 & KS4/Secondary, KS5/Post-16, College and adult provision: Full height unless a minimum of 1950mm is specified in the Project Brief
- **Gaps to toilet partitions and doors:**
 - Where not full height, partitions and doors shall be spaced a maximum of 150mm off finished floor level, or less as specified in the Project Brief
 - Full height partitions shall have no gaps at all (to top and bottom, and at sides)
 - Full height doors shall have a maximum gap of 5mm between the finished floor level and the

bottom of the door, and 5mm between the top of the door and the ceiling or over-panel

Note: The design shall not restrict full height doors from being lifted off its hinges close to the ceiling or over-panel in an emergency (see 'Hinges to toilet and shower doors' below)

- Gaps at the sides of toilet doors (irrespective of height) shall not provide the opportunity for malicious mobile phone use nor create finger traps
 - **Heights and gaps to shower cubicle elements:**
 - Shower cubicles may have a gap of 150mm or less between the finished floor level and the system. Shower cubicle systems (partitions and doors) shall be a minimum of 2.2m in height (the average above sloping floor levels)
- Note:** Refer to DfE's Pattern Book for typology variations
- **Panels:** Pre-drilled for fittings. Redundant or accidental drill holes in panels/doors will not be accepted
 - **Fittings:**
 - Anti-rust, tamper proof and vandal resistant
 - Feet to partition panel systems shall be mechanically fixed (to both panel system and floor) and not disrupt floor finishes
 - **Hinges to toilet and shower doors:**
 - To allow inward opening generally with rapid outwards operation or a lift off facility (with/without

panel lifters) in the event of an emergency (e.g., should a user requiring prompt emergency action be restricting the door from being opened inwardly)

- To fall open inwardly
- To eliminate the potential for finger trapping
- **Locks to toilet and shower doors:**
 - Lockable and opened manually from the inside
 - Suitable for use by people with impaired manual dexterity (i.e., a closed fist action)
 - Locks to be through fixed for added strength
 - Emergency release function via a hexagon/star key (not coin slot) to limit operation to School/College staff only
 - Lock indicator signs fitted to doors shall clearly display the word 'occupied'. A white/red or green/red indicator is prohibited
 - Spare locks to be provided to School/College at a ratio of 1:5 of those installed
- **Hooks:** Secret fixed coat hook with rubber buffer on the inside of each door or partition also serving as a doorstop
- **Visual contrast:** Contrasting colour of doors to pilasters in accordance with AD M
- **Visibility:** A view from adjacent circulation or a play/teaching space into a run of toilets when the doors are open is prohibited. Also see DfE's Pattern Book

2.7.14 Integrated Plumbing Systems (IPS)

- **Extent:** To WCs and urinals generally (in both toilet cubicles and toilet rooms) to conceal cisterns and services
Note: Not required where close coupled DOC M pack is used (e.g., in accessible toilets and hygiene rooms)
- **Prohibited:** In shower cubicles/rooms
- **Material:** Waterproof solid grade laminate (SGL) fixed and hinged/lockable panels fitted to a compatible subframe, all in accordance with manufacturer's recommendations
- **Joints:** Straight and level
- **Floor junction:** Fully bonded and sealed
- **Access panels:** Hinged and lockable with a master key and tamper proof fittings. Accessible panels to be positioned to facilitate easy inspection and maintenance of the IPS void and concealed building services e.g., drainage, electric and water supply connections

2.8

Internal doors and glazed screens

This sub-section outlines the performance and functional requirements for internal doors (glazed and unglazed) and glazed screens, ironmongery and internal roller shutters. For internal glazing to guarding and barriers (to protect from falls), see [2.4 Stairs, ramps and lifts](#). For external doors and associated ironmongery, see [2.6 External windows and doors](#)

General requirements

2.8.1 Summary

- **Purpose:**
 - Internal doors and glazed screens work with surrounding internal walls to act as the primary barrier between the interior spaces of a building
 - Solid internal doors with appropriate ironmongery can provide security, privacy and/or hide rooms from general view e.g., store rooms and service risers
 - Glazed doors and screens provide transparency to allow daylight in, views out, visual connectivity, and to facilitate passive supervision
 - Appropriate location, size and specification of internal doors and ironmongery shall provide safe, inclusive and free-flowing circulation and movement for all users (pupils/students, staff and visitors) on a day-to-day basis whilst ensuring their safe, effective escape in an emergency
- **Performance:**
 - Structure: All internal doors, glazed screens and component parts shall be capable of transferring design forces appropriate to the operational and environmental conditions to support structures for the intended design life/minimum life expectancy whilst retaining dimensional stability
 - Fire: Fire and smoke resistance with fire-stopping and fire door signage to meet the requirements of the project specific fire strategy. Also see [9 Fire safety](#)
 - Accessibility: See [2.8.7 Accessibility](#)
 - Security: Provide security glass (to Category P1A), and accommodate, integrate and coordinate locks and access control systems as necessary to meet the requirements in the Project Brief. See [2.8.12 Glazing](#) and [5.10.7 Access control](#) for technical requirements
 - Ventilation: Integrate and coordinate robust transfer grilles and/or undercuts to doors as required to achieve the required ventilation whilst meeting acoustic and fire performance requirements
 - Acoustics: Doorsets and glazed screens to comply with BB 93 to meet internal acoustic requirements for airborne sound insulation between spaces
 - Sustainable: Ethically sourced (e.g., FSC or PESCO) and supporting circular economy principles through re-use, re-manufacturing and recycling
 - Materials: Durable and resilient and able to withstand daily use within an education

2.8 Internal doors and glazed screens

environment including accidental and potential malicious or physical abuse

- Maintenance: Materials and components shall be easy to clean, maintain and repair/replace

2.8.2 Technical Manual references

- **Superstructure:** See [2.1 Structural frames](#)
- **Blinds/curtains:** See [4.1 Fittings, furniture and equipment](#)
- **Access control:** See [5.10 Security and communication systems](#)
- **Fire-stopping, fire alarm interlink and uninsulated glazing:** See [9 Fire safety](#)

2.8.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Statutory guidance:**
 - Internal doors, associated ironmongery and glazed screens to comply with [AD B](#), [AD E](#) (reference to [BB 93](#)), [AD K](#), [AD M](#) and [AD 7](#)
- **Standards:** Except where DfE requirements differ within this sub-section (2.8):
 - All components: To comply with BS 8300-2
 - Mechanical durability class of doorsets: To BS EN 12400

- Mechanical strength class of doorsets: To BS EN 1192
- Hygrothermal performance of doorsets: To Class 3 of BS EN 12219
- Glazing generally: To BS 6262 series, BS EN 12150 and BS EN 14449. In addition, to BS EN 356 for Special Schools, Special Colleges and AP, in locations needing to withstand a greater level of physical abuse/attack
- Joint Council for Qualifications (JCQ) – Instructions for conducting examinations – Table 1 Secure Room (“The Box”)

2.8.4 Minimum life expectancy

- **Internal doors:** 20 years
- **Internal glazed screens:** 20 years
- **Internal ironmongery:** 10 years
- **Internal roller shutters:** 20 years

2.8.5 Prohibited materials

- **Glazing:** Annealed float glass

2.8.6 Hygrothermal performance

- **Hygrothermal condition:** Where a material is exposed to different humidity and temperature levels on either side
- **Performance rating:** RH = relative humidity

2.8 Internal doors and glazed screens

- 'Normal' rating: One Side - 25% RH at 10°C / Opposite Side - 65% RH at 25°C
- 'Humid' rating: One Side - 25% RH at 10°C / Opposite Side - 85% RH at 25°C
- 'Wet' rating: One Side - 25% RH at 10°C / Opposite Side - 98% RH at 25°C
- **Environment:** Doorsets shall be able to withstand the hygrothermal conditions of spaces in which they are situated with no impact on performance or appearance to Class 3 of BS EN 12219

2.8.7 Accessibility

- **Visual contrast:** As AD M:
 - Door surfaces shall meet minimum Light Reflectance Values (LRV) in accordance with BS 8300-2
 - Door frames shall contrast visually with the surrounding wall
 - Door opening furniture shall contrast visually with the surface of the door
 - The leading edge of any door that is not self-closing, or is likely to be held open, shall contrast visually with the other door surfaces and its surroundings

- Measures shall be provided to prevent accidental impact with the leading edge of the door leaf when in the open position
- **Effective clear widths:**
 - The minimum effective clear width of a single leaf door in mainstream schools, AP, colleges, ambulant Special Schools and ambulant Special Colleges, and to staff only areas within non-ambulant Special Schools and non-ambulant Special Colleges shall be 825mm
 - In non-ambulant Special Schools and non-ambulant Special Colleges for predominantly pupil/student use, the minimum effective clear width of a single leaf door shall be 925mm, unless otherwise agreed with the Employer
Note: Larger doors may require an assistive opening device due to door weight
 - In specialist Changing Places facilities¹¹, and only where specified in the Project Brief, the minimum effective clear width of a single leaf door shall be 1000mm, with an assistive opening device due to door weight
 - The minimum effective clear width of double (and of equal width) doors shall be 1650mm (825mm per leaf)

¹¹ Not typical hygiene rooms.

2.8 Internal doors and glazed screens

- The only variation to the above requirement is when individual (master and slave) doors within double doorsets are required to be wider to allow Mobility Equipment to pass with good visibility maintained on both sides of the door. In these cases, the effective clear widths of doors shall meet the needs of the pupils/students and the operational requirements in the Project Brief
- Leaf and a half doorsets in lieu of double doorsets are not permitted
- **Dexterity:**
 - Door handles to BS 8300-2 and suitable for people with impaired manual dexterity
 - Where fitted with a latch, the door opening furniture shall be able to be operated with one hand using a closed fist
 - Hardware that requires hand or finger dexterity, fine motor movement or simultaneous actions to be avoided
- **Opening force of doors:** Within limits stated in AD M and BS 8300-2
- **Assistive opening devices:** Where assistive/power-operated opening devices are activated manually in Special Schools and Special Colleges (in addition to principal external entrance doors), push pads shall be mounted between 750mm and 1000mm from finished

floor level, and contrast visually with the surrounding background

- **Thresholds:** All doors shall have flush floor thresholds

2.8.8 Health and safety

- **Safeguarding:** Changing rooms shall be able to be used whilst the door of the designated changing room is held open with privacy maintained
- **Materials and components:** Including when combined, shall not have small openings that could trap fingers or sharp edges
- **Finger guards:** Shall be provided as outlined in [2.8.17 Ancillary ironmongery](#)
- **Sports halls, activity and dance studios and other spaces for energetic physical activity:** Ironmongery to be flush fitting to prevent potential collision and injury
- **Anti-ligature provision:** Elements of ironmongery, fittings, furniture and equipment shall be of anti-ligature type as required to meet the needs of the pupils/students in the Project Brief

Specific requirements

2.8.9 Internal doorsets

- **Standard:** To BS EN 14351-2
- **Fire performance:** To meet the project specific fire strategy and [9 Fire safety](#)
- **Acoustic performance:** In accordance with BB 93
- **Durability:** To BS EN 1192 and BS EN 12400
- **Key dimensions:** Refer to Table 6 for minimum effective clear widths and below:
 - Minimum clear height for all doors except to sports equipment stores: 2m
 - Minimum clear height for doors to sports equipment stores: 2.4m
- **Door leaf:**
 - All doors noted as Class 3 and Class 4 to BS EN 1192 (see 'mechanical strength' column to Table 6) shall have perimeter timber framed construction and be hardwood lipped to all four edges (minimum 8mm thickness)
 - All doors noted as Class 4 doors to BS EN 1192 (see 'mechanical strength' column to Table 6) shall also have a solid core made from high-density multi-layer particle board
- **Vision panels:**
 - Extent: To all door leaves wider than 450mm except on doorsets to medical inspection rooms, sick rooms, therapy rooms, hygiene rooms, toilets, leading into changing rooms, store rooms, plant rooms and service risers, unless otherwise specified in the Project Brief. Also see Table 6

Note: The requirement for fully glazed doors with the aperture inset 200mm from the top, leading and hinge edges in certain circumstances – see [2.8.11 Internal glazed screens](#) including where an access door is provided to the entrance of a general toilet facility (obscured as specified in the Project Brief)

 - Glazing requirements: See [2.8.12 Glazing](#)
 - Location: Minimum 200mm from leading edge
 - Minimum glazing width between beads: 150mm
 - Position(s): To comply with the visibility requirements in AD K, K6 Section 10, as a minimum
 - Beads: Fixed with pins or screws and as required to meet fire certification
- **Blinds to vision panels:**
 - Blinds shall be provided to vision panels in the following areas:

2.8 Internal doors and glazed screens

- To any space required to have a vision panel in compliance with AD B or AD M but where privacy is required (e.g., head's office, finance offices etc)
- All offices and office/meeting rooms, staff workroom, confidential meeting (interview room), and reprographics room
- Other spaces as specified in the Project Brief
- Blackout or dim-out blinds shall be provided to vision panels to spaces which require blackout or dim-out blinds on external glazing – see [4.1.28 Curtains and blinds](#)
- **Door frame:**
 - Door frames to non-fire rated, FD30 or FD30S doorsets within mainstream schools and colleges shall be made from engineered softwood, not MDF. Hardwood is also permitted
 - Door frames to FD60 (and greater) fire rated doorsets, and all doorsets within Special Schools, Special Colleges and AP (irrespective of fire rating, including non-fire rated), shall be made from hardwood
 - Each frame leg shall have a minimum of 5no. fixing locations, each location having 2no. screw fixings
 - Head of frame shall have a minimum of 1no. (central) fixing location comprising 2no. screw fixings
- Door frame depth to allow for concealed anti-ligature door furniture, such as door closers, as required to meet the needs of the pupils/students in the Project Brief
- **Perimeter gaps:**
 - Gaps between door and/or glazed screen frames and structural openings/reveals to internal walls shall be filled and sealed to meet the project specific requirements for fire-stopping/compartmentation and airborne sound insulation
 - Allow a sufficient gap between frame and opening to allow for such filler material/sealant
- **Ironmongery:** To support functionality and not undermine performance of the doorset
- **Evidence of conformity:** The Contractor shall provide manufacturer's details, date of manufacture and verification of performance/test certificate for each fire rated doorset (including smoke seals) to BS 8214
- **Door(s) to exam stores:** Single leaf doorsets only, double doorsets are not permitted. 54mm thick Class 4 doorset to BS EN 1192 (hollow panel door leaf is not permitted), all to comply with exam board or Joint Council for Qualifications (JCQ) rules

2.8.10 Vision panels in Special Schools, Special Colleges and AP

- **Vision panels:** Doorsets shall be as [2.8.9](#) including blinds, except for vision panels which shall be as follows
 - Extent: To all door leaves wider than 450mm except on doorsets to medical inspection rooms, sick rooms, therapy rooms, hygiene rooms, toilets, leading into changing rooms, store rooms, plant rooms and service risers, unless otherwise specified in the Project Brief
 - Glazing requirements: See [2.8.12 Glazing](#)
Note: Glazing meeting Category P1A of BS EN 356 to resist actions of force and physical abuse/attack shall be provided where necessary to meet the requirements in the Project Brief
 - Location: Minimum 200mm from leading edge
 - Minimum glazing width between beads: 100mm
 - Size: Two stacked and separate vision panels located between 500mm to 800mm, and 1100mm to 1800mm from finished floor level
 - Beads: Fixed with anti-tamper screws and as required to meet fire certification

2.8.11 Internal glazed screens

- **Extent:**
 - Fixed glazed screens shall be provided to ensure visual connectivity and passive supervision in the areas below, unless otherwise specified in the Project Brief:
 - All teaching, practical and play spaces (including group rooms) from circulation areas/corridors
 - Staff workrooms, offices, and meeting rooms (except confidential meeting/interview room and reprographics room)
Note: Where a smaller room like a staff office is accessed at the end of an ancillary corridor with insufficient space to install an adjacent glazed screen, the door leaf itself shall be fully glazed with the aperture inset 200mm from the top, leading and hinge edges
 - Stairs and lift lobbies from circulation areas/corridors, unless obstructed by a service spine required for servicing the stair/lift lobby itself e.g., for smoke ventilation
Note: In the case of obstruction, the doors onto the stairs/lift lobbies shall be fully glazed with the aperture inset 200mm from the top, leading and hinge edges

2.8 Internal doors and glazed screens

- Between the recording control space and adjacent music room/recording studio (optional), as agreed with the Employer
- A sliding glazed hatch/screen between the lighting/audio control space and adjacent main hall. Screen to be easily and safely openable and securely lockable on lighting/audio control space side only
- A fixed glazed screen or sliding glazed hatch (type to be agreed with the School/College) to provide sight between the administration general office and sick bay/sick room
- A sliding glazed hatch/screen between the enclosed general office/reception area to both sides of the secure line. Screens to be easily and safely openable and securely lockable by staff on office side only
- **Fire performance:** To meet the project specific fire strategy and [9 Fire safety](#)
- **Acoustic performance:** In accordance with BB 93
- **Glazing requirements:** See [2.8.12 Glazing](#)
- **Configuration options:**
 - Internal glazed screens may be immediately adjacent to the main door, as part of the doorset, or designed as internal windows with separate frames
 - Shall have a consistent design approach in relation to the doorset/screen configuration and detailing,

particularly when seen together in number along circulation areas/corridors

- **Key dimensions of internal glazed screens:**
 - Minimum area 1m² in each location, in addition to the glazed vision panel to the adjacent doorset
Note: This area equates to approx. 450mm wide x 2.1m high screen (adjacent to a doorset)
 - Height: The bottom edge of the glazing where adjacent to a doorset shall be no lower than the top of the skirting. Where a wider/separate glazed screen is proposed, the bottom edge of the glazing shall be no higher than 1.1m above floor level; unless an alternative height is required for child safeguarding purposes e.g., nappy changing
- **Beads:** Fixed with pins or screws and as required to meet fire certification, except in Special Schools, Special Colleges or AP where anti-tamper screws shall be used
- **Blinds to glazing:**
 - Blinds shall be provided to internal glazed screens to the following areas:
 - All staff workrooms, offices and meeting rooms
 - Other spaces as specified in the Project Brief
 - Blackout or dim-out blinds shall be provided to internal glazed screens to spaces which require blackout or dim-out blinds on external glazing

2.8.12 Glazing

- **Selection:** The specification of glass to internal glazed screens and vision panels to doorsets shall be in accordance with the BS 6262 series. A specific assessment shall be carried out in accordance with Figure 1 of BS 6262-1 to determine the correct glass for the application and area, but subject to a default minimum of:
 - Safety glass to all critical locations as defined in AD K, K4 Section 5 to mainstream schools, colleges and residential accommodation
 - Safety glass to all locations in Special Schools, Special Colleges and AP unless it is required to withstand a greater level of physical abuse/attack, in which case Category P1A to BS EN 356 toughened (tempered) safety glass shall be provided to meet the requirements in the Project Brief
- **Fire performance:** To meet the project specific fire strategy and [9 Fire safety](#)
- **Acoustic performance:** In accordance with BB 93
- **Performance generally:**
 - All components of the design shall be easy to clean and maintain
 - Glass shall remain in-situ if broken/damaged
- Glazing to internal screens when used to protect users from falls, including from height, shall be a combination of laminated and toughened glass of appropriate thickness and specification to meet the required horizontal UDL (uniformly distributed load) at a notional height of 1.1m above floor level and comply with AD K, BS 5234 and BS 6180
- **Safety glass:**
 - Standard: To BS 6206
 - Certification: Third party certificated and indelibly marked in accordance with BS 6262-4
- **Toughened glass:**
 - Standard: To BS EN 12150 series
 - Quality: Heat soak tested to minimise the extent of NiS (Nickel Sulphide Inclusion) and other impurities
- **Laminated glass:**
 - Standard: To BS EN 14449
 - Continuous frame support system: Required in accordance with BS 6180
- **Security glass:**
 - Standard: To BS EN 356
 - Extent: To internal doors required to resist actions of force to meet the requirements in the Project Brief
- **Manifestation:** In accordance with AD K, K5 Section 7

2.8.13 Internal roller shutters

- **Extent:** Between kitchen servery and space used for dining as a minimum, and to other spaces as specified in the Project Brief
- **Standard:** To BS EN 13241
- **Fire resistance:** To meet project specific fire strategy and tested to BS EN 1634-1
- **Acoustic performance:** Serveries shall be placed between kitchens and dining spaces wherever possible to avoid noise transfer during meal preparation. Where this is not possible between kitchens and multi-purpose halls, shutters to serving hatches shall be designed to have as high a level of sound insulation as practicable (not less than 18 dB Rw)
- **Operation:**
 - Automatic key operated controls in clear and obvious location for staff only use
 - To be linked to fire alarm system where fire rated and descend at a controlled speed on activation of the fire alarm; with audio/visual display and battery backup
 - Design shall prevent dirt build-up over serving area(s) and be fully demountable below ceiling level for maintenance

Ironmongery

2.8.14 Handles and push plates

- **Lever handles:**
 - Standard: To Grade 3 of BS EN 1906, except in Special Schools, Special Colleges and AP where Grade 4 is required
 - Type: With return end
 - Diameter range: 19mm - 35mm
 - Minimum length: 95mm
 - Fixings: Through-fixed
 - Minimum offset from the door leaf: 45mm
- **Pull handles:**
 - Standard: To BS 8424
 - Diameter range: 19mm - 35mm
 - Minimum length: 400mm
 - Orientation: Vertical
 - Slave leaf: Required
 - Fixings: Through-fixed
 - Minimum offset from the door leaf: 45mm
 - Positioning: Lowest end is no lower than 700mm and no higher than 1000mm above floor level and the uppermost end is no lower than 1300mm above floor level
 - Fitting of pull handles to the push side of doors: Prohibited
- **Push plates:**
 - Minimum dimensions: 90mm x 500mm but shall cover pull handle fixings
 - Orientation: Vertical
 - Slave leaf: Required
 - Fixings: Mechanically fixed with screws
 - Positioning: If a single push plate is not compatible with other ironmongery fitted to the door, provide two plates fitted above and below the lock position

2.8.15 Locks

- **Lever locks:**
 - Use: With lever handles
 - Operation: Key from outside and thumb-turn inside. Thumb-turn shall be capable of being overridden with a key if locked or if thumb-turn held from the inside/classroom side
 - Suiting to be agreed with School/College; minimise variations to manage access and lockdown
- **Dead locks:**
 - Use: Without lever handles; with pull handles
 - Operation: Key from outside. Where used on doors required for means of escape this deadlock shall be capable of being (panic) overridden from the inside

2.8 Internal doors and glazed screens

- Slave leaf in double door arrangement: Shall be fitted with flush bolts at top and bottom of slave leaf
- Suiting to be agreed with School/College; minimise variations to manage access and lockdown
- **Bathroom locks:**
 - Locking mechanism: From inside by thumb-turn or lever
 - Emergency release mechanism: From outside by hexagon/star key (not coin slot) to limit operation to School/College staff only – also see [2.7.13 Toilet and shower partition panels and doors](#)
- **Ergonomic locks:**
 - Use: Fully operable by users with impaired manual dexterity
 - Locking mechanism: From inside
 - Release mechanism: From outside by hexagon/star key (not coin slot) to limit operation to School/College staff only – also see [2.7.13 Toilet and shower partition panels and doors](#)
- **Space specific locking requirements:**
 - Exam stores: Locking arrangements to comply with exam board criteria or Joint Council for Qualifications (JCQ) rules e.g., 5-lever mortice lock or coded keypad lock or electronic security lock; cylinder locks are not acceptable
 - Secure stores (medical): 5-lever mortice lock or coded keypad lock or electronic security lock

- Communications room(s): Shall include a lock and key of a type that cannot be duplicated without authority. To be suited if more than one door. Provide six keys for each room lock
- Accessible staff only toilets: Shall include ironmongery that prohibits general access, permitting access for School/College staff and disabled users only, if required by the School/College and specified in the Project Brief

2.8.16 Door closers and electromagnetic devices

- **Door closers:**
 - Extent: To not be provided to classroom doors unless agreed with the Employer or as required to meet the project specific fire strategy (see [9 Fire safety](#)). Also see Table 7
 - Standard: To BS EN 1154
 - Opening force: Within limits stated in AD M and BS 8300-2
 - Operation:
 - Shall have an adjustable tensioner to optimise fire resistance and acoustic performance when closed
 - Delayed action closers shall not delay the closing action more than that required for its use and not exceed 25 seconds

2.8 Internal doors and glazed screens

- Shall not protrude lower than the underside of the door frame/stop to the top of the door opening
- Fire rated doorsets in circulation areas/corridors: Shall be provided with door closers together with electromagnetic hold open devices (see below) linked to the automatic fire detection and alarm system to ensure fire doors automatically close on activation of the fire alarm
- Fire rated doorsets in Special Schools, Special Colleges and AP shall be provided with concealed type overhead door closers
Note: These shall be of anti-ligature type where required to meet the needs of the pupils/students in the Project Brief
- **Electromagnetic hold open devices:**
 - Extent: To be securely fitted to self-closing fire doors to halls and in circulation areas/corridors (but not to doors leading onto stairs) and not to doors required to be self-closing to provide privacy e.g., to changing rooms
 - Standard: To BS EN 1155
 - Operation: To be linked to the automatic fire detection and alarm system to ensure fire doors automatically close on activation of the fire alarm

- **Access controlled doorsets to pupil areas in SEMH and AP settings:**
 - Extent: See [5.10.7 Access control](#) and as specified in the Project Brief
 - Operation: Electromagnetic device shall not protrude lower than the underside of the door frame/stop to the top of the door opening
- **Access controlled fire rated doorsets:**
 - Extent: To be provided with fail open electromagnetic devices and securely fitted to ensure fire doors automatically unlock on activation of the fire alarm to meet the requirements of the project specific fire strategy and/or Project Brief
 - Operation: Electromagnetic device shall not protrude lower than the underside of the door frame/stop to the top of the door opening

2.8.17 Ancillary ironmongery

- **Hinges:**
 - Standard: To BS EN 1935
 - Anti-ligature type: Where required to meet the needs of the pupils/students in the Project Brief, doorsets shall be provided with a full door length anti-ligature security hinge per leaf
- **Emergency release doorstops:**
 - Extent: Shall be provided on all inward opening doorsets to toilet facilities provided in a room (not

2.8 Internal doors and glazed screens

cubicle) securable from the inside and intended for use by one person, together with door pivots to permit dual swing in an emergency

- Type: Key operated removable doorstop
- Privacy: Detailing of door perimeter including all ironmongery shall prohibit views into the toilet when the door is closed
- **Finger guards:**
 - Extent: Shall be provided on all doorsets used by pupils/students in Early Years, KS1 and in Special Schools/Special Colleges, AP and SEN Units. Provide on other doorsets where required to meet the needs of the pupils/students in the Project Brief
 - Standard: To Class 2 as defined in Table 1 of BS 8613
 - Fitting: For newly supplied doorsets, guards shall be built into the door and frame. For retained/refurbished existing doorsets, guards shall be face fixed to door and frame without compromising the overall performance of doorset
 - Coordinate: Full door length anti-ligature security hinge(s) (if required) with finger guard(s) to ensure risks are fully mitigated
- **Kickplates:**
 - Extent: To be fitted to both sides of each door leaf, unless door is steel finished or a service riser door
- Minimum height: 200mm, or 450mm in any non-ambulant Special School/Special College
- Additional protection: May be provided by oversized kickplates of suitable material to meet the operational requirements in the Project Brief (e.g., to withstand trolley use or potential malicious damage), however, such a fixture shall not compromise the required fire performance of the doorset
- Fixing: Securely and mechanically fixed with screws
- **Doorstops:**
 - Safety: Locate so they do not constitute a trip hazard
 - Position on floor: No less than two thirds of the door width away from the hinge line but not where underfloor heating is provided
 - Position to adjacent skirting boards: As close to the leading edge of the leaf as possible, especially where underfloor heating is provided
- **Statutory fire door signage:** To meet the requirements of the project specific fire strategy. Also see [9 Fire safety](#)
- **Nameplates and numbers:**
 - Provision: Fitted to all internal doors
 - Purpose: Denoting name or purpose, agreed number and identifying suites (i.e., Departments)

2.8 Internal doors and glazed screens

- Fixing: To be tamper proof, preferably concealed

2.8 Internal doors and glazed screens

Type	Area	Effective clear width (mm) ¹	Mechanical durability ²	Mechanical strength ³	Vision panel required ⁴	Ironmongery set (as Table 7)	Notes
D01 ⁵	Medical inspection rooms, sick rooms, therapy rooms	825	5	3	No	a	n/a
D02 ⁵	All general teaching classrooms and shared teaching areas (except spaces listed in other door types below), science laboratories, light practical spaces, social spaces, libraries and study areas, small group rooms, staff rooms, staff workrooms, offices, meeting rooms	825	5	3	Yes	a	Closer to be avoided on classroom doors unless required by the fire strategy
D03 ⁵	Early Years and KS1/Infant classrooms, libraries and small group rooms used by Early Years and KS1/Infant pupils	825	5	3	Yes	e	Closer to be avoided on classroom doors unless required by the fire strategy
D04 ⁵	D&T/construction workshops	825	5	4	Yes	a	n/a
D05 ⁶	D&T food rooms, kitchenettes, kitchen preparation area, kitchen office	825	5	4	Yes	a	n/a

2.8 Internal doors and glazed screens

Type	Area	Effective clear width (mm) ¹	Mechanical durability ²	Mechanical strength ³	Vision panel required ⁴	Ironmongery set (as Table 7)	Notes
D06 ⁶	Accessible toilets, accessible changing, hygiene rooms	825	5	4	No	d	Access control system to be agreed with School/College. If door leaf opens inwards, it shall be openable outwards in an emergency
D07 ⁶	Entrance to toilet suites and changing rooms	825	8	3	No	c	This excludes supervised toilet suites in Early Years or where open plan suites are required in the Project Brief
D08 ⁶	Entrance to toilet suites in Special Schools/Special Colleges	825	8	3	No	l	Access control system to be agreed with School/College
D09 ⁶	Universal toilet rooms	825	8	3	No	b	If door leaf opens inwards, it shall be openable outwards in an emergency

2.8 Internal doors and glazed screens

Type	Area	Effective clear width (mm) ¹	Mechanical durability ²	Mechanical strength ³	Vision panel required ⁴	Ironmongery set (as Table 7)	Notes
D10 ⁵	Communications rooms, exam stores	825	8	4	No	n	See space specific door and locking requirements - 2.8.9 and 2.8.15
D11 ⁶	Store rooms, cleaners' stores	825	3	3	No	o	Door to open outwards if store room opens off teaching space
D12 ⁵	D&T prep, engineering prep, or materials store for heavy practical activities	825	3	4	Yes	o	n/a
D13 ⁶	Food prep/store from circulation and kitchen store from kitchen preparation area	825	3	4	No	o	n/a
D14 ⁶	Chemical and other hazardous material stores, service risers, plant rooms	825	3	4	No	o	Door shall be unlockable from inside
D15 ⁵	General teaching classrooms and shared teaching areas, science laboratories, light practical spaces, social spaces, libraries and small group rooms in non-ambulant Special Schools/non-ambulant Special Colleges	925	5	4	Yes	j	Access control system to be agreed with School/College

2.8 Internal doors and glazed screens

Type	Area	Effective clear width (mm) ¹	Mechanical durability ²	Mechanical strength ³	Vision panel required ⁴	Ironmongery set (as Table 7)	Notes
D16 ⁶	D&T food rooms in non-ambulant Special Schools/non-ambulant Special Colleges	925	5	4	Yes	j	Access control system to be agreed with School/College
D17 ⁶	Accessible toilets, hygiene rooms and changing rooms in non-ambulant Special Schools/non-ambulant Special Colleges	925	5	4	No	k	Access control system to be agreed with School/College. Pull handles to both faces if double swing
D18 ⁵	Dining and social areas (double doors - not lobbied)	1650	5	3	Yes	p	Plain meeting stiles
D19 ⁵	Multi-use and main halls, performance spaces (double doors - not lobbied)	1650	5	3	Yes	p ⁸	Plain meeting stiles. If used for PE, doors must open outwards from main space

2.8 Internal doors and glazed screens

Type	Area	Effective clear width (mm) ¹	Mechanical durability ²	Mechanical strength ³	Vision panel required ⁴	Ironmongery set (as Table 7)	Notes
D20 ⁵	Sports halls, activity studios, dance studios (double doors)	1650	5	3	Yes	i	Plain meeting stiles. Doors must open outwards from main space. All surfaces on hall/studio side shall be flush with no projecting frames or ironmongery
D21 ⁵	Circulation routes and zoning (double doors)	1650	5	3	Yes	f	Override to hold open device to be provided in an access restricted location
D22 ⁵	Draught lobbies and stairs (double doors)	1650	5	3	Yes	g	n/a
D23 ⁵	Doors between paired general teaching classrooms, light practical spaces, small group rooms, staff rooms, offices (double doors)	1650	5	3	Yes	m	Doors to open 180 degrees and be restrained in open position

2.8 Internal doors and glazed screens

Type	Area	Effective clear width (mm) ¹	Mechanical durability ²	Mechanical strength ³	Vision panel required ⁴	Ironmongery set (as Table 7)	Notes
D24 ⁵	Sports equipment stores (tall double doors)	1650	4	4	No	h	Dimensions to suit equipment to be stored. Pull handles to be flush fitting/non-projecting
D25 ⁵	Multi-use and main halls, performance spaces in Special Schools/Special Colleges (double doors - not lobbied doors)	1650	5	4	Yes	q	Plain meeting stiles. If used for PE, doors must open outwards from main space. Access control system to be agreed with School/College
D26 ⁵	Circulation routes and zoning in Special Schools/Special Colleges (double doors)	1650	5	4	Yes	r	Access control system to be agreed with School/College. Override to hold open device to be provided in an access restricted location

Table 6: Internal doorset requirements

2.8 Internal doors and glazed screens

- ¹ Opening angle greater than 90 degrees is permitted
- ² Mechanical durability class defined in BS EN 12400
- ³ Mechanical strength class defined in BS EN 1192
- ⁴ Unless required to comply with AD B and/or AD M
- ⁵ Hygrothermal performance rating 'normal' – see 2.8.6
- ⁶ Hygrothermal performance rating 'humid' – see 2.8.6
- ⁷ Hygrothermal performance rating 'wet' – see 2.8.6
- ⁸ Where sports and PE are to be played, ironmongery set to be changed to 'i'

2.8 Internal doors and glazed screens

Ironmongery set	Finger guards required	Lever handles required	Pull handle / push plate required	Lock type	Door closer required ³	Flush bolts to top / bottom of slave leaf
a	No	Yes	No	Lever	No	n/a
b	No	Yes	No	Bathroom	No	n/a
c	No	No	Yes	None	Yes	n/a
d ¹	No	No	Yes ⁴	Ergonomic	No	n/a
e	Yes	Yes	No	Lever	No	n/a
f ²	No	No	Yes	Dead lock	Yes	Yes
g	No	No	Yes	None	Yes	Yes
h	No	No	Yes	Dead lock	No	Yes
i	No	No	Yes, flush	Dead lock	Yes	Yes
j	Yes	Yes	No	Lever	No	n/a
k ¹	Yes	No	Yes ⁴	Ergonomic	No	n/a
l	Yes	No	Yes	None	Yes	n/a
m	No	Yes	No	Lever	No	Yes
n	No	Yes	No	Special see 2.8.15	Yes	n/a
o	No	Yes ⁵	No	Lever	Yes	n/a
p	No	No	Yes	Dead lock	Yes	Yes
q	Yes	No	Yes	Dead lock	No	Yes
r ²	Yes	No	Yes	Dead lock	Yes	Yes

Table 7: Ironmongery requirements

2.8 Internal doors and glazed screens

¹ Staff and/or disabled only use via access control system to be agreed with School/College

² Electromagnetic hold open device required with override positioned in access restricted location

³ Unless required by project specific fire strategy

⁴ Referring to horizontal pull handle/closing bar to back of door

⁵ A cylinder pull with deadlock may be installed on service riser doors requiring infrequent access in lieu of lever handles/lever locks

Note: Hinges to all sets to be of standard (butt hinge) type to BS EN 1935 except ironmongery set 'm' which shall be parliament type or where full door length anti-ligature security hinges are required to meet the needs of the pupils/students in the Project Brief

3

Internal finishes

3.1

Wall finishes

This sub-section outlines the performance and functional requirements for surface finishes to internal walls and partitions. For non-structural internal partitions and walls, including stud partitions, movable partitions, toilet and shower partition panels and doors, and Integrated Plumbing Systems (IPS), see [2.7 Internal walls and partitions](#). For external wall finishes, see [2.5 External walls](#)

General requirements

3.1.1 Summary

- **Purpose:** Wall finishes internally (i.e., the surface finish to internal walls and partitions) when well designed and maintained:
 - Work in conjunction with wall and partition build-ups to meet the requirements of the space including fire and impact resistance, and acoustic and hygiene performance
 - Complement the building's interior and support navigation and wayfinding
- **Performance:**
 - Fire: Wall finishes, including linings and fire-stopping, to be selected and installed to meet the requirements of the project specific fire strategy. Also see [3.1.6 Fire performance](#)
 - Accessibility: Wall finishes to visually contrast with door frames and face plates with 30 points or greater difference in light reflectance value (LRV) between the contrasting surfaces, in accordance with AD M
 - Moisture: To be resistant or impervious to moisture where required
 - Hygrothermal performance: See [3.1.7 Hygrothermal performance](#) and Table 8
 - Durability: See [3.1.8 Durability](#)
 - Hygiene: To be easy to clean and maintain in wet sanitary areas or where food is prepared
 - Surface reflectance: Minimum light reflectance value for wall finishes shall be 50%, unless natural materials are used
 - Acoustics: Acoustic systems and treatments to be selected and installed to comply with BB 93, except where there is a variation to these requirements against a specific space type in the Schedule of Spaces. Where this occurs, the requirements of the space type shall take precedence
 - Health and safety: See [3.1.9 Health and safety](#)

3.1.2 Technical Manual references

- **Substrates and pattering:** See [2.7 Internal walls and partitions](#) and [6 Technology](#)
- **Skirting:** See [3.2 Floor finishes](#)
- **FF&E:** See [4 Fittings, furniture and equipment \(FF&E\)](#)
- **Daylighting, lighting, heating and ventilation:** See [5 Services](#)
- **Track/hoist systems and splashbacks:** See [5.1 Sanitaryware and ancillaries](#)
- **AV equipment:** See [6.3 AV systems and fixed equipment](#)

- **Fire-stopping:** See [9 Fire safety](#)

3.1.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - Paints and varnishes: [Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2012](#)
- **Statutory guidance:**
 - Internal wall finishes to comply with [AD B](#), [AD E](#) (reference to [BB 93](#)), [AD M](#) and [AD 7](#)
- **Standards:** Except where DfE requirements differ within this sub-section (3.1):
 - To comply with BS 6150 and BS 8300-2
 - Waterborne paints: To achieve a Class 1 classification to BS EN ISO 11998 or a Type C classification to BS 7719 in heavy duty areas, tested to BS EN 13300

3.1.4 Minimum life expectancy

- **Plaster/plasterboard to fixed internal walls and partitions:** 30 years (as per overall internal wall build-up)
- **Paint decoration including to 'heavy duty' areas:** 5 years before first redecoration cycle
- **Hygienic wall cladding:** 30 years

- **Tiling:** 15 years
- **Acoustic wall panelling:** 20 years

3.1.5 Prohibited materials

- **Sealants:** Application of PVA on plasterboard surfaces to receive a painted finish is prohibited

3.1.6 Fire performance

- **Fire spread:** Finishes to internal walls and partitions shall not provide a medium for fire spread
- **Fire resistance:**
 - Finishes to be fire and smoke resistant
 - Fire classification for linings to comply with BS EN 13501-2
- **Flake test:** To be carried out by a paint manufacturer on existing painted walls and exposed surfaces for refurbishment projects where surface spread of flame needs to be controlled and to determine whether the fire resistance of the paint finish requires a specialist flame retardant coating to be applied

3.1.7 Hygrothermal performance

- **Hygrothermal condition:** Where a material is exposed to different humidity and temperature levels on either side
- **Performance rating:** RH = relative humidity

- 'Normal' rating: One side - 25% RH at 10°C / Opposite side - 65% RH at 25°C
- 'Humid' rating: One side - 25% RH at 10°C / Opposite side - 85% RH at 25°C
- 'Wet' rating: One side - 25% RH at 10°C / Opposite side - 98% RH at 25°C
- **Mould resistant finishes:** To be used in spaces where Table 8 identifies the hygrothermal performance as 'humid' or 'wet'

3.1.8 Durability

- **Low maintenance:** Wall finishes shall:
 - Be suitable for an education environment (e.g., can withstand the expected impact/wear caused by the frequent movement of pupils/students and staff, including abrasion from bags and use of trolleys)
 - Allow limited areas to be repainted/redecorated or removed and replaced (e.g., individual tiles, sheets or panels) without damaging adjacent finishes or affecting the overall appearance
 - Resist abrasion from routine cleaning methods without a noticeable change in surface appearance
 - Allow the removal of graffiti and stubborn marks without damaging the surface of the material
- **Additional protection:**
 - All plastered walls: High performance primer to be applied to corner edge beading before decorating

- Corner guards: See [3.1.19 Wall ancillaries](#)

3.1.9 Health and safety

- **Decorations and finishes:**
 - All paints and varnishes shall be waterborne with low Volatile Organic Compound (VOC) content
 - Solvent-based finishes shall be permitted by exception and only when expressly agreed with the Employer
 - Rough and/or unfinished applications are unacceptable
- **Anti-bacterial coatings:** Shall be applied where required to meet the particular health needs of the pupils/students in the Project Brief

3.1.10 Coordination with services and fittings

- **Service penetrations:**
 - To be fully coordinated to ensure openings through walls for building services are of suitable size and shape (not overly large) and accurately located to provide a neat and tidy final finish
 - No penetration(s) shall compromise the performance of the overall wall and/or partition
- **Fixing of equipment:** Tracking and fixing of wall-mounted equipment such as hoists in hygiene rooms and interactive screens to teaching walls to be coordinated with other wall-mounted services. Finished

3.1 Wall finishes

tiles, sheet cladding and acoustic wall panels with redundant or accidental drill holes will not be accepted

Specific requirements

3.1.11 Plaster coatings

- **Extent:** See Table 8
- **Standards:** To BS EN 13279-1 and BS 8481
- **Type:**
 - Low-humidity areas: Gypsum plaster
 - High-moisture areas: Cement plaster
- **Thickness:** 12-25mm in accordance with manufacturer's recommendations for application
- **Installation:** Provide bonding agent or suitably rough surface to ensure strong and long-lasting adhesion to prepared substrate in accordance with manufacturer's recommendations

3.1.12 Plasterboard

- **Extent:** See Table 8
- **Standard:** To BS EN 520 and standards relevant to plasterboard type and application
- **Types:** Gypsum board to meet project specific performance requirements:
 - Standard
 - Moisture-resistant
 - Fire-resistant
 - Acoustic
 - Impact-resistant

- Insulated
- **Installation:**
 - Fixing: Plasterboard to be screw fixed to metal or timber studs in accordance with manufacturer's recommendations
 - Surface finish: All joints to be compound taped, filled and sanded smooth or 1-3mm thick plaster skim coat applied to surface area to a smooth finish

3.1.13 Paint and coatings

- **Base/surface finish:** Smooth and free from holes, scratches and gouges
- **Primer coats:**
 - Number of primer coats, site conditions for application and compatibility with substrate and subsequent finish coats to be in accordance with manufacturer's recommendations
- **Finish coats:**
 - Number of finish coats and site conditions for application and compatibility with primer coats to be in accordance with manufacturer's recommendations
 - In general areas including classrooms and offices: High performance, durable trade acrylic matt

3.1 Wall finishes

- In circulation areas/corridors, halls and large spaces: High performance, durable trade acrylic eggshell (or matt finish when expressly agreed with the Employer), tested to achieve Type C scrub rating to BS 7719, that can be maintained through cleaning and not only through redecorating
- Where paint is used in catering kitchens and D&T food rooms it shall be a high performance antibacterial eggshell
- All colours to be agreed with the School/College and Employer
- **Protective coating:** Single pack clear/coloured protective performance coating or single pack protective performance glaze over the manufacturer's approved base coats
- **Intumescent paint:**
 - Thickness: As defined in BS EN ISO 12944-5
 - Finish: Top sealer coat gloss or semi-gloss

3.1.14 PVCu cladding

- **Extent:** See Table 8. Also, a material option for splashbacks – see [5.1 Sanitaryware and ancillaries](#)
- **Material:** Extruded semi-rigid PVCu (Polyvinyl Chloride unplasticized)
- **Fire resistance:** To be tested to BS EN 13501-1 to achieve Class B-s3, d0
- **Finish:** Satin/smooth

- **Colour:** White, or an alternative to be agreed with the School/College and Employer
- **Thickness:** Minimum 2.5mm
- **Joints:**
 - Hot welded, colour matched with cladding sheet
 - No joint trims between sheets, except along base of cladding at junction with coved skirting where a compatible transition strip is permitted; 50mm overlap detail (cladding over coved floor finish) with clear sealant bead also permitted
- **Corners:**
 - General: Thermoformed on site
 - Vulnerable external corners: Overclad with stainless steel corner protectors, to a height of 1.8m
- **Installation:**
 - Substrate: Flat, level, dry and stable; waterproofed where required
 - Fixing: Install with non-toxic, solvent-free, waterproof and mould-resistant adhesive in accordance with manufacturer's recommendations

3.1.15 Ceramic tiling

- **Extent:** A material option for splashbacks – see [5.1 Sanitaryware and ancillaries](#)
- **Standard:** To BS EN 14411
- **Type:** Glazed

- **Joints:** Flexible, water and mould-resistant, polymer modified cementitious grout
- **Installation:**
 - To BS 5385 series
 - Substrate: Flat, level, dry and stable; waterproofed where required
 - Adhesive: High-performance cementitious adhesive with no vertical slip or shrinkage, extended open time, water, frost and mould-resistant applied in accordance with manufacturer's recommendations

3.1.16 Stainless steel sheet cladding

- **Extent:** See Table 8
- **Standard:** To BS EN 10088-2
- **Type:** Grade 304
- **Finish:** Satin/brushed
- **Thickness:** Minimum 0.9mm
- **Joints:**
 - Seamless ground and polished welds
 - No joint trims between sheets, except along base of cladding at junction with coved skirting where a compatible transition strip is permitted; 50mm overlap detail (cladding over coved floor finish) with clear sealant bead also permitted
- **Installation:**
 - Substrate: Flat, level, dry and stable; waterproofed where required

- Adhesive fixing: Install with food-safe, non-toxic, water and mould-resistant adhesive applied in accordance with manufacturer's recommendations
- Additional mechanical fixing: In high impact or humid areas use stainless steel screws or rivets in combination with adhesive, flush to the panel

3.1.17 Acoustic wall panelling

- **Extent:** As required to meet BB 93 or reverberation time against specific space type(s) where different
- **Dimensions, thickness and orientation:** To meet project requirements. Angled wall panels may be required to achieve required sound quality
- **Fire resistance:** Panels shall comply with Table 30 (Classification of linings) in [9 Fire safety](#) in conjunction with the fire performance of the whole wall/partition
- **Core material options:**
 - High-density mineral wool
 - Cement-bonded wood wool
 - Foam
 - Perforated MDF or veneered plywood
 - Recycled polyester
- **Surface finish options:**
 - Fabric-wrapped
 - Painted or lacquered perforated finish
 - Laminate

3.1 Wall finishes

- **Edge profile:** Square, bevelled or concealed edges
Note: Material selection, product type and fixing arrangement of the panels shall be suitable for the type of activities within space, mounting height and expected level of impact/tampering
- **Installation:**
 - Substrate: Flat, level, dry and stable
 - Fixing: Concealed/secret but securely fixed to substrate using the methods and components/fixings recommended by the manufacturer for the application and substrate
 - Application shall not compromise the performance of the wall and/or partition the panel is fixed to

3.1.18 Wall padding

- **Extent:** Where required to meet the needs of the pupils/students in the Project Brief (e.g., SEN spaces, quiet calming spaces and soft play rooms)
- **Dimensions and thickness:** To meet project requirements
- **Fire resistance:** Padding shall comply with Table 30 (Classification of linings) in [9 Fire safety](#) in conjunction with the fire performance of the whole wall/partition
- **Moisture resistance:** Waterproof, easy to clean, and resistant to mould
- **Core material:** High-density foam. Density between 30–150 kg/m³, depending on impact absorption needs

- **Surface finish:** Durable, tear-resistant vinyl or PU leather
- **Edge profile:** Square, rounded, or bevelled edges to minimise sharp corners
- **Backing:** Plywood, MDF, or composite board for structural integrity and mounting stability
- **Installation:**
 - Substrate: Flat, level, dry and stable
 - Fixing: Concealed/secret but securely fixed to substrate using method and products recommended by manufacturer for application
 - Application shall not compromise the performance of the wall and/or partition the panel is fixed to

3.1.19 Wall ancillaries

- **Lockable powder coated steel access panels:**
Install:
 - In staff only areas or where pupils/students are supervised (e.g., not in toilet cubicles, not in separate toilet rooms, not in showers or shower drying areas, not in changing rooms and other areas where pupils/students are unattended)
 - At a height to facilitate safe access to equipment or building services for maintenance, subject to an agreed Access, Cleaning and Maintenance Strategy and Planned Maintenance Plan

3.1 Wall finishes

- **Corner guards:**
 - Made from PVCu or stainless steel to be fixed to exposed corners or columns in circulation areas/corridors as a minimum, and any other areas susceptible to damage, to a minimum height of 1.8m above FFL
 - Transparent PVCu corner guards to be used to corners with wall-applied graphics/murals

3.1 Wall finishes

Type	Finish	Area	Finish ¹	Joints ²
W01	Painted plasterboard or painted plaster or flush pointed paint grade blockwork with painted finish ³	All general areas including classrooms not subject to humid/wet conditions or high hygiene requirements	Smooth for plaster/board n/a for blockwork	Jointless for plaster/board Flush for blockwork
W02	Painted plasterboard or painted plaster or flush pointed paint grade blockwork with a painted finish (heavy-duty) ³	Light practical spaces, activity studios, drama studios, dance studios, social areas, fitness rooms, D&T/construction workshops, D&T/engineering prep rooms	Smooth for plaster/board n/a for blockwork	Jointless for plaster/board Flush for blockwork
W03	Painted plasterboard or painted plaster or flush pointed paint grade blockwork with a painted finish (heavy-duty) ³	Science laboratories, chemical stores, changing rooms, cleaners' stores, plant rooms	Smooth/ impervious for plaster/board n/a for blockwork	Jointless for plaster/board Flush for blockwork
W04	Painted plasterboard or painted plaster (heavy-duty) ⁴	D&T food rooms, serveries, toilets	Smooth/ impervious	Jointless
W05	Painted plasterboard or painted plaster or PVCu cladding or stainless steel sheet cladding (heavy-duty) ⁴	Kitchen preparation areas, kitchen staff and food stores, medical inspection rooms, sick bays/sick rooms, kitchenettes	Smooth/ impervious	Jointless/ impervious
W06	PVCu cladding ⁵	Showers, hygiene rooms	Smooth/ impervious	Jointless/ impervious
W07	Painted plaster, pre-finished timber/plywood, flush pointed paint grade blockwork with a painted finish or flush pointed fair faced (unpainted) architectural masonry/decorative blockwork (heavy-duty) ³	Multi-purpose/main halls, sports halls	Smooth for plaster/timber n/a for blockwork	Jointless for plaster Flush for timber/blockwork

3.1 Wall finishes

W08	Painted plasterboard or painted plaster or flush pointed fair faced (unpainted) architectural masonry/decorative blockwork (heavy-duty) ³	Dining/informal dining areas, circulation areas/corridors including stairs, entrance/reception areas	Smooth for plaster/board n/a for blockwork	Jointless for plaster/board Flush for blockwork

Table 8: Wall finish requirements

¹ Finish

Smooth: No coarser than brush-applied matt emulsion/eggshell on a flat plastered/skimmed/taped and jointed surface without projections, indents or holes part-way through the material

Impervious: Able to resist the penetration of water, solutions containing detergents and disinfectants, and other liquids likely to be encountered

² Joints

Jointless: Without visible joints including hairline cracks to joints

Flush: Pointing type to fair faced blockwork

Impervious: Without joints or having joints that are sealed by methods which make the whole surface impervious to prevent the collection of dirt and bacteria

³ Hygrothermal performance rating 'normal' – see 3.1.7

⁴ Hygrothermal performance rating 'humid' – see 3.1.7

⁵ Hygrothermal performance rating 'wet' – see 3.1.7

Note: Where 'heavy-duty' is stated, it shall apply to the full extent of the wall finish

3.2

Floor finishes

This sub-section outlines the performance and functional requirements for surface finishes to internal floors. For external surface finishes, see [8.1 Surfaces for play, sport, paths and roads](#)

General requirements

3.2.1 Summary

- **Purpose:** Floor finishes internally (i.e., the surface finish to internal floors) when well designed and maintained:
 - Work in conjunction with supporting substrates to meet the requirements of the space including fire and impact resistance, thermal and acoustic performance, and to contain and/or drain liquids or remove dirt and debris
 - Mitigate the hazard risk leading to trips, slips and falls
 - Suit the range of activities taking place in the space
 - Complement the building's interior and support wayfinding
- **Performance:**
 - Fire: Floor finishes, including underlays, to be selected and installed to meet the requirements of the project specific fire strategy. Also see [3.2.5 Fire performance](#)
 - Accessibility: Level/flush floor finishes shall be provided in new buildings; ramped internal thresholds to overcome abutments between varying depth floor coverings will not be accepted. Colour/light reflectance combinations to finishes generally, including skirting and flooring, to provide visual contrast in compliance with AD M
 - Safety: Floor finishes shall be anti-slip and chosen to contrast with nosings on stairs. There shall be at least 30 points difference between the stair nosing LRV and that of the floor
 - Moisture: To be resistant or impervious to moisture where required
 - Durability: See [3.2.6 Durability](#)
 - Hygiene: To be easy to clean and maintain in wet sanitary areas or where food is prepared
 - Movement: Joints for thermal and structural movement to be accommodated in both the floor finish and sub-floor to meet design requirements and installed in accordance with manufacturer's recommendations
 - Surface reflectance: Minimum light reflectance value for all floors shall be 5%, and not higher than 40% to avoid visible scuff marks
 - Acoustics: Flooring selected to be considered in compliance with BB 93, except where there is a variation to these requirements against a specific space type in the Schedule of Spaces. Where this occurs, the requirements of the space type shall

take precedence. Resilient layers to be selected and installed to meet BB 93 requirements to control impact sound (e.g., from footsteps and movement of furniture) transmitted into spaces via the floor above

- Health and safety: See [3.2.7 Health and safety](#)

3.2.2 Technical Manual references

- **Substrate:** See [1.2 Lowest floor construction and 2.1 Structural frames](#)
- **FF&E:** See [4 Fittings, furniture and equipment \(FF&E\)](#)
- **Underfloor heating:** See [5.5 Heating and cooling systems](#)
- **Daylight and visual amenity calculations:** See [5.8 Daylighting and electrical lighting](#)
- **Fire-stopping:** See [9 Fire safety](#)

3.2.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - Paints and varnishes: [Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2012](#)
- **Statutory guidance:**
 - Internal floor finishes to comply with [AD B](#), [AD E](#) (reference to [BB 93](#)), [AD M](#) and [AD 7](#)

- **Standards:** Except where DfE requirements differ within this sub-section (3.2):
 - To comply with BS 8300-2
 - All British and European standards relevant to the material type including BS 8203, BS EN ISO 12951, BS EN 14041 and BS EN ISO 10874
- **Guidance:**
 - Sports hall flooring including markings: [Sport England Design Guidance Floors for Indoor Sports](#)

3.2.4 Minimum life expectancy

- **Lino, rubber, vinyl or other sheet material:** 10 years
- **Carpet and barrier matting:** 10 years
- **Tiling:** 15 years
- **Area elastic flooring:** Vinyl 10 years, timber 25 years
- **Resin flooring:** 15 years
- **Paint to concrete:** 5 years before first redecoration cycle

3.2.5 Fire performance

- **Fire spread:** Finishes shall not provide a medium for fire spread
- **Reaction to fire:** Finishes to be fire and smoke resistant, including fire classification for floor coverings to comply with BS EN 13501-1

3.2.6 Durability

- **Standard:** To BS EN ISO 10874 and BS EN ISO 12951
- **Low maintenance:** Floor finishes shall:
 - Be suitable for an education environment (e.g., can withstand the expected impact/wear caused by dirt, moisture, spills and the frequent movement of pupils/students, staff and furniture, including trolleys
 - Resist abrasion from routine cleaning methods, including cleaning and/or buffing machines, without any noticeable change in surface appearance
 - Allow the removal of graffiti and stubborn marks without damaging the surface of the material
 - Be chemical and heat resistant in the areas as required in Table 9
- **Loading:** Floor (including area elastic) finishes shall:
 - Support fixed and moving furniture and equipment (F&E) and withstand pedestrian traffic and mobility equipment without deformation or permanent marking
 - Where beneath retractable bleacher seating, be homogenous if vinyl, capable of carrying the weight and point loads imposed by the rollers, and resist all wear associated with this equipment
- **Underfloor heating:** Floor finish to withstand the effects of temperatures up to 27°C

3.2.7 Health and safety

- **Decorations and finishes:** Slip resistant, with low Volatile Organic Compound (VOC) content and visually contrasting
- **Texture and colour:** Select finishes that are suitable for:
 - Their application and location
 - Age and needs of pupils/students including those with SEND
- **Finish:** Flat, level, dry and stable; waterproofed where required
- **Jointing:** Flush between different finishes
- **Slip resistance:** To BS EN 13893

3.2.8 Coordination with services and fittings

- **Service penetrations including floor gullies/drainage:** To be coordinated to ensure penetrations through floors are not excessively large and provide a neat and tidy final finish. No penetration(s) shall compromise the performance of the overall floor and/or sub-floor
- **Fixing of equipment:** Tracking and fixing of floor-mounted equipment such as machinery in D&T workshops to be coordinated with other FF&E building services. Finished tiles, sheet coverings, matting and

3.2 Floor finishes

sprung/semi-sprung flooring with redundant or accidental holes/cuts will not be accepted

Specific requirements

3.2.9 Linoleum, rubber and vinyl flooring

- **Extent and performance:** See Table 9
- **Standards:**
 - Linoleum: To BS EN ISO 24011
 - Rubber: To BS EN 12199
 - Vinyl: To BS EN ISO 10581
- **Resilience:** To BS EN ISO 24343-1
- **Type:** Homogeneous and anti-static
- **Installation:**
 - Standard: To BS 8203, substrate to SR1
 - Adhesive: In accordance with manufacturer's recommendations
 - Joints: Minimal, orthogonal joints; flush and smooth welds
 - Finish: Neatly cut and smooth, without any irregularities such as trowel lines, adhesive comb lines, indentations and/or joints in sub-floor being visible through the sheet covering

3.2.10 Carpet

- **Extent and performance:** See Table 9
Note: For 3m square carpet mats – see [4 Fittings, furniture and equipment \(FF&E\)](#)
- **Standard:** To BS EN 1307

- **Type:** Heavy duty, tufted pile, anti-static; broadloom or tiles
- **Edging:** Bound
- **Backing:** Non-slip
- **Installation:**
 - Adhesive: In accordance with manufacturer's recommendations
 - Joints: Neat, orthogonal and flush
 - Finish: Without any irregularities such as trowel lines, adhesive comb lines, indentations and/or joints in sub-floor being visible through the sheet covering

3.2.11 Barrier matting

- **Extent and performance:** All entrance and draught lobbies, and at all external doors used by pupils/students, staff and visitors. Also see Table 9
Note: Barrier matting is not required at external doors to halls, plant rooms or external stores
- **Standards:** To BS 7953 and BS EN 1307
- **Type:** Heavy duty, non-slip, recessed to be flush with adjacent floor finishes, except at external doors to Early

3.2 Floor finishes

Years and KS1 classrooms where loose mats with a non-slip backing and ramped edging are permitted

- **Dimensions:**
 - Entrance and draught lobbies: Full area
 - External doors: Size based on an analysis of use
- **Installation:** Laid in the direction of travel to not impede the movement of wheelchairs or non-ambulant building users

3.2.12 Ceramic and porcelain tiles

- **Extent and performance:** See Table 9
- **Standard:** To BS EN 14411
- **Type:** Glazed
- **Joints:** Flexible, water and mould-resistant, polymer modified cementitious grout
- **Installation:**
 - To BS 5385
 - Substrate: Flat, level, dry and stable; waterproofed where required
 - Adhesive: Cement-based

3.2.13 Area elastic flooring

- **Extent and performance:** See Table 9
- **Standard:** To meet area elastic performance A3 or A4 to BS EN 14904
- **Surface finish:** To suit activity:

- Timber: For multi-purpose halls, sports halls and activity studios where FF&E is used within space
- Vinyl: For dedicated halls, dance and activity studios with no sports or FF&E use
- **Timber type:**
 - Maple, oak or beech; solid hardwood or engineered board with minimum hardwood veneered surface of 6mm
 - Finish: 2-pack polyurethane flexible lacquer/sealant. Acrylic mixes are prohibited
- **Vinyl type:** See [3.2.9 Linoleum, rubber and vinyl flooring](#)
- **Shock absorption layer:**
 - Material: Rubber pads, foam strips, or elastic battens
 - Spacing: 300–500mm centres
- **Moisture barrier:** Polyethylene membrane
 - Installation: To BS 8201

3.2.14 Resin flooring

- **Extent and performance:** See Table 9
- **Type:** Epoxy or polyurethane
- **Installation:** To BS 8204-6 and in accordance with manufacturer's recommendations for application

3.2.15 Painted concrete

- **Extent and performance:** See Table 9

3.2 Floor finishes

- **Standard:** To BS EN 1504-2, in conjunction with floor screed system
- **Paint type:** Epoxy, low VOC emissions
- **Installation:** In accordance with manufacturer's recommendations for application

3.2.16 Polished concrete

- **Extent and performance:** See Table 9. Polished concrete shall not be used in spaces where acids can come into contact with the floor
- **Standards:** Concrete screed to BS EN 206-1 and BS 8500-2
- **Installation:** In accordance with manufacturer's recommendations for application and with safe level of slip resistance

3.2.17 Skirting

- **Material options:**
 - Timber
 - Ceramic/porcelain
 - Coved and continuous with floor to Types F05, F09 and F10 in Table 9 as a minimum but shall not be used on stairs

Note: Sit-on PVC skirting trims are not acceptable
- **Height:** Minimum 100mm
- **Performance:**
 - Finish: Smooth and rigid

- **Durability:** Hard wearing to minimise appearance of scuffs, scratches and chips

3.2.18 Flooring accessories and trims

- **Stair nosings:** Aluminium or stainless steel to suit profile of steps with vinyl/rubber inserts (colour(s) to provide compliant visual contrast), mechanically fixed, preferably concealed
- **Transition strips:** Aluminium or wood depending on adjacent floor finishes; mechanically fixed, preferably concealed, and suitable for wheelchairs in all locations. In non-ambulant Special Schools, transition strips should be designed out wherever possible for ease of movement
- **Ramp edges:** Aluminium or stainless steel with vinyl/rubber inserts (colour(s) to provide compliant visual contrast), mechanically fixed, preferably concealed
- **Cove trims:** Flexible full cove former complete with integral capping edge/strip. When abutting PVCu or stainless steel sheet wall cladding (see [3.1 Wall finishes](#)) a compatible transition strip or 50mm overlap detail (cladding over coved floor finish) with clear sealant bead is required

3.2.19 Bunded area for chemical storage

- **In pool plant rooms:** Where a hydrotherapy or swimming pool is provided, it shall have a separate pool plant room with a bunded area for chemical storage formed from reinforced concrete, concrete block or brick. The bund shall have a lining resistant to water and the chemicals stored, with the lining taken up the walls to a minimum of 100mm above the bund wall height. Bunds and bunded areas shall be capable of retaining 110% of the volume of the chemicals stored
- **In science chemical stores:** For chemical stores in science areas, a suitable COSHH risk assessment shall be carried out to determine whether a fixed bund is required (preventing the use of trolleys on castors) or whether the use of chemical resistant, high impact, deep-sided polypropylene trays would suffice – see [4 Fittings, furniture and equipment \(FF&E\)](#)

Note: Option chosen post COSHH risk assessment to be specified in the Project Brief

3.2 Floor finishes

Type	Finish options ⁴	Area	Slip resistance ^a	Electrostatic rating ^b	Durability ^c	Specific requirements
F01	Hygienic carpet and/or lino, rubber or vinyl ¹	All general teaching classrooms and shared teaching areas (except those listed in other types), group rooms, therapy rooms, staff rooms, circulation areas/corridors including stairs	n/a	Yes	Commercial 33	Carpet may be to part of a space as FF&E layout; lino, rubber or vinyl to all wet areas/ around sinks ⁴
F02	Lino, rubber, resin or vinyl ¹	Store rooms, communications rooms	n/a	Yes	Commercial 33	n/a
F03	Non-slip and hygienic lino, resin, rubber or vinyl ²	Early Years and KS1/Infant classrooms, Primary SEN classrooms, external equipment stores	R10 SRV 36 + 20 microns	Yes	Commercial 33	Hygienic carpet mats on top of finish to part of area, as space type
F04	Non-slip and chemical resistant lino, resin, rubber or vinyl ²	Light practical spaces, science laboratories, chemical stores, cleaners' stores, dark rooms, reprographics	R10 SRV 36 + 20 microns	Yes	Commercial 33	Suitable for heavy movable FF&E on castors
F05	Non-slip, hygienic and chemical resistant lino, resin, rubber or vinyl ²	D&T food rooms, kitchen staff and food prep/stores, medical inspection rooms, sick bays/sick rooms, laundries	R10 SRV 36 + 20 microns	Yes	Commercial 33	Suitable for heavy movable FF&E on castors

3.2 Floor finishes

Type	Finish options ⁴	Area	Slip resistance ^a	Electrostatic rating ^b	Durability ^c	Specific requirements
F06	Hygienic, durable and waterproof lino, resin, rubber or vinyl ²	Dining/informal dining areas, serveries	R9	Yes	Commercial 34	R10/minimum SRV 36 slip resistance in separate servery areas
F07	Non-slip, chemical and heat resistant concrete (polished or painted finish) or resin, rubber or vinyl ²	D&T/construction workshops, D&T prep, engineering prep, plant rooms	R11 Minimum SRV 36	Yes	Commercial 34 for rubber and vinyl	Suitable for heavy movable FF&E on castors
F08	Hygienic, durable area elastic composition lino, rubber, timber or vinyl ²	Sports halls, activity studios, drama studios, dance studios, fitness rooms, main halls	R9	No	Commercial 34	Sports hall floor to accommodate suitable sports court markings. Sports and activity flooring to BS EN 14904 and area elastic to A3 or A4. Suitable for movable bleacher seating where specified. Suitable for fitness equipment type to prevent indentation

3.2 Floor finishes

Type	Finish options ⁴	Area	Slip resistance ^a	Electrostatic rating ^b	Durability ^c	Specific requirements
F09	Non-slip, hygienic and chemical resistant ceramic/porcelain, resin, rubber or vinyl ³	Changing rooms, showers, toilets, hygiene rooms	R10 Minimum SRV 36	No	Commercial 34	Barefoot areas shall be to BS EN 16165: Barefoot slip resistance category B
F10	Non-slip, hygienic chemical and heat resistant ceramic/porcelain, resin, rubber or vinyl ²	Kitchen preparation areas	R11 Minimum SRV 36	No	Commercial 34	n/a
F11	Barrier matting ²	Entrance and draught lobbies and at all external doors used by pupils/students, staff and visitors, except to halls, plant rooms and external stores		No	Commercial 34	n/a

3.2 Floor finishes

Type	Finish options ⁴	Area	Slip resistance ^a	Electrostatic rating ^b	Durability ^c	Specific requirements
F12	Polished concrete	All nursery playrooms, general teaching classrooms, circulation areas	R10 (R11 in areas that get wet, minimum SRV 36)	No	n/a	Do not use in teaching areas where regular use of water is part of learning, areas with potential acid use (e.g., science laboratories), high hygiene requirements (e.g., kitchens), wet foot areas (e.g., changing rooms), areas of frequent mopping (e.g., toilets) or areas of acoustic sensitivity (e.g., SEN spaces, music spaces)
F13	Hygienic lino, rubber or vinyl	Lift cars	n/a	Yes	Commercial 33	

Table 9: Floor finish requirements

¹ 'Water Resistance 1' – to withstand a reasonable degree of spillage and dampness from footwear etc

² 'Water Resistance 2' – to allow frequent spillage or wetting without damage, staining or absorption. Requirements for resilience are covered in BS EN 661 and BS EN 662

3.2 Floor finishes

³ 'Water Resistance 3' – to allow regular wetting without damage, staining or absorption. Requirements for spreading of water are covered in BS EN 661 and BS EN 13553 for vinyl in wet areas

⁴ When a mixed floor finish is used, the water resistance level applies to the larger carpeted area, whilst the lino, rubber, or vinyl finish around the sink and worktop shall be rated as 'Water Resistance 2'

^a BS 7976 series: Slip Resistance (Ramp test rating, or R value), Slip Resistance Value (SRV) and surface roughness; BS EN 13845: polyvinyl chloride floor coverings; BS EN 14411: ceramic tiles

^b BS EN 14041: Electrostatic Rating

^c BS EN ISO 10874: European Flooring Use classification (for durability)

3.3

Ceiling finishes

This sub-section outlines the performance and functional requirements for surface finishes to ceilings, including plaster and plasterboard, paints and coatings, acoustic baffles and rafts

General requirements

3.3.1 Summary

- **Purpose:** Ceiling finishes internally (i.e., the surface finish to internal ceilings and soffits) when well designed and maintained:
 - Work in conjunction with supporting/exposed substrates to meet the requirements of the space including fire and impact resistance, thermal and acoustic performance, and electrical lighting distribution
 - Facilitate air movement to meet the project specific ventilation strategy
 - Meet the security requirements of the space e.g., where access to ceiling voids needs to be restricted or removed
 - Complement the building's interior
- **Performance:**
 - Structure: Although often non-structural to the building frame, internal ceilings and soffits shall be structurally sound and detailed to accommodate anticipated structural deflection as required
 - Height: Shall comply with the open and clear height requirements¹² of the space type in the Schedule of Spaces
 - Fire: Ceiling and soffit finishes to be selected and installed to meet the requirements of the project specific fire strategy, including all fixings, coatings, sealants, fire-stopping and edge treatments. Also see [3.3.6 Fire performance](#)
 - Thermal: Ceiling and soffit finishes to be considered in relation to the overall thermal performance of the space/building, including during periods of excessive heat
 - Moisture: To be resistant to moisture and mould where required
 - Hygrothermal performance: See [3.3.7 Hygrothermal performance](#) and Table 10
 - Durability: See [3.3.8 Durability](#)
 - Hygiene: To be easy to clean and maintain in wet sanitary areas or where food is prepared

¹² 'Open height' means the distance from finished floor level to underside of soffit (or ceiling where applicable). 'Clear height' means the unobstructed distance from finished floor level to underside of acoustic rafts/baffles, light fittings, ventilation units, bulkheads etc.

3.3 Ceiling finishes

- Surface reflectance: Minimum light reflectance value for ceiling finishes shall be 70%, unless natural materials are used
- Acoustics: Ceiling/soffit finishes and additional acoustic treatment to be selected and installed to comply with BB 93, except where there is a variation to these requirements against a specific space type in the Schedule of Spaces. Where this occurs, the requirements of the space type shall take precedence
- Materials: Durable and resilient and able to withstand daily use within an education environment including accidental and potential malicious or physical abuse. Materials vulnerable to impact damage (e.g., by people or balls), shall not be used in spaces where such impact is expected e.g., in sports and/or multi-use halls
- Health and safety: See [3.3.9 Health and safety](#)

3.3.2 Technical Manual references

- **Track and hoist systems:** See [5.1 Sanitaryware and ancillaries](#)
- **Heating and ventilation systems:** See [5.5 Heating and cooling systems](#) and [5.6 Ventilation systems and thermal comfort](#)
- **AV equipment:** See [6.3 AV systems and fixed equipment](#)

- **Daylight and visual amenity calculations, and electrical lighting:** See [5.8 Daylighting and electrical lighting](#)
- **Fire-stopping:** See [9 Fire safety](#)

3.3.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - Paints and varnishes: [Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2012](#)
- **Statutory guidance:**
 - Internal ceiling and soffit finishes to comply with [AD B](#), [AD E](#) (reference to [BB 93](#)), [AD M](#) and [AD 7](#)
 - Except where DfE requirements differ within this sub-section (3.3):
 - To comply with BS 8300-2
 - All British and European standards relevant to the material type including BS EN 13964
- **Standard:**
 - Joint Council for Qualifications (JCQ) – Instructions for conducting examinations – Table 1 Secure Room (“The Box”)

3.3.4 Minimum life expectancy

- **Monolithic ceilings:** 20 years
- **Demountable/gridded ceilings:** 20 years
- **Acoustic ceiling panels:** 20 years
- **Paint decoration including to 'heavy duty' areas:** 5 years before first redecoration cycle

3.3.5 Prohibited materials

- **Sealants:** Application of PVA on plasterboard surfaces to receive a painted finish is prohibited
- **Access panels:** Even if lockable, are prohibited for use within monolithic ceilings in areas where pupils/students are unsupervised

3.3.6 Fire performance

- **Fire spread:** Finishes shall not provide a medium for fire spread
- **Fire resistance:** Finishes to be fire and smoke resistant, including fire classification for linings to comply with BS EN 13501-2
- **Flake test:** To be carried out by a paint manufacturer on existing painted ceilings and exposed soffits for refurbishment projects where surface spread of flame needs to be controlled, and to determine whether the fire resistance of the paint finish requires a specialist flame retardant coating to be applied

3.3.7 Hygrothermal performance

- **Hygrothermal condition:** Where a material is exposed to different humidity and temperature levels on either side
- **Performance rating:** RH = relative humidity
 - 'Normal' rating: One side - 25% RH at 10°C / Opposite side - 65% RH at 25°C
 - 'Humid' rating: One side - 25% RH at 10°C / Opposite side - 85% RH at 25°C
 - 'Wet' rating: One side - 25% RH at 10°C / Opposite side - 98% RH at 25°C
- **Mould resistant finishes:** To be used in spaces where Table 10 identifies the hygrothermal performance as 'humid' or 'wet'

3.3.8 Durability

- **Low maintenance:** Ceiling and soffit finishes shall allow limited areas to be repainted/redecorated or removed and replaced (e.g., individual tiles, sheets or panels) without damaging adjacent finishes or affecting the overall appearance

3.3.9 Health and safety

- **Decorations and finishes:**
 - All paints and varnishes shall be waterborne with low Volatile Organic Compound (VOC) content

3.3 Ceiling finishes

- Solvent-based finishes shall be permitted by exception and only when expressly agreed with the Employer
- Rough and/or unfinished applications are unacceptable
- **Anti-bacterial coatings:** Shall be applied where required to meet the particular health needs of the pupils/students in the Project Brief
- **Anti-ligature provision:** Elements of ceilings shall be of anti-ligature type as required to meet the needs of the pupils/students in the Project Brief
- **Pattressing for fixtures and fittings:**
 - Ceilings to be designed and installed to support the self-weight of the system and any ceiling-mounted or integrated fixtures and fittings including, but not limited to, light fittings, smoke detectors and access panels, whilst maintaining the integrity of the ceiling to meet the project specific fire resistance and sound insulation requirements
 - Where significant loads from fixtures and fittings are anticipated including, but not limited to, ventilation units, stage lighting rigs, specialist AV equipment and track and hoist systems, such fixtures shall be independently supported from the primary structure using suitable fixings for the substrate and appropriate factors of safety

3.3.10 Coordination with services and fittings

- **Service penetrations:** To be coordinated to ensure penetrations through ceilings, soffits and structure are not excessively large and provide a neat and tidy final finish. No penetration(s) shall compromise the performance of the overall ceiling, soffit and/or structure
- **Fixing of equipment:** Tracking and fixing of ceiling or soffit-mounted equipment such as hoists in hygiene rooms and projectors, stage lighting rigs and curtain tracks in large/performance spaces to be coordinated with other ceiling or soffit-mounted services, particularly those in ceiling voids. Finished surfaces including tiles, trims, sheet coverings and acoustic baffles/rafts with redundant or accidental drill holes will not be accepted

Specific requirements

3.3.11 Monolithic ceilings - plaster coatings

- **Extent and performance:** See Table 10
- **Standards:** To BS EN 13279-1 and BS 8481
- **Types:**
 - Low-humidity areas: Gypsum plaster
 - High-moisture areas: Cement plaster
- **Thickness:** 12-25mm in accordance with manufacturer's recommendations for application
- **Installation:** Provide bonding agent or suitably rough surface to ensure strong and long-lasting adhesion to prepared substrate in accordance with manufacturer's recommendations

3.3.12 Monolithic ceilings - plasterboard

- **Extent and performance:** See Table 10
- **Standard:** To BS EN 520 and standards relevant to plasterboard type and application
- **Type:** Gypsum board to meet project specific performance requirements:
 - Standard
 - Moisture-resistant
 - Fire-resistant
 - Acoustic/perforated
 - Impact-resistant

- Insulated
- **Fixing system:** Timber joists or metal frame (MF) comprising channels, sections, angles and strap hangers
- **Insulation:** Acoustic and thermal insulation depending on project specific requirements
- **Installation:**
 - Fixing: Plasterboard to be screw fixed in accordance with manufacturer's recommendations for application
 - Surface finish: All joints to be compound taped, filled and sanded smooth or 1-3mm thick plaster skim coat applied to surface area to a smooth finish

3.3.13 Demountable/gridded ceilings

- **Extent and performance:** See Table 10
- **Standard:** To BS EN 13964
- **Grid material options:** Factory primed and coated galvanized steel or aluminium; visible face to be finished with a polyester finish coating
- **Tile material options:** Mineral fibre, gypsum board, fibreglass, metal
- **Fixings:** Corrosion resistant clips to secure tiles into place within the grid system to prevent

3.3 Ceiling finishes

unauthorised/unwanted lifting/removal of tiles or access to ceiling void

- **Tile profile:** Level and flush at joints
- **Insulation:** Acoustic and thermal insulation depending on project specific requirements
- **Maintenance:** Shall allow easy removal, replacement of tiles and cleaning without change to surface appearance

3.3.14 Raft ceilings

- **Extent and performance:** See Table 10
- **Standard:** To BS EN 13964
- **Raft supports:** Drop rods, cables or hanger wires
- **Raft ceiling type:** Gypsum board, exposed wood or metal
- **Edge profile:** Square, bevelled or concealed edges
- **Installation:**
 - Substrate: Flat, level, dry and stable
 - Panels: Aligned and levelled
 - Fixing: Into/through rafts to provide robust support to substrate using method and products recommended by manufacturer for application and loading
 - Application shall not compromise the performance of the ceiling/soffit the raft is fixed to
 - Coordinated: With integrated/adjacent services whilst providing sufficient access for maintenance

3.3.15 Acoustic ceiling panels

- **Extent and performance:** See Table 10
- **Dimensions, thickness and absorption:** To meet project specific acoustic performance requirements
- **Fire resistance:** Panels shall comply with Table 30 (Classification of linings) in [9 Fire safety](#) in conjunction with the fire performance of the whole soffit
- **Acoustic ceiling panel type:** Perforated veneered plywood, fabric-wrapped mineral wool, coated glass wool, exposed wood wool, wood or metal
- **Edge profile:** Square, bevelled or concealed edges
Note: Material selection, product type and fixing arrangement of the panels shall be suitable for the type of activities within space, mounting height and expected level of impact/tampering
- **Installation:**
 - Type: Either directly fixed to soffit or positioned vertically (as baffles) or horizontally (as rafts)
 - Substrate: Flat, level, dry and stable
 - Panels: Aligned and levelled
 - Fixing: Into/through panels to provide robust support, free from swing. Securely fixed to substrate using the methods and components/fixings recommended by the manufacturer for the application, substrate and loading

3.3 Ceiling finishes

- Application shall not compromise the performance of the ceiling/soffit the panel is fixed to
- Coordinated: With integrated/adjacent services whilst providing sufficient access for maintenance

3.3.16 Paint and coatings

- **Base/surface finish:** Smooth and free from holes, scratches and gouges
- **Primer coats:**
 - Number of primer coats, site conditions for application and compatibility with substrate and subsequent finish coats to be in accordance with manufacturer's recommendations
- **Finish coats:**
 - Number of finish coats and site conditions for application and compatibility with primer coats to be in accordance with manufacturer's recommendations
 - General areas: High performance, durable trade acrylic matt
 - Where paint is used in wet areas e.g., showers and hygiene rooms it shall be moisture, steam and mould resistant
 - Brilliant white to be avoided in circulation areas, including stairs and lobbies
 - All colours to be agreed with the School/College and Employer

- **Protective coating:** Single pack clear/coloured protective performance coating or single pack protective performance glaze over the manufacturer's approved base coats
- **Intumescent paint:**
 - Thickness: As defined in BS EN ISO 12944-5
 - Finish: Top sealer coat gloss or semi-gloss

3.3.17 Ceiling ancillaries

- **Lockable steel access panels:** Install:
 - In staff only areas or where pupils/students are supervised (e.g., not over toilet cubicles, not in separate toilet rooms, not in showers or shower drying areas, not over changing room benches and other areas where pupils/students are unattended)
 - At a height to facilitate safe access to equipment or building services for maintenance, subject to an agreed Access, Cleaning and Maintenance Strategy and Planned Maintenance Plan
- **Bulkheads/boxing out:**
 - Shall be designed out wherever possible through appropriate use ceiling voids, dedicated service spines, IPS and vanity unit panelling
 - Where unavoidable, and not due to poor design, a bulkhead shall not cover more than 10% of floor area within the space and not protrude lower than 150mm below the clear height requirements

3.3 Ceiling finishes

- **Isolated building services and/or equipment:**
 - Such as individual light fittings, sprinkler heads, fire and smoke detectors, beacons, PIR sensors and Wi-Fi points may protrude up to 150mm below than the clear height for the space
 - Stage lighting bars and AV equipment such as projectors in large spaces (e.g., halls) may protrude lower than 150mm below the clear height, where agreed with the Employer and School/College

3.3 Ceiling finishes

Type	Finish	Area
C01	Clipped, gridded ceiling ¹	Teaching spaces less than 13m ² in area
C02	Clipped, gridded ceiling with no exposed services below (including M&E ductwork) to withstand pressure washing ²	Kitchen preparation area, kitchen staff, food stores
C03	Clipped, gridded ceiling with no exposed services below (including M&E ductwork) ²	D&T food rooms, kitchenettes, cleaners' stores
C04	Monolithic, moisture resistant ceiling ² with no exposed services (gridded ceiling also prohibited) Note: No access panels in restricted areas (see 3.3.17)	Toilets, dry changing rooms (and other areas where pupils/students are left unattended), medical treatment rooms, sick bay/sick rooms
C05	Monolithic, moisture resistant ceiling ³ with no exposed services (gridded ceiling also prohibited) Note: No access panels in restricted areas (see 3.3.17)	Showers, wet changing rooms, hygiene rooms
C06	Exposed soffit with exposed services ¹	Teaching spaces of 13m ² and over in area unless specifically noted in the Pattern Book, exam stores ⁴
C07	Exposed soffit with exposed services ²	Plant rooms, swimming pools
C08	Exposed impact resistant, integral soffit with exposed impact resistant services ¹	Sports halls, indoor PE/multi-use halls
C09	Clipped, gridded ceiling ¹ or exposed soffit with exposed services ¹	Offices, administration, staff only spaces and horizontal circulation

Table 10: Ceiling finish requirements

3.3 Ceiling finishes

¹ Hygrothermal performance rating 'normal' – see 3.3.7

² Hygrothermal performance rating 'humid' – see 3.3.7

³ Hygrothermal performance rating 'wet' – see 3.3.7

⁴ False ceilings are not permitted under Joint Council for Qualifications (JCQ) rules

4

Fittings, furniture and equipment

4.1

Fittings, furniture and equipment (FF&E)

This sub-section outlines the performance and functional requirements for fittings, furniture and equipment (FF&E), including fitted, fixed and loose furniture and equipment. For toilet and shower partition panels and doors and Integrated Plumbing Systems (IPS), see [2.7 Internal walls and partitions](#). For external furniture, see [8.6 External furniture](#)

General requirements

4.1.1 Summary

- **Purpose:** Fittings, furniture and equipment (FF&E) shall be selected and installed to:
 - Facilitate the required activity/activities of the space and the needs of the pupils/students in the Project Brief
 - Furnish spaces to make them flexible, adaptable and visually appealing for their intended function
 - Ensure ergonomic, safety and accessibility standards are met
- **Performance:**
 - Accessibility: Fixed height and height adjustable furniture and/or fittings requiring manual operation to be selected to suit user age and any identified special needs and disabilities. Furniture to contrast visually with the surrounding background
 - Moisture: To be resistant to moisture and mould, particularly where risk of contact with water is high
 - Fire: To resist the effects of fire and surface spread of flame to meet the requirements of the project specific fire strategy
 - Sustainable: Ethically sourced (e.g., FSC or PESCC) and supporting circular economy principles through re-use, re-manufacturing and recycling
 - Materials and edgings: Durable and resilient and able to withstand the expected impact/wear caused by daily use within an education environment including accidental and potential malicious or physical abuse
 - Timber: To be sound, well-conditioned, properly seasoned, free from defects, and suitable for internal joinery use
 - Safety: See [4.1.7 Health and safety](#)
 - Installation: All fixed and fitted furniture and equipment to be installed as per manufacturer's recommendations
 - Cleaning: To resist abrasion from routine cleaning methods without any noticeable change in surface appearance
 - Maintenance: See [4.1.8 Operation and maintenance](#)

4.1.2 Technical Manual references

- **Toilet/shower partition panels and doors, and Integrated Plumbing Systems (IPS):** See [2.7 Internal walls and partitions](#)
- **Services within FF&E:** See [5 Services](#)
- **Sanitaryware and ancillary fittings:** See [5.1 Sanitaryware and ancillaries](#)
- **Integration with Technology:** See [6 Technology](#)
- **External play equipment:** See [8.5 Play equipment and nature habitats](#)
- **External furniture including external signage:** See [8.6 External furniture](#)

4.1.3 Legislation, standards and best practice

- **Legal requirements:**
 - All FF&E, including legacy items: To comply with [The Furniture and Furnishings \(Fire\) \(Safety\) Regulations 1988](#)
 - Paints and varnishes: To comply with Schedule 2 of the [Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2012](#)
- **Standards:**
 - Accessible design standards: To BS 8300-2
 - Upholstered furniture: To comply with all British and European standards relevant to the material type,

particularly for flammability, strength and stability and fabric wear and tear

- Laminates: To BS EN 438-3
- All FF&E suppliers: To be BS EN ISO 9001 and BS EN ISO 14001 certified
- **Guidance:**
 - School/College catering kitchen: Equipment to achieve the good practice benchmarks for energy usage outlined in CIBSE TM50
 - Sports halls/activity studios: Refer to Sport England sports hall design guides and additional sport specific guidance available from National and Worldwide sporting governing bodies

4.1.4 Minimum life expectancy

- **Chairs and tables:** 20 years
- **Upholstery to seating:** 12 years
- **Worktops and fitted benching:**
 - Solid grade laminate: 25 years
 - Stainless steel: 25 years
 - Laminated: 15 years
- **Storage:**
 - Metal lockers: 20 years
 - Timber/laminated cupboards and shelving: 15 years
 - Metal shelving: 20 years
- **Sinks:**

4.1 Fittings, furniture and equipment

- Stainless steel: 40 years
- Epoxy resin: 20 years
- Enamelled fireclay: 20 years
- **Taps:** 15 years
- **Curtains and blinds:** 12 years
- **Whiteboards:** 25 years
- **Noticeboards:** 15 years
- **Bleacher seating and permanent raised stage:** 20 years (with regular servicing and maintenance of bleacher seating)
- **Signage:** 15 years
- **Laboratory FF&E including fume cupboards:** 20 years (with regular servicing and maintenance)
- **D&T workshop equipment:**
 - Machinery (e.g., lathes, milling machines): 20 years (with regular servicing and maintenance, and occasional parts replacement)
 - Electronic equipment (e.g., 3D printers, laser cutters): 10 years (with regular servicing and maintenance, and occasional parts replacement)
- **Catering equipment / white goods:**
 - Commercial ovens, fridges, freezers and dishwashers: 20 years (with regular servicing)
 - Domestic-grade appliances: 5 years (with regular servicing)

4.1.5 Definition groups and responsibilities

- **Defined terms:** For definitions of the terms: fittings, fitted furniture or equipment, fixed furniture or equipment and/or loose furniture or equipment, see the definition for Fittings, Furniture and Equipment (FF&E) outlined in [Annex A Glossary of defined terms](#)
- **Groups:** Each item of FF&E shall be in one of four groups, which identifies the responsibility for procurement, fixing and placing (also see [Annex A Glossary of defined terms](#)):
 - **Group 1: Fittings and fitted furniture** (e.g., blinds, bleacher seating), supplied new and fitted to the fabric of the building by the Contractor
 - **Group 2: Fixed equipment** (e.g., floor standing drill, washing machine) installed by the Contractor and sourced either:
 - New, supplied by the Contractor
 - New, supplied by the School/College/others
 - Legacy, supplied by the School/College/others
 - **Group 3: Loose furniture and loose, large equipment** (e.g., tables, chairs), placed by the Contractor and sourced either:
 - New, supplied by the Contractor
 - New, supplied by the School/College/others
 - Legacy, supplied by the School/College/others

- **Group 4: Loose, small equipment** (e.g., art materials, books) typically legacy items provided by the School/College/others which are boxed by the School/College/others and decanted by the Contractor
- **Legacy items:**
 - Assessment: The Contractor is to assess each working legacy item to determine its condition and suitability for re-use, upgrade or replacement with new
 - Legacy items identified for re-use: The Contractor is to ensure legacy items are working and safe prior to decant and after installation in their final location(s)

4.1.6 FF&E quantities

- **Standard quantities:** FF&E items required for each space are listed by 'collections' in the FF&E data library and are based on the standard scheduled occupancy
- **Specific quantities:** The number of FF&E items required for each space will be defined by the FF&E collection against the individual space type in the Schedule of Spaces (forming part of the Project Brief)

4.1.7 Health and safety

- **Materials and components:**
 - Including when combined, shall not have small openings that could trap fingers or sharp edges
 - All timber shall be sanded to create smooth and splinter-free surfaces
 - Shall minimise dirt and water ingress
 - Shall include waterproof and mould resistant sealant to all junctions between worktops/sinks and their background
- **Secure fixing:**
 - Suitable substrates, including pattrassing, shall be installed behind FF&E where fitted and/or fixed to the building to meet anticipated loads with appropriate factors of safety
 - All fixings shall be tamper proof in accordance with manufacturer's recommendations for the substrate and expected impact/wear/load caused by frequent use within an education environment
- **Legacy furniture:**
 - All legacy FF&E shall be assessed to ensure compliance with current fire safety standards relevant to their intended use and environment
 - Both new and legacy recirculatory fume cupboards shall be tested and installed to comply with BS EN

14175 and CLEAPSS Guide G9 standards for recirculatory fume cupboards

- **Low VOC materials:** Shall be prioritised to prevent 'off-gassing' pollutants
- **Services:** Any pipework connections, distribution systems, components and containment systems within FF&E shall be hidden from view wherever possible and allow secure access for maintenance personnel only. To be safely protected/inaccessible to pupils/students, tamper proof, free from exposed contacts, and correctly insulated and labelled

4.1.8 Operation and maintenance

- **Design:** FF&E shall be designed and detailed to facilitate ease of operation, cleaning and maintenance, comprise readily available parts/products that can be easily replaced, and ensure minimum inconvenience and disruption from breakdowns, repairs and maintenance activities
- **Certificates of compliance:** Provide to certify that the furniture being supplied conforms to and has been tested to the appropriate standard(s) BS/BS EN/ISO or other recognised equivalents
- **Warranties:** The Contractor shall provide to the Employer and School/College all manufacturers' warranties where available, covering parts and labour (where applicable)

4.1.9 Services within FF&E

- **Coordination:** All serviced FF&E, including for the placement of Technology equipment, shall be integrated with the safe and optimal positioning of main building services systems (e.g., small power, data, lighting, gas, cold and hot water services, mechanical supply and extraction systems, above ground drainage etc as applicable)
- **Controls:** Shall:
 - Be securely and mechanically fixed to the item of FF&E or in close proximity to the internal fabric of the building
 - Not be a loose hand-held remote control or a device attached to a surface with Velcro
 - Not rely on batteries for power, except for controls to retractable bleacher seating – see 4.1.31
 - Controls such as isolator switches on FF&E shall only enable use by authorised personnel
- **Installation:** Specialist suppliers shall install serviced equipment, whether new or legacy

4.1.10 FF&E layout requirements

- **Internal spaces:** Shall:
 - Be safe and not cramped for the maximum number of pupils/students and teaching staff to be accommodated

4.1 Fittings, furniture and equipment

- Suit the School/College's curriculum
- Provide different settings to suit different teaching styles and the educational objectives of the School/College
- Provide more than one teaching position where possible or where required to meet the operational requirements in the Project Brief
- Ensure good sight lines to and from the teacher and all pupils/students in the space
- Provide effective, safe and inclusive access for all known activities
- Ensure disabled pupils/students are able to access all activities on offer in at least one space of each type or within each Suite
- Ensure the safe movement of all users (pupils/students, staff and visitors) on a day-to-day basis whilst ensuring their safe, effective escape in an emergency. Furniture shall not extend travel distances beyond those permissible
- Prioritise teaching and learning e.g., coats and bags storage shall not compromise teaching area and use
- Allow the safe positioning (including working clearances) of machinery and other equipment in accordance with manufacturers' guidance, and away from circulation routes and/or door swings
- Ensure easy supervision of equipment by positioning within a single activity zone
- Position audio visual (AV) and Technology equipment at 90° to external windows to avoid glare on screens
- Keep central parts of a space clear for movable items by restricting fitted and fixed F&E to the perimeter of the space wherever possible
- **Minimum clearances:** Consult with the relevant specialists and provide required safe working clearances to manufacturer's recommendations. The tables within this section (4.1) provide some recommended clearances for selected items of equipment/spaces

Specific requirements

4.1.11 Science laboratories and preparation rooms

- **Standards:** To BS EN 14056, BS EN 13150, BS EN 14175-2 and CLEAPSS G9 Fume Cupboards in Schools
- **Gas:** The suitability of either connecting to an existing natural gas supply or using an LPG system to serve gas taps shall be evaluated and agreed with the Employer and School/College – see [5.9 Fuel installations](#)
- **Design:** Furniture shall allow pupils/students to carry out practical activities individually, in pairs and in small groups, be able to face the demonstration bench, and be observed by the teacher
- **Science pedestals:**
 - Fixing: Firmly floor fixed to manufacturer's recommendations
 - Unit tops: Firmly secured to the base unit with a minimum of eight fixing points to prevent the tops becoming loose from the base and the potential for the gas pipe fracturing
- **Pupil serviced bollard (dry):**
 - Material: Minimum 16mm solid grade laminate top
 - Gas: Top mounted 4no. two way gas outlets
- Power: 4no. twin gang 13 amp sockets
- Access: 1no. access panel
- Indicative size: 600mm x 600mm x 850mm
- **Pupil serviced bollard (wet and dry):**
 - Material: Minimum 16mm solid grade laminate top
 - Gas: Top/side mounted 4no. two way gas outlets
 - Power: 4no. twin gang 13 amp sockets
 - Water: Category 5 cold water supply
 - Access: 1no. access panel
 - Sink: 1no. undermount laboratory grade cast epoxy resin, polypropylene or acrylic sink with polypropylene dilution trap and integral overflow, and a single fixed swan neck tap. For drainage requirements to science laboratories, see [5.2.6 Foul drainage above ground](#)
 - Indicative size: 600mm x 600mm x varies mm
- **Teacher 'L' shaped serviced demo desk (wet and dry) or Teacher serviced bollard (wet and dry):**
 - Material: Minimum 16mm solid grade laminate top with routed drainage grooves adjacent to undermount sink
 - Gas: Top/side mounted 1no. two way gas outlet

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- Power: 2no. twin gang 13 amp sockets
- Data: 1no. data socket
- Water: Category 5 hot and cold water supply
- Access: 1no. access panel
- Sink: 1no. undermount laboratory grade cast epoxy resin, polypropylene or acrylic sink with polypropylene dilution trap and integral overflow, and a single fixed swan neck tap. For drainage requirements to science laboratories, see [5.2.6 Foul drainage above ground](#)
- Indicative size: 1800mm x 1800mm x 850mm (desk) and 600mm x 600mm x varies mm (bollard)
- **Fixed work surfaces:** Install double gas taps, located away from collision hazards. As a minimum, one gas tap shall be shared between pairs of pupils/students, unless otherwise specified in the Project Brief
- **Fixed benching in prep rooms:** Install one gas tap per technician in the locations agreed with the Employer and the School/College
- **Fume cupboards:**
 - Extent: As a minimum, fume cupboards shall be provided to 1 in 3 science laboratories and science studios, and in all science prep rooms, and be of ducted type, unless otherwise specified in the Project Brief
 - Note:** Recirculatory fume cupboards shall only be used as additional fume cupboards and not in place of the minimum number of ducted fume cupboards required
- Standard: Refer to CLEAPSS G9 Fume Cupboards in Schools
- Fire: See [9 Fire safety](#)
- Ventilation: See [5.6.20 Science laboratories, chemical stores and prep rooms](#)
- Position:
 - Fume cupboards shall be fixed in position in prep rooms and be able to be pulled out from the wall on flexible connections in science teaching spaces for demonstration purposes, unless otherwise specified in the Project Brief
 - Coordination of the fume cupboard position in relation to windows and vents is required to ensure chemical fumes are not drawn out of the cupboard and into the space
 - Locate away from fire exits and main circulation routes and provide sufficient space for groups of pupils/students to observe demonstrations
- Indicative sizes: 1000mm x 700mm x 1850mm (ducted) or 1100mm x 600mm x 1950mm (semi-mobile, ducted)
- **Space allocation:** See Table 11 overleaf for the safe working distances around science laboratory furniture

Position	Clear dimension (mm)
Tables back to back ¹	1400-1650
Tables side to side (circulation route) ¹	900-1050
Back of table to front to table ¹	900-1200
Back of table to wall or outer edge of door	850-1050
Back of tables to side of table ¹	1050-1400
Back of fume cupboard to wall (when in use)	1400
Side of fume cupboard to wall	300

Table 11: Recommended clearances for science laboratory tables and fume cupboards

¹ Use upper limit where there is a run of more than two tables

4.1.12 Design and technology (D&T) / practical workshops

- **Standard:** To BS 4163
- **Gas:** The suitability of either connecting to an existing natural gas supply or using an LPG system to serve any gas-fuelled specialist equipment shall be evaluated and agreed with the Employer and School/College – see [5.9 Fuel installations](#)
- **Space allocation around machinery:**
 - Allow the safe use of each and every machine to prevent the operator(s) from being accidentally pushed by passers-by
 - See Table 12 overleaf for recommended safe working areas around a sample range of equipment
- **Space allocation overlap:** 250mm for both machines when located next to each other
- **Space for maintenance:** Allow 150mm at the back of machinery
- **Working space in front of machinery:** Provide in addition to circulation space
- **Users working position:** Shall not be against a wall or fixed structure

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Machine	Side 1 (to the left of the operator directly facing the machine) (mm)	Front (operator position) (mm)	Side 2 (mm)	Back (mm)
Bandsaw	1000	1500	300	1000
Brazing hearth ²	750	1000	750	150
Chip forge ²	750	1000	750	150
Circular saw ¹	2200	1250/2800 ³	1400	1650/2400
Crucible furnace	1000	1200	200	200
Drill ²	750	1000	750	150
Grinder	600	1000	600	150
Hacksaw ¹	2700	1000	1550	350
Horizontal grindstone	600	1000	600	150
Linisher ²	600	1000	600	150
Metal lathe	750	1000	600	400
Milling machine	750	1000	750	400
Moulding bench	50	1000	50	50
Planer/thicknesser	2400	1000	2300	350
Polisher ²	600	1000	600	150
Welding bench ²	750	1000	750	150
Wood lathe	1000	1000	600	350

Table 12: Recommended clearances for workshop machinery

¹ Measurements to the blade

4.1 Fittings, furniture and equipment

² Machines which can share a 250mm overlap if placed side by side

³ Larger dimension applies if there is a cut-off table

4.1.13 D&T food rooms / catering teaching spaces

- **Standard:** To BS 4163
- **Design:**
 - All appliances to be electric
 - Position socket outlets to ensure that an electrical cable attached to a piece of equipment does not have to cross a hot cooking surface
 - All new hobs and sinks shall be set in a continuous work surface, except where required to be height adjustable to meet accessibility requirements. Alternative arrangements, including the use/re-use of new/legacy freestanding cookers, shall be agreed with the Employer
 - As a minimum, cooking appliances (hobs and ovens) shall be shared between pairs of pupils/students, unless otherwise specified in the Project Brief. An additional hob and oven shall be provided for the teacher for demonstrations
- **Worktops:** See [4.1.22 Worktops and fitted benching](#)
- **Sinks:** See [4.1.24 Stainless steel sinks](#)
- **Indicative hob / oven sizes:**
 - Hob (inset): 600mm x 600mm
 - Oven (inset): 595mm x 550mm x 595mm
 - Mini oven: 600mm x 550mm x 450mm
 - Oven housing unit: 600mm x 600mm x 550mm
- For accessible ovens provide a side opening oven in a tower housing unit
- **Space allocation:** See Table 13 below for the safe working distances around sinks and cooking appliances
- **Space allocation overlap:** 250mm where hobs/ovens and worktop run back-to-back, resulting in a total clearance of 1750mm

Position	Clear dimension (mm)
Space required in front of cooking appliances	1000
Space between sink and cooking appliances	750-1000
Space between 2 cooking appliances	750-1050
Space between cooking appliances and wall	450-750
Space between cooking appliances and end of worktop run	600-750

Table 13: Recommended clearances in D&T food rooms

4.1.14 Main halls and performance spaces

- **Design:** Any Secondary School main hall or College performance space shall be designed to ensure that:
 - The performance area is the full width of the hall, and accessed from doors at either side of the end wall at the appropriate height
 - The end wall is behind the performance area and suitable as a cyclorama
 - The minimum performance area for assemblies shall be 1.5m deep if floor-based or 2.4m deep if provided on a permanent raised stage
 - The performance area for major performances shall be at least 6.9m deep
 - The space can facilitate blackout via blinds or curtains
 - A room suitable for changing/dressing is nearby
- **Extent:**
 - Any new Secondary School main hall or College performance space shall be provided with either: retractable bleacher seating (see 4.1.31) at one end and a floor-level performance area at the other; or a permanent raised stage (see 4.1.30), extendable by demountable staging, at one end of the hall
 - Sufficient loose chairs shall be provided to the remainder of the space and not compromise escape and transitional routes
 - Unless otherwise specified in the Project Brief, any Secondary School of less than 900 places shall be provided with a permanent raised stage
 - Unless otherwise specified in the Project Brief, any Special School of more than 200 pupils or Secondary School of more than 900 places shall be provided with retractable bleacher seating
 - For Colleges and Special Colleges, as specified the Project Brief
- **Height clearance:** Minimum 4.3m between the stage lighting and the height of staging and any raked/tiered seating
- **Lighting bars and LED lights:** Designed and installed to meet the technical requirements outlined in [5.8.12 Stage / performance lighting](#)
- **Drapes:** Shall:
 - In a Secondary School main hall and College performance space, form a proscenium arch at the front of the performance area comprising two sections with a 50-100% fabric fullness
 - Be suspended from a track, and opened and closed via a pulley system from the centre to off-

stage

Note: Location of pulley system to be agreed with the School/College

- **Curtains and curtain tracking:** Fire-resistant fabric with corded tracking
- **Full height mirrors:** See [4.1.34 Mirrors](#)
- **Storage:** Furniture store to open directly off the main hall/performance space

4.1.15 Learning resource centres and libraries

- **Design:**
 - Provide good sight lines from the librarian's desk, where provided, to all parts of the learning resource centre/library
 - Ensure flexibility so that the space can easily adapt to suit different uses in the future
 - Position low shelving or seating near windows to benefit from natural daylight

4.1.16 Store rooms

- **Design:**
 - Provide shelves for the number and type of items to be stored therein
 - Provide sufficient space adjacent to shelving to allow items to be safely manoeuvred

4.1.17 Indoor dining rooms

- **Design:**
 - Provide an indoor dining environment that meets the needs of the pupils/students and the operational requirements in the Project Brief including, but not limited to, the anticipated number of users within the time period(s), the agreed queuing methods, the hot/cold food offering split and provision of other mobile/satellite serveries as applicable
 - Facilitate a logical flow for users round the dining room, from arrival to queuing to collect food, the number of cashless pay stations (where relevant), being seated whilst eating and self-clearing
 - Clearly identify zones of activity including:
 - An agreed area for queuing, which does not compromise general circulation routes or the means of escape strategy
 - The servery to ensure an efficient and inclusive service and pupil/student safety. This includes the height of a non-hinged/fixed tray slide which shall be accessible for wheelchair users
 - Sufficient circulation space for pupils/students to move between dining tables and to enable a wheelchair user to dine alongside other pupils/students

4.1 Fittings, furniture and equipment

- The agreed seating capacity for the time period(s)
- Sufficient space for food vending trolleys and dirty/waste collection points
- Furniture storage provision with sufficient space for manoeuvring

4.1.18 Commercial catering kitchens

- **Design:**

- Facilitate a continuous progression of activities from the delivery of goods through to the preparation and serving of food, through to washing up, with no crossover to avoid contamination
- Clearly identify zones of activity including:
 - 'Dry' storage for raw materials, located in a cool area and away from a plant room or kitchen appliances where there may be heat transfer through walls and pipes
 - 'Cold' storage
 - Storage for frozen products
 - Food preparation space. Work surface allocation shall allow for the preparation of different food types in designated areas (e.g., to prepare for special diets)
 - Processes such as frying etc grouped together, preferably in a central cooking suite rather than against a wall
- Efficient and safe circulation space for staff to work in
- Storage for equipment, utensils, crockery and cutlery
- Separate storage for cleaning equipment and chemicals
- Space for waste and recyclable materials with direct access to the external storage area for general waste and recycling to prevent cross contamination
- An area for checking in and receiving stock, and for the unpacking of goods delivered via the service route directly to the kitchen
- Space for the disposal of waste food and the stacking of dirty crockery allocated near the entrance to the dining room
- Direct access from the dining area to the crockery wash area in the kitchen without passing through the servery counter
- The crockery wash area with sufficient space for loaded trolleys
- A designated space for administrative work sited close to the loading area but within the preparation area to provide sight of all the activities
- A staff toilet and changing area with storage for clothing and personal belongings

4.1 Fittings, furniture and equipment

- **Equipment:**
 - All appliances to be electric, unless otherwise agreed with the Employer
 - The main cooking equipment shall be located, wherever possible, in an island with sufficient worktop adjacent to provide 'put-down' space
 - To be easily movable for cleaning, and where appropriate, be on lockable castors
 - Where gas supplies exist to serve re-used legacy equipment (and only where expressly agreed with the Employer), hoses shall not inhibit equipment to be moved for easy cleaning and servicing
- **Handwashing:** Wash hand basins (not set in worktops) to be placed at all entrances to the kitchen with soap dispensers, paper towel dispensers and covered waste bins (for disposal of paper towels)
- **Space allocation:** See Table 14 for the safe working distances in commercial kitchens

Position	Clear dimension (mm)
Clearance in front of storage units and alongside circulation routes	1200
Front of cooking equipment to wall or door	1200
Front of servery units to wall/obstruction behind	1200
Between cooking equipment (facing each other)	1800-2000

Table 14: Recommended clearances in catering kitchens

4.1.19 Commercial sub-let catering environment

- **Design:**
 - Where areas are provided for commercial sub-letting/third party food offerings, and only where specified in the Project Brief, provide a 'shell & core' with second fix services in place to suit a pre-agreed layout supplied by the vendor in advance of construction and agreed with the Employer and College
 - To meet the requirements outlined in [4.1.18 Commercial catering kitchens](#), unless otherwise agreed with the Employer

4.1.20 Mobile / satellite serveries

- **Extent:** Provided for use either internally or externally, as specified in the Project Brief
- **Standard:** Containers to comply with BS EN 631-1
- **Type:** Designed to store and serve hot, refrigerated and/or dry food as required, with a retractable canopy for outdoor use
- **Material:** Grade 304 satin/brushed stainless steel
- **Castor wheels:** Heavy duty and lockable, minimum 100mm diameter
- **Payment system:** Cashless or as specified in the Project Brief
- **Indicative size:**
 - Width range: 1200-2000mm
 - Depth: Minimum 600mm
 - Height: Fully accessible to all users

4.1.21 Chairs and tables

- **Standards:** To BS EN 16139, BS EN 1729-1 and -2
- **Heights:**
 - Nursery: Sizemark 1
 - Reception: Sizemark 2
 - KS1/Infant: Sizemark 3
 - KS2/Junior: Sizemark 4
 - KS3 & KS4/Secondary, KS5/Post-16, College and adult: Sizemark 5/6

- **Classroom chairs:**
 - Material: Plastic one piece seat and back, high impact resistant polypropylene. 4 steel legs or skid base/integral legs
- **Practical stools (science):**
 - Material: Plastic or timber moulded seat with minimal leg splay
 - Indicative size: 430mm x 350mm
- **Minimum thickness of tabletops:**
 - Timber: 25mm
 - Laminated: 18mm
 - Solid grade laminate: 16mm
- **Library desk and/or reception desk:**
 - Height: Suitable for wheelchair users
 - Material: 25-40mm top made from laminated manufactured board core with high pressure applied ABS impact and water-resistant edging, finished flush and smooth with the core of the laminate concealed behind the edging
- **Adjustable tables:**
 - Material: Solid grade laminate top with fully welded and epoxy powder coated metal frame
 - Mechanism: Simple adjustment
 - Indicative sizes: 1200mm x 600mm x varied heights (practical) or 1200mm x 750mm x varied heights (for hob or sink)

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- **Practical tables:**
 - Material: Solid grade laminate top with fully welded and epoxy powder coated metal frame
 - Indicative size: 1200mm x 600mm x 850mm
- **Commercial kitchen tables:**
 - Frames and legs: Grade 430 satin/brushed stainless steel
- **Space allocation:** See Table 15 below for the clear distances around classroom tables for safe circulation

Position	Clear dimension (mm)
Tables back to back ¹	1200-1350
Table side to side (circulation route)	1000-1200
Back of table to front to desk	750-1050
Back of table to wall ¹	850-1000

Table 15: Recommended clearances for general classroom tables

¹ Use upper limit where there is a run of more than two tables or ICT benching

4.1.22 Worktops and fitted benching

- **Generally:**
 - Accessibility: Where fitted worktops are provided, dual height or adjustable height surfaces shall also be installed

- Safety: Where a sink is positioned at the end of a run of worktop, provide a minimum of 100mm worktop adjacent to the sink to prevent items falling on the floor
- **Solid grade laminate worktops:**
 - Extent: Practical spaces
 - Minimum thickness of worktop: 16mm
 - Minimum thickness of end panel: 16mm
 - Heat resistance: To 180°C when used in D&T food rooms
 - Drainage grooves: Machined into the worktop adjacent to undermounted sinks. Not required if sink has integral drainer
- **Stainless steel worktops:**
 - Extent: Workshops
 - Material: Grade 316 satin/brushed stainless steel, minimum thickness 2mm
- **Laminated manufactured board worktops:**
 - Minimum thickness of worktop: 25mm and up to 40mm
 - Minimum thickness of end panel: 18mm
 - Edging: High pressure applied ABS impact and water-resistant edging, finished flush and smooth with the core of the laminate concealed behind the edging

- **Frames and legs:**
 - Material: Minimum 32mm steel square section, fully welded tube
 - Finish: Epoxy powder coated to the pre-agreed RAL colour(s)
 - Fittings: Adjustable levelling feet
 - Technology coordination: Designed to support cable management systems where required
- **Indicative worktop depths:**
 - Generally (without appliances under): 600mm/750mm/1200mm and of various heights depending on location as outlined in the FF&E data library and/or Project Brief
 - Worktops with appliances under: 650mm to allow service zone
 - Back-to-back worktops with appliances under: 1300mm to allow service zone/ventilation
- **Splashbacks:** See [5.1.28 Splashbacks](#) for requirements in relation to worktops with sinks

4.1.23 Storage

- **Standards:** To BS EN 16121, BS EN 14749, BS 6222-3 and BS 4680
- **Lockers:**
 - Positioning:
 - Internally only and within service spine

- Access to lockers shall not compromise the safe use of circulation space
 - Lockers to be placed off the floor surface if floors are to be mopped
 - Carcass: Fully welded 16-gauge sheet steel
 - Doors: Fire-resistant solid grade laminate
 - Finish: Powder coated prior to assembly if steel
 - Fire rating: Class A2-s3, d2
 - Safety: Lockers above 1.2m high to be securely fixed back to the wall to prevent toppling
 - Locking mechanism: School/College preferred method (e.g., combination locks), as specified in the Project Brief
 - Ventilation: Generally, include vents to lockers; exclude vents when lockers are positioned in protected escape routes
 - Indicative size: 300mm x 300mm x 1800mm (4 lockers high)
- **Cupboards:**
 - Carcass, doors, drawer fronts and shelving: Minimum 18mm thick laminated manufactured board
 - Edging: High pressure applied ABS impact and water-resistant edging, finished flush and smooth with the core of the laminate concealed behind the edging

- Hinges: 270-degree piano hinge, anti-finger trap type
- **Under bench cupboards, portfolio units, paper units, oven / tower housing units and wall cupboards:**
 - Carcass, doors, drawer fronts and shelving: Minimum 18mm thick laminated manufactured board
 - Edging: High pressure applied ABS impact and water-resistant edging, finished flush and smooth with the core of the laminate concealed behind the edging
 - Hinges: 270-degree piano hinge, anti-finger trap type
- **Under bench tray units:**
 - Carcass/doors (if applicable): Minimum 18mm thick laminated manufactured board
 - Edging: High pressure applied ABS impact and water-resistant edging, finished flush and smooth with the core of the laminate concealed behind the edging
 - Tray: Shatter proof
 - Indicative size: 1020mm x 465mm x varied heights (12no./18no./24no. tray units)
- **Chemical storage trays:**
 - Extent: Provide in science chemical store rooms where bunds are not present (e.g., if there are only

a few bottles and the tray has sufficient volume to contain a catastrophic spill from one bottle, subject to a COSHH risk assessment)

- Type: Deep-sided, stackable/nestable with labels
- Material: Chemical resistant, high impact polypropylene
- **Shelving – general:**
 - Type: Wall mounted steel uprights with 3 adjustable shelves
 - Material: Minimum 18mm thick timber/manufactured board with timber/ABS edging or similar approved
 - Indicative size: Shelving depth 300mm and various widths (depending on location)
 - Upper shelf height: No greater than 1800mm
- **Shelving – storerooms:**
 - Type: Wall mounted steel uprights with adjustable height shelving to the full length of 3 walls
 - Material: Minimum 18mm thick timber/manufactured board with timber/ABS edging or similar approved
 - Indicative size: Shelving depth 455mm and various widths (depending on location)
 - Upper shelf height: No greater than 1800mm

- **Shelving – stockrooms:**
 - Type: Adjustable reinforced metal shelves or reinforced 25mm thick wooden shelves with central metal support
 - Material: Metal frame
 - Indicative sizes: Shelving depth options 380mm/455mm/600mm and various widths (depending on location)
- **Tray racking:**
 - Type: Heavy-duty, fully welded steel with cross brace, runners and 57no. trays
 - Indicative size: 1050mm x 430mm x 1830mm
- **Changing benches and single benches with integral coat hooks:**
 - Type: Lacquered solid timber or recycled polymer lathe and rail board with epoxy powder coated steel frame (Grade 304 for wet areas)
 - Hooks: Safety design or anti-ligature type as required to meet the needs of the pupils/students in the Project Brief
 - Indicative size: 400mm length per pupil/student; heights to suit age range
- **Coat hooks:**
 - Type: Single row of double safety design hooks or anti-ligature type as required to meet the needs of the pupils/students in the Project Brief at 130mm centres fixed to minimum 18mm

timber/manufactured board panel with timber/ABS edging/recycled polymer/solid grade laminate rail board

- Indicative size: 750mm/1500mm length x 150mm high

4.1.24 Stainless steel sinks

- **Standard:** To BS EN 13310
- **Kitchens:**
 - Type: Grade 304 or 430 satin/brushed, corrosion and heat resisting
 - Taps: Lever mixer tap or sensor operated mixer tap with flexible hose attachment
 - Indicative size: 1200mm x 500mm x 250mm
- **Primary Schools including Early Years:**
 - Extent: All classrooms shall have a sink, unless otherwise provided in shared practical areas. The extent and mounting height(s) will be as specified in the Project Brief
 - Type: Single bowl with left or right hand drainer
 - Material: Satin/brushed, 18-gauge steel
 - Taps: Lever mixer tap or sensor operated mixer tap, as specified in the Project Brief
 - Indicative size: 1000mm x 500mm x 170mm
- **D&T food rooms / catering teaching spaces:**
 - Extent: As a minimum, sinks shall be shared between pairs of pupils/students, unless otherwise

specified in the Project Brief. An additional sink shall be provided for the teacher

- Type: Single bowl with left or right hand drainer
- Material: Satin/brushed, 18-gauge steel
- Taps: Single fixed swan neck mixer tap
- Indicative size: 1000mm x 500mm x 170mm
- **D&T / practical workshop spaces:**
 - Type: Grade 304 satin/brushed, corrosion and heat resisting
 - Taps: Lever mixer tap or sensor operated mixer tap with flexible hose attachment, as specified in the Project Brief
 - Indicative size: 1200mm x 500mm x 250mm
- **Screen-wash sinks:**
 - Extent: To art rooms, as specified in the Project Brief
 - Taps: Lever mixer tap or sensor operated mixer tap with flexible hose attachment, as specified in the Project Brief
 - Indicative size: 1155mm x 1140mm x 1500mm
- **Hand wash basins:**
 - Extent: As required to meet hygiene standards and/or as specified in the Project Brief
 - Type: Grade 304 satin/brushed
 - Taps: Lever mixer tap or sensor operated mixer tap, as specified in the Project Brief
 - Indicative size: 380mm x 250mm x 200mm

4.1.25 Epoxy resin sinks

- **Single sink bowls in science laboratories:**
 - Type: Undermount laboratory grade cast epoxy resin, polypropylene or acrylic sink with polypropylene dilution trap and integral overflow
 - Taps: Single fixed swan neck tap with flexible hose attachment (optional) to suit cold water only to science laboratories with the exception of hot and cold water supply to teacher's demo desk/bollard and prep rooms
 - Indicative size: 600mm x 500mm x 250mm

4.1.26 Enamelled fireclay 'Belfast' sinks

- **Extent:** Optional to art rooms, science laboratories, D&T food rooms/catering teaching spaces, D&T/practical workshops and dark rooms, as specified in the Project Brief
- **Standards:** To BS EN 13310 and BS 1206
- **Taps:** Lever mixer tap or sensor operated mixer tap (swan neck tap to suit cold water only to science laboratories with the exception of hot and cold water supply to teacher demo desk/bollard and prep rooms) with flexible hose attachment (optional), as specified in the Project Brief
- **Indicative sizes:**
 - Large (with silt trap): 915mm x 610mm x 305mm

4.1 Fittings, furniture and equipment

- Medium: 480mm x 380mm x 190mm
- Small: 430mm x 330mm x 190mm
- **Cleaners' sinks:** See [5.1.13 Cleaners' sinks](#)

4.1.27 Upholstery

- **Standards:** To BS 7176, BS 5852, BS EN 16139, BS 7177 and BS EN 597-1
- **Labelling:** Permanent fire safety labels are required on upholstered items and furnishing to demonstrate compliance with the latest fire safety standards. Legacy items must also carry this label in order to be decanted to/used in a new/refurbished building
- **Durability:** All fabric to achieve minimum of 40,000 rubs on the Martindale test, grading it suitable for commercial, heavy hospitality use
- **Fabric in catering environments:** Anti-bacterial/anti-microbial, waterproof and stain resistant
- **Fabric in workshop environments:** Stain resistant

4.1.28 Curtains and blinds

- **Standards:** To BS 5867-2 and BS EN 13120
- **Fabric:** Fire retardant and, if located behind or near to sinks, water resistant
- **Blinds generally:**
 - Blinds shall be provided to exterior glazing (external windows and rooflights) in all occupied spaces

- Blinds do not need to be provided to clerestory windows that are used as part of the ventilation strategy, unless the space requires black out
- Vertical blinds shall not be used in spaces for pupils/students
- In rooms where roller blinds are used to control solar glare, the openness of the weave of the material shall not exceed 3% and the material shall be screen (dim-out) type with a total visible light transmittance of 5-7%
- **Blackout blinds:**
 - One in three science laboratories shall provide blackout via blackout blinds for specific physics and biology experiments
 - Note:** A low level of lighting is needed for safety during these experiments, which may be provided by desk lights or the dimming of the main lights
 - Blackout blinds (or curtains) shall be provided in all main halls and drama studios including clerestory windows, where provided
 - Fit with wall tracks and bottom bars
- **Blinds and curtains in spaces higher than 3.6m:** Remotely operated through either a mains powered system
- **Blinds to vision panels and internal glazed screens:** See [2.8 Internal doors and glazed screens](#)

- **Cords and chains:** Containment in accordance with BS EN 13120
- **Shower curtains:** Waterproof nylon curtain with rustproof rail and fittings
Note: Shower curtains shall not be provided to showers except in hygiene rooms and non-ambulant single person shower rooms in SEND settings

4.1.29 Whiteboards and noticeboards/display boards

- **Standard:** To BS EN 14434
- **Fire resistance:**
 - Irrespective of where they are to be installed, all noticeboards and display boards greater than 1m² in area shall be fire tested as a complete item to pass the 'smouldering ignition source 0 (cigarette test)' and 'flaming source 1 (match test)' in accordance with the fire testing procedures in BS 5852, Clause 12
 - Exception: Individual signs/notices required under the Health and Safety (Safety Signs and Signals) Regulations 1996 and small noticeboards/graphic displays up to 1m² in area
- **Noticeboards/display boards in teaching spaces:**
 - Extent: The total area of noticeboards in teaching spaces shall not exceed 20% of the wall area or, if an automatic fire suppression system is installed,

not exceed 50% of the wall area, to a maximum area of 60m² in either case

- Type: Fabric covered and aluminium framed or unframed, as specified in the Project Brief
 - Indicative size: 1200mm x 20mm x 1500mm
 - Installation: Shall not extend more than 2.5m in width without having a break between them of at least 0.4m
- **Noticeboards/display boards in circulation spaces:**
 - Type: Fire-resistant and fitted with a top hung glass or polycarbonate cover, and no more than 3m in length
 - Indicative size: 1200mm x 20mm x 1500mm
 - Installation: Ensure a gap of at least 1m between noticeboards
 - **Whiteboards:**
 - Extent: In all teaching spaces, unless otherwise specified in the Project Brief, and clear of all door swings
 - Type: Vitreous enamel, non-magnetic, aluminium framed
 - Indicative size: 1500mm x 20mm x 1500mm

4.1.30 Permanent raised stage

- **Extent:** Provide in Secondary Schools with less than 900 places

4.1 Fittings, furniture and equipment

- **Area:**
 - Secondary Schools: Extend to provide a range of depths between 2.4-6.9m
 - Colleges: Performance area to be at least 90m²
- **Type:** Modular and demountable
- **Access:**
 - Steps to the front of the stage: Demountable with secure and detachable handrail
 - Disabled access: Provide either a compliant ramp or platform lift to access the doors in the end wall

4.1.31 Retractable bleacher seating

- **Extent:** Provide in any Special School of more than 200 pupils or Secondary School of more than 900 places
- **Standards:**
 - To Annex D of BS 9999
 - To BS EN 13200-1, -2, -3, -4 and -5
 - To BS EN 12727 Test Level 4, Severe Category Use
- **Area:** Extend to approximately half of the length of the hall and the full width of the hall with minimal gaps at each side
- **Storage:** Seating to retract to fit within a dedicated storage area at the back of the hall to specialist supplier's recommendations
- **Components:**

- Seating units (either individual seats or benches) with seat backs and handrails
- Powder coated mild steel frame
- Rubber wheels
- Wooden deck with optional commercial broadloom carpet finish, as specified in the Project Brief
- **Operation:** Electronically, with a hand-held control unit

4.1.32 Barres

- **Type:** Solid, round and lacquered timber barre(s) with smooth finish fixed on steel wall mounted brackets at regular centres using fixings to suit reinforced substrate and anticipated loads, all in accordance with manufacturer's recommendations
- **Indicative diameter:** 42-48mm

4.1.33 Rebound screens

- **Type:** Scratch resistant laminate 0.9mm thick with high impact composite core and integral wheels; optional trolley
- **Indicative size:** 2400mm x 30mm x 1200mm

4.1.34 Mirrors

- **Extent:** To music practice rooms, dance studios and activity studios where defined in the FF&E data library and/or as specified in the Project Brief

- **Material:** Toughened glass to BS EN 12150 series, backed with an impact-resistant safety layer and finished with polished edges
- **Fittings:** Adhesive fixed with tamper proof fixings
- **Indicative size:** 600mm x 1800mm for individual person mirror; larger mirrors likely to be required for group activities in dance/fitness studios, as specified in the Project Brief

4.1.35 Carpet mats

- **Type:** Impervious, soft textured, heavy duty, tufted pile and anti-static
- **Edging:** Bound, ramped and weighted
- **Backing:** Non-slip
- **Indicative size:** 3m x 3m

4.1.36 Signage

- **Generally:**
 - Standard: To BS 599-1
 - Design: Allow for the incorporation of changes during use, whilst preventing the opportunity for tampering
 - Directional: Signage to be consistent and clearly visible, especially for visitors, giving clear directions
 - Durability: Sign surfaces to resist impact from hand-held objects and abrasion from cleaning and

maintenance regimes without any noticeable change in surface appearance

- Fixings: In accordance with manufacturer's recommendations

- **External information and wayfinding signage:** Design(s) to be clearly visible and provide a positive first impression – see [8.6 External furniture](#)
- **Internal door signage:** Provide for every space and Suite as specified in the Project Brief, denoting its name or purpose and its agreed number
- **Fire safety signage:** See Section 5 of [9 Fire safety](#) for fire safety signage requirements including, but not limited to, wayfinding during escape (including from roofs for maintenance personnel), assembly/muster points and fire door signage for fire rated doorsets
- **Drinking water signage:** All drinking water shall be labelled as such
- **Hazard warning signage:** Shall be provided in accordance with The Health and Safety (Safety Signs and Signals) Regulations 1996. Signage to comply with BS 5499-10 and L64 (HSE)

4.1.37 Defibrillators

- **Guidance:** Refer to [Automated external defibrillators – a guide for schools](#)
- **Scope:** Installation of automated defibrillators (AEDs) shall be applicable in all Whole School/College or

Partial School/College projects, inclusive of refurbishment only projects

- **Minimum provision:**
 - Primary School, Special School and AP: One, unless otherwise specified in the Project Brief
 - Secondary School: Two, with one located with the sports facility, unless otherwise specified in the Project Brief
 - College or Special College: As specified in the Project Brief
 - Education setting on a split site: One on each site, unless otherwise specified in the Project Brief
- **AEDs located outside:** Shall be housed within a thermostatically controlled cabinet with a code operated locking mechanism
- **Purchasing:** The Contractor can obtain from the National Health Service (NHS) Supply Chain Framework (Defibs4Schools), who provide devices suitable for education settings

5 Services

5.1

Sanitaryware and ancillaries

This sub-section outlines the performance and functional requirements for sanitaryware (e.g., taps, sinks and toilets) and ancillaries (e.g., soap dispensers, hand dryers and mirrors). For toilet and shower partition panels and doors, and Integrated Plumbing Systems (IPS), see [2.7 Internal walls and partitions](#). For splashback material options, see [3.1 Wall finishes](#)

General requirements

5.1.1 Summary

- **Purpose:** Sanitaryware and ancillaries work with other building elements to support:
 - The health and wellbeing of all users by facilitating easy and regular use
 - Needs appropriate to age, disability and assisted use
 - All hygiene, medical and therapy needs
- **Performance:**
 - Accessibility: Fittings requiring manual operation such as taps, flushes and locks to be selected to suit user age and any identified special needs and disabilities. Sanitaryware, toilet seats with lids and grab rails within accessible toilets and hygiene rooms to contrast visually with background wall and floor colours
 - Moisture: To be resistant to moisture and mould
 - Materials: To withstand daily use within an education environment including accidental and potential malicious or physical abuse
 - Cleaning: To resist abrasion from routine cleaning methods without any noticeable change in surface appearance; maintains hygiene
 - Maintenance: Simple construction to reduce maintenance and replacement costs

Note: Pipework shall be designed and coordinated within service spines, ceiling voids, vanity units and IPS to remove the need for additional boxing out, particularly at low/floor level. Where there is no alternative, all low-level boxing shall be formed using solid grade laminate (SGL) only

5.1.2 Technical Manual references

- **Toilet/shower partition panels and doors, and Integrated Plumbing Systems (IPS):** See [2.7 Internal walls and partitions](#)
- **Junctions to wall, floor and ceiling finishes:** See [3 Finishes](#)
- **Vanity units, worktops and loose equipment:** See [4 Fittings, furniture and equipment \(FF&E\)](#)
- **Foul water drainage systems:** See [5.2 Drainage](#)
- **Valves and pipework:** See [5.3 Water installations](#)
- **Power requirements:** See [5.7 Electrical infrastructure](#)
- **Alarm cords:** See [5.10 Security and communication systems](#)

5.1.3 Legislation, standards and best practice

- **Legal requirements:**
 - Toilets and washing facilities: [The School Premises \(England\) Regulations 2012](#) applicable to maintained schools and [The Education \(Independent School Standards\) Regulations 2014](#) applicable to academies, free schools and sixth form colleges
 - Early years provision: [Early Years Foundation Stage \(EYFS\) Statutory Framework](#)
 - Staff provision: [The Workplace \(Health, Safety & Welfare\) Regulations 1992](#)
- **Statutory guidance:**
 - Accessibility: To comply with AD M, BS 8300-1 and BS 8300-2 except where DfE requirements differ within this sub-section (5.1)
- **Standard:**
 - All sanitary installations to BS 6465-3
- **Best practice:**
 - [Changing Places: 'The Practical Guide'](#)

5.1.4 Minimum life expectancy

To CIBSE Guide M: Appendix 12.A1 in general and as follows:

- **Vitreous china / enamelled fireclay sanitaryware:** 20 years

- **Solid surface sanitaryware:** 20 years
- **Stainless steel sanitaryware:** 40 years
- **Taps:** 15 years
- **Showers:** 15 years
- **Drinking fountains / filling stations:** 10 years
- **Electric hand dryers:** 5 years
- **Commercial washing machine / heated drying cabinet:** 10 years

5.1.5 Health and safety

- **Detailing:**
 - Materials and elements shall not have small openings that could trap fingers or sharp edges or corners
 - Shall minimise dirt and water ingress
 - Shall include waterproof and mould resistant sealant to all junctions between sanitaryware and their background
- **Secure fixing:**
 - Suitable substrates, including pattressing, shall be installed behind finishes where sanitaryware and ancillaries will be fixed including, but not limited to, wall hung toilet pans, sinks and wash hand basins, wash troughs, grab rails and ceiling/wall mounted hoists to meet anticipated loads with appropriate factors of safety

5.1 Sanitaryware and ancillaries

- All fixings shall be tamper proof in accordance with manufacturer's recommendations for the substrate and expected impact/wear/load caused by frequent use within an education environment
- Allow secure access to services for maintenance personnel only; to be inaccessible to pupils/students

5.1.6 Product sourcing

- **Sanitaryware:** Where individual components and fittings are assembled to form a single element of sanitaryware e.g., toilet pan, close coupled cistern, flushing mechanism and fittings forming a single close coupled toilet, all such components and fittings shall be compatible and sourced from the same manufacturer. Where products can be sourced and assembled using components from different manufacturers e.g., counter top taps mounted to a wash trough, the compatibility of these products shall be checked before sourcing and each element fitted in accordance with the respective manufacturer's recommendations

Specific requirements

Sanitaryware

5.1.7 Toilet pans

- **Provision:** For ratios, refer to DfE's Pattern Book
- **Standard:** To BS EN 997
- **Type:** Wall hung or floor mounted. Wall hung preferred for hygiene and cleaning. Also see to [5.1.5 Health and safety](#)
- **Material:** To be vitreous china to BS 3402
- **Seats with lids:** Full seat ring with lid to BS 1254 and top fitting. Contrasting colour of seat with lid within all accessible toilets and hygiene rooms (part of DOC M pack)
- **Height above finished floor level (measured without seat):**
 - Early Years: 305mm
 - Accessible Early Years: 350-355mm
 - KS1/Infant and KS2/Junior: 350-355mm
 - KS1/Accessible Infant and KS2/Accessible Junior: 390-410mm
 - KS3 & KS4/Secondary, KS5/Post-16, College and adult: 390-410mm
 - Accessible Secondary/College/adult/hygiene room: 480mm

5.1.8 Urinals

- **Extent:** In schools and colleges, these can only be selected for Post 16 and shall be facilitated where specified in the Project Brief
- **Material options:**
 - Vitreous china urinal bowls to BS 3402 and BS 5520
 - Grade 304 brushed stainless steel urinal trough to BS EN 10088 series
- **Privacy screens:** Coordinated with urinals

5.1.9 Toilet and urinal flushing cisterns

- **Extent:** To service each toilet and/or urinal
- **Standards:**
 - To BS EN 14055
 - British Standard flush test in compliance with Water Regulation Guide (WRAS)
 - UK class 2 flush test to cover any part flush performance in line with BS EN 997
 - Regulation 4 of The Water Supply (Water Fittings) Regulations 1999 approved e.g., KIWA, WRAS or NSF approved

- **Material options:**
 - Vitreous china to BS 3402 with lockable lids where exposed either within accessible toilets and hygiene rooms (e.g., part of close coupled DOC M pack) or for urinals
 - Plastic to BS EN 14055 to toilets generally, and where concealed behind lockable IPS – see to [2.7.14 Integrated Plumbing Systems \(IPS\)](#)
 - Plastic to BS 1876, where concealed for urinals
- **Toilet flushing options:**
 - Dual flush with either a 6/4 litre or 4/2.6 litre flush with separate manual push buttons for low and standard volume flush to BS 1125 (not to be used in Special Schools, colleges or Special Colleges)
 - Touch free, proximity sensor controlled flush to a maximum of 5 litres (preferred, to be used in Special Schools, colleges or Special Colleges)
- **Urinal flushing options:** Cistern volume to suit number of urinals:
 - Touch free, proximity sensor controlled
 - Manual push button flush
 - Adjustable time delayed flush with timer to shut-off water supply during periods of non-use (e.g., overnight)
- **Overflow:** Internal overflow required to all toilet and urinal cisterns

5.1.10 Wash hand basins

- **Provision:** Alternative to wash troughs. For ratios, refer to DfE's Pattern Book
- **Standard:** To BS EN 14688
- **Material:** To be vitreous china to BS 3402
- **Indicative minimum sizes:**
 - 500mm x 400mm to communal handwashing areas and hygiene rooms
 - 400mm x 250mm to ambulant universal toilet rooms
 - 370mm x 300mm to accessible toilets (part of DOC M pack)
Note: The position of taps shall be within the easy reach of anticipated users
- **Mounting heights (to top surface):**
 - Early Years: 500mm
 - KS1/Infant: 700mm
 - KS2/Junior: 750mm
 - KS3 & KS4/Secondary, KS5/Post-16, College and adult: 750-850mm
 - Accessible toilets (DOC M pack): 720-740mm
 - Height adjustable wash hand basin with flexible servicing in hygiene room (580-1030mm) only where specified in the Project Brief (for Changing Places provision)
- **Joints:** Fully sealed along top/back edge to basin width

5.1 Sanitaryware and ancillaries

- **Coordinated:** With splashback, mirrors and soap dispensers
- **Service runs:** Concealed
- **Access to services:** Removable panels with tamper proof fixings
- **Plugs:** Prohibited in wash hand basins/washrooms used by pupils/students

5.1.11 Wash troughs

- **Provision:** Alternative to wash hand basins. For ratios, refer to DfE's Pattern Book
- **Standard:** To BS EN 14296
- **Material options:**
 - Vitreous china to BS 3402
 - Solid surface to BS EN ISO 19712 series
 - Grade 304 brushed stainless steel to BS EN 10088 series
- **Indicative minimum sizes:** (500mm width per person)
 - 2-person wash trough: 1000mm x 400mm
 - 3-person wash trough: 1500mm x 400mm

Note: The position of taps shall be within the easy reach of anticipated users
- **Mounting heights (to top surface):**
 - Early Years: 500mm
 - KS1/Infant: 700mm
 - KS2/Junior: 750mm

- KS3 & KS4/Secondary, KS5/Post-16, College and adult: 750-850mm
- **Joints:** Waterproof, even, smooth and jointless appearance
- **Upstand:** Integral to minimum height of 50mm at junction with walls; coordinated with minimum 300mm high splashback, mirrors and soap dispensers
- **Type:** Set onto unit to match toilet partition panel system concealing services beneath trough but supported by water-resistant framework securely fixed to substrate – see to [5.1.5 Health and safety](#). Concealed services to be accessed via panels aligned with panel system, secured with tamper proof fixings to prevent unauthorised access
- **Plugs:** Prohibited in wash troughs/washrooms used by pupils/students

5.1.12 Taps for hand washing

- **Provision:** Equal to number of handwashing facilities
- **Standards:**
 - To BS EN 816 and BS EN 817 (non-concussive and lever)
 - To BS EN 15091 (electric)
 - To BS EN 1111
 - Regulation 4 of The Water Supply (Water Fittings) Regulations 1999 approved e.g., KIWA, WRAS or NSF approved

5.1 Sanitaryware and ancillaries

- **Options:**
 - Wall mounted or counter top mounted chromium brass mixer tap with built-in mains fed electronic sensor generally, except to accessible toilets
 - Extended lever mixer tap or sensor operated compact mixer tap to accessible toilets (DOC M pack)
- **Flow performance:** Maximum 4 litres per minute
- **Fixing:** Taps shall be fitted with solid copper connections and double brass or copper backnuts to lock the taps in place in accordance with manufacturer's instructions for substrate/location. Plastic backnuts shall not be used

5.1.13 Cleaners' sinks

- **Extent:** One sink with taps to be provided in each cleaners' store
- **Type:** Heavy-duty and floor mounted
- **Material options:**
 - Fireclay to BS 1206
 - Grade 304 brushed stainless steel to BS EN 10088 series
- **Indicative minimum size:** 455mm x 380mm x 355mm
- **Bucket grating:** Fitted, stainless steel, hinged
- **Waste/trap:** Sealed unslotted strainer waste and bottle trap

- **Support/fixing:** 2no. stainless steel legs to front with wall bearing plate to rear and fixings, all from the same manufacturer as the sink

5.1.14 Taps to cleaners' sinks

- **Extent:** Pair of taps to be provided to each cleaners' sink
- **Type:** Wall mounted chromium brass lever handle bib taps with anti-vandal outlets
- **Fixing:** Wall mounted above sink (as 5.1.12) and over 1200mm high splashback – see [5.1.28 Splashbacks](#)

5.1.15 Shower fittings generally

- **Extent:** To each pupil/student and staff shower (not hygiene room)
- **Standard:** Regulation 4 of The Water Supply (Water Fittings) Regulations 1999 approved, e.g. KIWA, WRAS or NSF approved
- **Type:** Individual/single person vandal resistant commercial shower panel to receive top or back fed pre-mixed water supply (via chromium-plated copper pipework where exposed). Panel to be electrically safe and contain timed flow push button and shower head concealing services within
- **Material options to panel:**
 - Grade 304 stainless steel to BS EN 10088 series

5.1 Sanitaryware and ancillaries

- Satin or anodised aluminium finish, with chrome plated valve and head
- **Temperature:** Thermostatic Mixing Valve (TMV) to provided blended water and anti-scald protection, preferably instantaneously (i.e., hot water not centrally stored) – see [5.3 Water installations](#)

5.1.16 Shower fittings for hygiene rooms

- **Extent:** To be provided as a wash-down facility in every hygiene room
- **Standard:**
 - Regulation 4 of The Water Supply (Water Fittings) Regulations 1999 approved, e.g. KIWA, WRAS or NSF approved
 - To meet Changing Places: 'The Practical Guide'
- **Type:** Detachable shower head on rail (mounting height range 1200-1400mm). The shower head shall be able to be hand-held as well as supported on a rail to meet personal care needs
- **Controls:** Thermostatic single mixer extended lever to BS EN 1111 (mounting height range 750-1000mm)

5.1.17 Ablution

- **Extent:** Associated with some prayer/faith rooms where provided, refer to DfE's Pattern Book

- **Standard:** Regulation 4 of The Water Supply (Water Fittings) Regulations 1999 approved e.g., KIWA, WRAS or NSF approved
- **Type:**
 - Proprietary product containing a fixed seat
 - Homogenous modular type, formed in a single piece and self-draining to the outlet
- **Indicative minimum size:** 820mm x 700mm
- **Finish:** Slip-resistant surface
- **Fixing:** To abut Integrated Plumbing Systems (IPS) with the tap fitted to the IPS
- **Drainage:**
 - Installed with drainage components as specified by the manufacturer
 - Connections shall be to a shared foul drainage system within the IPS zone and not under appliances
- **Joints:** Appliance sealed at all perimeters and abutments between multiple units

Sanitary ancillaries

5.1.18 Drinking fountains / bottle filling stations

- **Extent:**

- To be installed in indoor communal areas, 2no. in Courtyard Garden dining areas, and outdoor areas used for play and sport, unless otherwise specified in the Project Brief. Not within toilet areas
- In Mainstream Primary Schools, drinking water shall be supplied to all classroom sinks via a labelled tap. Where drinking water is provided via sinks located in shared practical areas and not in classrooms, the provision shall be supplemented as necessary with drinking fountains. In these cases, the extent will be as specified in the Project Brief
- In Mainstream Secondary Schools and Colleges, one water fountain shall be provided for each floor of each new or refurbished building, with one fountain serving a maximum floor area of 1000m²
- In Special Schools, Special Colleges and AP, as specified in the Project Brief

- **Standard:** Regulation 4 of The Water Supply (Water Fittings) Regulations 1999 approved e.g., KIWA, WRAS or NSF approved

- **Type:**

- Proprietary product, plumbed in, floor mounted and discreetly fastened back to the wall
- To have a push button or 'dead' handle system to minimise spillages and prevent the water supply being left on
- With built-in bottle filler securely fitted
- Suitable for indoor and outdoor use or as appropriate for proposed location(s)

Note: Bottle fillers/filling stations only can be provided as an alternative, where agreed with the Employer and School/College

- **Material:** Stainless steel to BS EN 10088 series
- **Height:** Appropriate to age range:
 - Junior: Approximately 700mm above ground level
 - Senior: Approximately 900mm above ground level
- **Services:** Concealed
- **Signage:** All drinking water shall be labelled as such

5.1.19 Track and hoist systems

- **Extent:** To be provided in every hygiene room, unless stated otherwise, and in other spaces as specified in the Project Brief
- **Standards:**
 - To BS EN ISO 10535

5.1 Sanitaryware and ancillaries

- CE marked
- To meet Changing Places: 'The Practical Guide'
- **Prohibited:** Mobile hoists are not acceptable
- **Type:**
 - Motorised 'X-Y system' (also known as an 'H system') with a pair of ceiling mounted parallel side beams supporting a moving track (boom)
 - At least 3 spreader connections to the sling
 - Tracking system compatible with all slings and accessories
- **Use:** For transfer of pupil/student between a wheelchair and the toilet, shower and changing bed (where included)
- **Maximum loading capability:** 200kg for hoist and track
- **Hoist lifting height:** 2.1m
- **Operation:** Hoist shall return to the end of the track where the battery-charging unit is housed from a mains supply
- **Controls:**
 - Hand-held remote-control device, preferably fixed to system, manoeuvring hoist up and down and along the track
 - Hoist has an emergency stop or a pull cord
- **Turntable:** Electric or manually operated, if required by the Project Brief

5.1.20 Electric hand dryers

- **Extent:** One for every five toilets, or part thereof, within a space
Note: DfE's requirement is for electric hand dryers unless a preference for paper towels has been identified in the Project Brief, in which case clause 5.1.21 shall apply
- **Drying time:** Less than 30 seconds
- **Control:** Infrared for no contact start, auto-off
- **Noise level:** Less than 65dBA at 1m
- **Fittings:** Concealed and tamper proof
- **Mounting heights (to underside):**
 - Early Years: 650mm
 - KS1/Infant: 775mm
 - KS2/Junior: 850mm
 - KS3 & KS4/Secondary, KS5/Post-16, College and adult: 1000mm

5.1.21 Paper towel dispensers

- **Extent:** One for every five toilets, or part thereof, within a space
Note: Paper towel dispensers shall only be provided if identified in the Project Brief in lieu of electric hand dryers (may be supplied by a service provider to School/College)
- **Type:** Single sheet dispenser with tamper proof lock

5.1 Sanitaryware and ancillaries

- **Control:** Hands-free
- **Fittings:** Concealed and tamper proof
- **Mounting heights (to underside):**
 - Early Years: 650mm
 - KS1/Infant: 775mm
 - KS2/Junior: 850mm
 - KS3 & KS4/Secondary, KS5/Post-16, College and adult: 1000mm

5.1.22 Soap dispensers

- **Extent:** One for every wash hand basin or every 500mm length (person bay) of wash trough (may be supplied by a service provider to School/College)
- **Type:** Cartridge with a minimum of 1000ml of liquid soap via a dosing pump
- **Fittings:** Concealed and tamper proof
- **Mounting heights (to underside):**
 - Early Years: 700mm
 - KS1/Infant: 900mm
 - KS2/Junior: 900mm
 - KS3 & KS4/Secondary, KS5/Post-16, College and adult: 1000mm

5.1.23 Toilet paper dispensers

- **Extent:** One for every toilet pan (may be supplied by a service provider to School/College)
- **Type:** Sheet with tamper proof lock

- **Fittings:** Concealed and tamper proof
- **Mounting heights (to underside):**
 - Early Years: 500mm
 - KS1/Infant: 550mm
 - KS2/Junior: 600mm
 - KS3 & KS4/Secondary, KS5/Post-16, College and adult: 800-1000mm

5.1.24 Sanitary product dispensing machines

- **Extent:** Minimum one machine per female toilet suite, or as specified in the Project Brief, for use from and including KS2 onwards (may be supplied by a service provider to School/College)
- **Location:** In common areas used only by females, not in an individual cubicle/room and not visible from circulation areas
- **Mounting height (to underside):** 850-1000mm

5.1.25 Sanitary product disposal bins

- **Extent:** One for every female toilet cubicle or universal toilet room, or as specified in the Project Brief, for use from and including KS2 onwards (may be supplied by a service provider to School/College)
- **Location:** On the floor adjacent to the toilet pan

5.1.26 Grab rails

- **Extent:** As required to meet standards below within all accessible and ambulant toilet facilities and hygiene rooms
- **Standards:**
 - To AD M
 - To BS 8300-2
 - To meet Changing Places: 'The Practical Guide'
- **Types:** Vertical and horizontal grab rails and hinged arms securely fixed to walls and back of door with concealed fixings as above standards, 35mm diameter
- **Material:** Polyester coated aluminium
- **Colour:** Contrasting visually with background wall and floor colours

5.1.27 Mirrors

- **Extent:**
 - 1500mm (h) x 600mm (w) wall mounted mirror 600mm from finished floor level to underside of mirror in each accessible toilet and hygiene room
 - Minimum 700mm (h) x 400mm (w)¹³ wall mounted mirror above splashback to each wash hand basin or wash trough person position. One large mirror to the width of the wash trough/vanity unit may be

installed if prior agreed with the School/College and Employer

- **Material:** Toughened glass to BS EN 12150 series, backed with an impact-resistant safety layer and finished with polished edges
- **Fittings:** Adhesive fixed with tamper proof fixings

5.1.28 Splashbacks

- **Extent:**
 - To all sanitaryware without integral splashbacks of an equivalent height
 - To a minimum height of 300mm above all locations with running water e.g., wash hand basins, wash troughs and worksurfaces with sinks

Note: To be coordinated with sanitaryware, mirrors and soap dispensers in toilet/hygiene areas

 - To a minimum height of 1200mm above all cleaners' sinks
 - To be positioned to form a continuous impervious zone behind all drinking fountains, hand dryers and paper towel dispensers. Zone shall extend 300mm above and to the sides and fully beneath the ancillaries to meet the floor finish – see [3.1.14 PVCu cladding](#) for acceptable transition details between PVCu splashback and coved skirting

¹³ Dimensions may be increased to better suit height of handwashing facilities and users and/or align with width of selected wash hand basin.

5.1 Sanitaryware and ancillaries

- **Width:** Full width of sanitaryware or worksurface and, where sanitaryware is positioned in an internal corner, shall also return along the wall to the full depth of the sanitaryware
- **Material options:** Water resistant, easy to clean, durable:
 - Solid grade laminate to BS EN 438-6
 - PVCu wall cladding – see [3.1 Wall finishes](#)
 - Ceramic tiling to BS EN 14411 – see [3.1 Wall finishes](#)
- **Seals:** Ensure waterproof joints and eliminate gaps

5.1.29 Nappy changing work surface

- **Extent:** In nursery-based hygiene rooms or dedicated nappy change facilities
- **Type:**
 - Proprietary product
 - Constructed from seamless solid surface
 - Rounded raised sides to prevent 'roll off' from the worktop
 - Includes an adjacent underslung or inset basin within the same worktop surface
- **Upstand:** Minimum 50mm at the junction with walls
- **Fitting:** Onto a vanity unit base constructed from solid grade laminate (SGL); base inset to provide foot space or wheelchair space under

- **Accessories:** Open storage unit to provide safe and easy access to disposable hygiene products

Note: Wall mounted fold up/down changing surfaces are not permitted

5.1.30 Changing bench

- **Extent:** As standard in hygiene rooms
- **Standards:** To meet BS 8300-2 and Changing Places: 'The Practical Guide'
- **Type:**
 - Proprietary product
 - Height-adjustable (300-1000mm)
- **Fixing:** Wall mounted or freestanding

5.1.31 Shower seat

- **Extent:** Shall be facilitated where specified in the Project Brief
- **Standard:** To BS 8300-2 and Changing Places: 'The Practical Guide'
- **Type:**
 - Proprietary product
 - Height-adjustable (470-550mm)
- **Fixing:** Wall mounted; may be fold down type with support legs to the floor

5.1.32 Laundry appliances

- **Extent:** Shall be facilitated where a laundry is specified in the Project Brief
- **Purpose:** To provide suitable facilities for the washing and drying of uniform and PE kits/sports clothing
- **Provision:**
 - Commercial washing machine, load capacity 6kg, with integral pump and connected to foul drainage system
 - Heated drying cabinet, load capacity 6kg, vented in accordance with manufacturer's instructions; floor mounted but securely fixed to wall behind

5.2

Drainage

This sub-section outlines the performance and functional requirements for surface water and foul water drainage, both above and below ground. For rainwater drainage from roofs see, [2.3 Roofs](#). For nature-based sustainable drainage systems, see [8.7 External drainage \(nature-based SuDS\)](#)

General requirements

5.2.1 Summary

- **Purpose:**
 - Drainage systems, when well designed and maintained, both above and below ground, prevent flooding and protect buildings from water damage including from contaminated water/sewage
 - Above ground drainage systems include outlets and pipework for surface (rain) water management, and soil and waste pipework for discharging foul (waste) water from facilities such as toilets, sinks, showers, and dishwashers to below ground drainage systems
 - Below ground drainage systems include all pipework, gullies, rodding points, inspection chambers and manholes located at or below ground level for both surface and foul water
- **Performance:**
 - Nature-based SuDS: Establish a strategic approach to managing site-wide surface water that prioritises nature-based sustainable drainage solutions (SuDS)
 - Durability: Reliable and long-lasting drainage systems
 - Efficiency and resilience: Accurately sized drainage systems including in peak use and storm events
 - Coordination: Required between nature-based SuDS solutions and attenuated/piped surface water drainage systems, and between substructure/superstructure and all below and above ground building services
 - Routing: Drainage stacks shall be routed within the dedicated service spine wherever possible to prevent impact on the learning environment
 - Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.2.2 Technical Manual references

- **Structural design:** See [1.1 Foundations and substructure](#) and [1.2 Lowest floor construction](#)
- **Rainwater drainage from roofs:** See [2.3 Roofs](#)
- **Water supplies:** See [5.3 Water installations](#)
- **Sustainable drainage systems and landscape design:** See [8.7 External drainage \(nature-based SuDS\)](#)

5.2.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Standards:**
 - Design, install and commission drainage systems in accordance with BS EN 1610, BS EN 12056 series and BS EN 752
 - Gullies to buildings shall be in accordance with BS EN 1253 series
 - Gully tops and inspection chamber/manhole tops in pedestrian and vehicular trafficked areas to BS EN 124-1
- **Best practice:**
 - CIRIA SuDS Manual (C753)
 - CIRIA Guidance on the construction of SuDS (C768)
 - CIRIA Retrofitting to manage surface water (C713F)
 - CIBSE Guide L: Sustainability

5.2.4 Minimum life expectancy

- **Below ground drainage and manholes:** 60 years
- **Above ground drainage:** 25 years

5.2.5 Operation and maintenance

- A Planned Maintenance Plan for drainage system components including grease traps, dispersion dosing systems, interceptors, sink and floor drainage traps, roof drainage and vents shall be provided as part of the handover information

Specific requirements

Above ground drainage

5.2.6 Foul drainage above ground

- **Requirements:**
 - Design, install, test and commission an above ground foul (soil and waste) water drainage system(s), including all connections to below the ground foul water drainage system(s)
 - Above ground foul drainage shall facilitate the required activity/activities of the space (e.g., vocational practical spaces), the needs of the pupils/students and the operational requirements in the Project Brief
 - Above ground foul drainage to be based on the primary ventilated stack system
 - Pipe routes, bends and connections shall be rationalised to ensure good flow and minimise opportunity for blockage and leakage
 - Discharge shall be conveyed without crossflow, backfall, leakage or blockage
 - Drainage stacks shall be routed within the dedicated service spine wherever possible to prevent impact on the learning environment
 - Stacks shall be avoided in occupied rooms such as classrooms, groups rooms and offices
- Where drainage passes through occupied spaces it shall be acoustically insulated to prevent noise breakout into the space
- Internal branches in ceiling voids over food preparation and server areas are not permitted
- Appliances shall drain without noise nuisance
- Air from drainage systems shall not be vented internally
- An external floor drain/gully to a washdown facility in refuse areas/bin and compost stores shall be connected to the foul water drainage system
- All above ground drainage routes, outlets and access/rodding points shall be positioned in locations safely accessible for cleaning and maintenance
- Drainage proposals shall be submitted to the Employer's Representative for approval
- **Access points:**
 - Rodding and access points to be positioned at all changes of direction

- Access points to be provided on all vertical soil stacks at each floor level, above the spillover level of the highest appliance on each floor
- All stub stacks shall have an access point
- Access points shall be provided at the foot of soil vent pipes (SVP), and horizontal anti-siphon pipes above fitment flood level
- Access/rodding points shall be located in accessible service zones (e.g., service spine) or in unoccupied spaces e.g. cleaners' stores
- **Discharging to atmosphere:**
 - All soil stacks shall discharge to atmosphere at roof level with a domical cage resistant to bird nesting and movement by vermin
 - Air Admittance Valves (AAVs) are not permitted
 - Ventilation pipes shall terminate in accordance with AD H i.e., at least 900mm above any opening into the building within 3m. They shall be finished with a wire cage or perforated cover, fixed to the end of the ventilating pipe, which does not restrict the flow of air
- **Drainage to science laboratories:**
 - The stacks serving sinks in science laboratories shall be high-density polyethylene (HDPE) or cast iron incorporating chemical resistant EPDM couplings
- A polypropylene dilution trap shall be fitted either before the stack or at each science sink
- If the dilution trap is fitted before the stack, all pipework up to the trap shall be polypropylene
- No other waste (e.g., condensate) shall be connected into the above ground foul drainage run before the dilution trap, only after the trap
- Polypropylene dilution traps and pipework shall be designed specifically for laboratory drainage
- **Drainage to kitchens:**
 - Grease interception and/or dispersion dosing systems for fats, oils and grease (FOG) shall be provided to meet the requirements of the Local Water Authority
 - Grease traps shall be in accessible locations for cleaning and maintenance
 - Heads of drains in kitchens shall be terminated/ventilated externally at roof level
- **Internal floor drains:**
 - Trapped, roddable floor drains with stainless steel cover to be provided, as a minimum, in the following areas:
 - General kitchen areas
 - Areas with specialist plant and equipment, including kitchen and refrigeration appliances
 - Shower cubicles/rooms

5.2 Drainage

- Outside the shower area where there is a row of showers
- Hygiene rooms
- Specialist D&T and vocational spaces
- Any space/area requiring washdown facilities as specified in the Project Brief
- Any floor gullies and floor traps shall be tamper proof and easy to maintain
- Internal floor drains shall be fitted with a removable trap
- Specialist traps may be required in some locations e.g., pottery workshops and engine workshops
- Where shower cubicles are grouped, they can be drained via continuous drainage serving several cubicles, however, water should not have to pass from one cubicle to another to reach the drain

Below ground drainage

5.2.7 Below ground drainage

- **Requirements:**

- All below ground foul and surface water drainage systems shall be designed, installed, tested and commissioned
- Foul and surface water drainage systems shall be separated
- Drainage installations to operate under gravity
- Pumped drainage systems are not permitted
- Where the overall topography of the site slopes towards the building, irrespective of localised arrangements, and to prevent water collecting on the ground covering/oversite concrete beneath a suspended floor, continuous surface water drainage shall be provided against the face of the building on the 'up-slope' and extend to a minimum of half the face of the building to the two connected sides
- All systems shall be accessible for maintenance including Type C waterproofing protection where applied – see [1.1 Foundations and substructure](#)

- **Material options:**

- PVCu to BS EN 1401-1 and BS EN 13598-1 and -2 where applicable
- Vitrified clay to BS EN 295 series

- Cast iron to BS EN 877

- **Existing drains:**

- The condition of existing drains shall be assessed via an Underground Drainage CCTV Survey up to the main utility connection point
- Where it is proposed to connect directly into an existing drain within the site boundary, the existing drainage system shall be:
 - In a suitable state of repair
 - Of the correct size to allow for the increased capacity
 - Of the correct fall to take account of the lower flow rates from modern sanitaryware
 - Not be within another building's footprint
- Pumped drainage shall not be connected into existing gravity fed drainage systems
- Repairs to existing drains shall be validated by another Underground Drainage CCTV Survey on completion to ensure compliance with Building Regulations

5.2.8 Foul water system

- **Connection to below ground:** Foul water drainage shall connect directly to external manholes – see [5.2.10 Drainage components](#)
- **Connection to utility sewers:**
 - By gravity only
 - Sewage ejectors, pumps and holding tanks are not permitted

5.2.9 Surface water system

- **Requirements:**
 - The Contractor shall assess current and future flood risks to both buildings and the outdoor environment to establish a strategic approach to managing site-wide surface water that prioritises nature-based sustainable drainage solutions (SuDS)
 - Surface water drainage systems shall be designed to comply with the requirements of both the Lead Local Flood Authority (LLFA) and local water company
 - The Contractor shall outline how the site-wide surface water drainage system has been designed to mitigate the effects of climate change and prioritise nature-based SuDS in a Site Drainage

Strategy Report for approval by the Employer's Representative

- Surface water shall drain away from the building line where possible
- Surface water systems shall be designed and installed to prevent standing water and slip hazards
- External door thresholds shall be drained to prevent localised flooding
- **Building roof drainage:**
 - Rainwater drainage from building roofs shall be taken away from the building via the below ground drainage system
 - The below ground drainage system shall be connected to nature-based SuDS where site specific topographical and ecological conditions allow
 - All external rainwater downpipes shall be installed into double gullies with the rear grating cut out to ensure the pipe discharges to and above the gully water trap seal. The front removable gully grating shall provide access to clear blockages
- **Structures in the landscape:** Rainwater drainage from structures in the landscape shall drain to adjacent nature-based SuDS e.g., raingardens, rain planters and swales
- **Sustainable drainage solutions (SuDS):** For the technical requirements of SuDS including raingardens,

rain planters, filter strips, swales, attenuation ponds and permeable paving, see [8.7 External drainage \(nature-based SuDS\)](#) and [8.1 Surfaces for play sport, paths and roads](#)

5.2.10 Drainage components

- **Manholes and inspection chambers:**

- All manholes and inspection chambers shall be located externally and not in locations where they could impact outdoor learning and means of escape (during maintenance)
- Where internal manholes and inspection chambers are unavoidable, and not due to poor design, this approach and the individual locations shall be agreed with the Employer's Representative with the evidence to validate their need
- Internal manholes and inspection chambers shall have fully recessed double seal covers with stainless steel edging/framing to incorporate flush floor finishes within the cover
- For the technical requirements for external manhole covers see [8.7.12 Inspection chamber covers, gullies, channels and grates](#)
- Manholes are not permitted in proposed or possible future sports pitch locations
- All gully and channel drain outlets shall be trapped and roddable

- **Rocker pipes:**

- Required where drains pass through structural elements such as beams to facilitate structural movement
- Required where drains connect into manholes to facilitate ground movement

5.3

Water

installations

This sub-section outlines the performance and functional requirements for water installations, including hot and cold water services and Category 5 water supplies

General requirements

5.3.1 Summary

- **Purpose:** Water installations, when well designed and maintained, provide safe and clean supplies of hot and cold water to users
- **Performance:**
 - Durability: Reliable and long-lasting water systems
 - Efficiency and resilience: Efficient distribution of water supplies
 - Water quality: Avoid water stagnation; minimise the risk of legionella and other contaminants
 - Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.3.2 Technical Manual references

- **Irrigation:** See [8.3 Soft landscape](#)
- **Heating and cooling systems:** See [5.5 Heating and cooling systems](#)
- **Drainage:** See [5.2 Drainage](#)
- **Sanitaryware:** See [5.1 Sanitaryware and ancillaries](#)

5.3.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - [The School Premises \(England\) Regulations 2012](#) applicable to maintained schools
 - [The Education \(Independent School Standards\) Regulations 2014](#) applicable to academies, free schools and sixth form colleges
- **Standards:**
 - Design, install and commission all water systems in accordance with BS EN 806 series and follow the guidance in BS 8558
 - For the control of legionella bacteria and other waterborne pathogens, comply with HSE Approved Code of Practice (ACOP) L8, HSG 274, BS 8580-1,-2 and BS 8680
 - Systems shall be cleaned, disinfected, pressure tested and commissioned in accordance with BSRIA BG 2, BSRIA BG 29, BS EN 806-4, and CIBSE Commissioning Code W
 - Tanks and water fittings shall be Regulation 4 of The Water Supply (Water Fittings) Regulations 1999 approved e.g., KIWA, WRAS or NSF approved

5.3.4 Minimum life expectancy

- **Water storage tanks:** 25 years
- **Valves, booster sets and pumps:** 20 years
- **Pipework and insulation:** 30 years
- **'Point of use' electric hot water heaters:** 15 years

5.3.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for the water installations, including legionella and water quality management, water treatment, storage tank cleaning, water heaters, booster sets, control valves, pumps and distribution pipework for the School/College to adopt/fund, if they so wish, from Practical Completion
- **Warranties:** 5-year manufacturer's warranty covering parts and labour for all water installations including storage tanks, water heaters, booster sets, control valves, pumps and distribution pipework

5.3.6 Operation and maintenance

- The Building User Guide shall include explanations of all water systems
- A Planned Maintenance Plan for water installations and water quality shall be provided as part of the handover information

- The Contractor shall produce a Legionella Risk Assessment, Written Control Scheme and Log Book in accordance with HSE Approved Code of Practice (ACOP) L8, HSG 274, BSRIA BG 57 and BSRIA BG 58. The Contractor shall work with the School/College to develop these documents and advise them of their ongoing responsibilities

Specific requirements

5.3.7 Cold water services

- **Extent:** Design, install, test and commission a potable cold water supply system(s) to provide a supply of cold water at outlets including, but not limited to:
 - Wash hand basins/wash troughs, sinks and showers
 - Toilet and urinal cisterns
 - Kitchen and vending equipment
 - Drinking water fountains
- **System design:** Shall:
 - Minimise stagnant water
 - Minimise system temperature and minimise any heat gains to the cold water system
 - Locate frequently used outlets (e.g., a suite of toilets) at the end of a pipe run
 - Provide an end-of-line programmable (adjustable for time and temperature) automatic flushing and recording device (mains powered and hard wired) to all pipework legs where poor water turnover is anticipated. Monitoring/programming of this device shall be possible from the BMS head end
 - Include an isolation valve where the incoming water main enters the building
 - Include pressure regulating valves to limit, balance and equalise system pressures
- Design to a maximum velocity of water in pipework of 1.5 metres/second in occupied areas and 2 metres/second in risers and plantrooms
- Include an electro-magnetic water conditioner where the calcium carbonate content of the incoming mains water supply is greater than 200mg/litre or 14 on the Clark scale. To be positioned after the water tank and just after the booster set
- See [5.11 BMS, controls and performance monitoring](#) for water metering requirements
- **Cold water storage:**
 - Water storage to be based on 3 litres/occupant for nurseries and creches, and 5 litres/occupant for Schools/Colleges
 - The storage volume of a tank shall be variable and easily adjustable
 - For larger schemes, such as those with more than 1000 occupants, the initial set storage volume may be adjusted to below 5 litres/occupant to ensure a good turnover of water
 - A GRP twin compartment insulated tank shall be designed to maintain an uninterrupted water supply during tank cleaning and maintenance

5.3 Water installations

- Tanks shall be in a separate plant room to heat producing equipment
- **Booster set:** Shall:
 - Include variable speed booster pumps (duty and standby), expansion vessel, pressure vessel, safety valves, speed control, and anti-surge protection
 - Have a connection to the storage tank's low-level probe to ensure pumps do not run dry
 - Be located adjacent to storage tank
- **Drinking fountains and water bottle fillers:**
 - Internally and externally located drinking fountains and water bottle fillers to be supplied with potable water
 - Do not locate outlets at the end of a pipe run
 - Clearly marked as drinking water only. See [5.1 Sanitaryware and ancillaries](#) for the technical requirements for these fixtures
 - All external pipework runs to be capable of isolation and draining to prevent freezing in winter

5.3.8 Hot water services

- **Extent:** Design, install, test and commission a hot water supply system(s) to provide a supply of hot water at outlets including, but not limited to:
 - Wash hand basins/wash troughs
 - Sinks
 - Showers

- **System design:** Shall:
 - Use local non-storage (or low storage) 'point of use' electric hot water heaters
 - Set the outlet temperature to 41°C for wash hand basins/wash troughs, showers and sinks in practical teaching spaces
 - Provide anti-scald protection through Thermostatic Mixing Valves (TMVs) to all outlets, except for kitchens and cleaners' sinks. The TMVs shall be Type 3 in accordance with BS EN 1111 and/or BS EN 1287
 - Provide kitchen and cleaners' sinks with an outlet temperature of 50°C. These outlets shall be provided with a hot water hazard warning sign
- **Larger hot water loads:**
 - Centralised hot water systems shall only be used where there is a demonstrable large hot water load across the whole building e.g., in a non-ambulant Special School
 - Where there is a demonstrable large hot water load in a specific area, such as in kitchens, a local heat pump and local storage shall be provided
 - All hot water systems with storage shall use a circulating loop
 - Centralised hot water shall be generated using a heat pump system

5.3 Water installations

- Air source heat pumps are permitted for hot water generation even when ground source heat pumps are installed for space heating
- Storage tanks shall be insulated to minimise heat loss
- Hot water shall be stored to at least 60°C but not exceed 65°C
- Hot water distribution return water shall be maintained at a minimum temperature of 50°C
- The temperature from each outlet shall reach 50°C within one minute of running
- Hot water systems shall be completely independent to space heating systems
- Design to a maximum velocity of water in pipework of 1.5 metres/second in occupied areas and 2 metres/second in risers and plantrooms

5.3.9 Category 5 water systems

- **Extent:** Design, install, test and commission a Category 5 water supply system(s) to supply the following (as applicable):
 - Outlets in science laboratories
 - Bib taps in Early Years outdoor areas
 - Bib taps on building elevations close to trees, hedges and planting
 - Bib taps or irrigation systems on green roofs

- Bib taps in refuse areas/bin and compost stores with washdown facilities
- Bib taps in area of mud kitchen
- Connections for the filling of mechanical systems
- Any further outlets specified in the Project Brief where a Category 5 water supply is required according to WRAS guidance

Note: Quantities and locations of outlets shall be agreed with the Employer and School/College. For technical requirements for outdoor bib taps and lockable tap covers – see [8.6 External furniture](#)

- **System design:** Shall
 - Ensure flow rates are met
 - Ensure storage is minimised to avoid water stagnation
 - Locate equipment in a separate plant room to heat producing equipment
 - Position equipment in locations accessible for cleaning and maintenance
 - Include an end-of-line programmable (adjustable for time and temperature) automatic flushing and recording device (mains powered and hard wired) to each science laboratory. Monitoring/programming of this device shall be possible from the BMS head end
 - Ensure water supplies to science laboratories have a means of isolation at the teaching wall

- Ensure all external pipework runs have a means of isolation and draining to prevent freezing in winter

5.3.10 Pipework and fittings

- **Requirements:** Exposed pipework in kitchens, showers, accessible toilets and hygiene rooms shall be stainless steel or chrome plated
- **Access and maintenance:** Pipework, valves and ancillaries positioned to provide ease of maintenance
- **Pipework routing:**
 - Main hot and cold water pipework to be routed in service risers to high level in corridors with branches to serve spaces
 - Cold water pipework shall not run adjacent to hot water piped services in ceiling voids and risers
 - Pipework shall not be distributed through, above, or on walls adjacent to, communications rooms and electrical plant rooms
 - External pipework is not permitted unless required for external outlets
- **Pipework and supports:** Shall allow for axial expansion
- **Audible effects:** Pipework shall be free from the audible effects of expansion, vibration and water hammer
- **Valves:** Drain down and isolating valves to be positioned to allow complete drain down. Drain down shall be possible without damage to finishes
- **Pipework insulation and identification:**
 - Internal hot and cold water pipework to be continuously insulated, except exposed pipework in kitchens and where required in sanitary spaces
 - Pipework shall be insulated in accordance with BS 5422
 - Insulated pipework to be identifiable using adhesive colour bands in accordance with BS 1710
 - All insulating materials shall have a Global Warming Potential (GWP) of zero
 - Mineral wool pipe section insulation shall be installed in accordance with BS 3958-4 and BS 5422
 - Pipework insulation shall be continuous over pipe supports
 - Insulation within plant rooms shall be protected with aluminium sheet
- **Pipework fittings:**
 - Install copper pipework in accordance with BS EN 1057. Copper fittings, jointing materials and supports all in accordance with British Standards
 - Pre-soldered capillary fittings shall be lead free copper or copper alloy complying with BS EN 1254 series

5.3 Water installations

- Screwed joints e.g., to valves and gauges shall be to BS EN 10226 series using PTFE tape to BS 7786
- Maintenance joints in copper pipework up to and including 54mm diameter to be copper alloy union couplings, bronze to bronze navy pattern. Flanged maintenance joints are to be used in pipework with a diameter greater than 54mm. Flanges are to be solid full face copper alloy, slip-on type suitable for brazing, complying with BS EN 1092-3
- Flanged joints shall be made with full face rubber insertion jointing rings to BS 7874 and BS EN 681 series and BS EN 682 as appropriate; brass nuts, bolts and washers complying with the requirements of the same British Standard and pressure rating or table as the flanges being connected
- Flexible connections shall not be used on sanitary fittings, with the exception of height adjustable units where specified in the Project Brief
- Basin and sink taps shall be fitted with solid copper connections and double brass or copper backnuts to lock the taps in place in accordance with manufacturer's instructions for substrate/location. Plastic backnuts shall not be used

5.4

Heat source

This sub-section outlines the performance and functional requirements for heat sources, including Ground Source Heat Pumps (GSHP), Air Source Heat Pumps (ASHP) and district heating connections. For the design of heating systems, see [5.5 Heating and cooling systems](#)

General requirements

5.4.1 Summary

- **Purpose:** Heat source using low carbon technologies
- **Performance:**
 - Durability: Reliable and long-lasting low carbon heat generation
 - Efficiency and resilience: Accurately sized heating systems
 - Coordination: Required between main heating plant and heating distribution design; and between boreholes and landscape design
 - Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.4.2 Technical Manual references

- **Heating and cooling systems:** See [5.5 Heating and cooling systems](#)

5.4.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Standards:**
 - To comply with the relevant parts of BS EN 378 and BS 5930

- **Best practice:**

- For hydraulic and heat pump design, follow the guidance in [CIBSE Guide B1 Heating](#) and [CIBSE AM17 Heat pump installations for large non-domestic buildings](#)
- For Ground Source Heat Pump (GSHP) design, follow this guidance:
 - [Ground Source Heat Pump Association \(GSHPA\) Vertical Borehole Standard](#)
 - [Environment Agency's Environmental good practice guide for ground source heating and cooling](#)
- For borehole drilling, refer to this guidance from the British Drilling Association:
 - [BDA Health & Safety Manual for Land Drilling 2015: A Code of Safe Drilling Practice](#)
 - [Guidance on Managing the Risk of Hazardous Gases when Drilling or Piling Near Coal](#)

5.4.4 Minimum life expectancy

- **Ground source heat pumps:** 20 years
- **Boreholes and underground pipework manifolds:** 30 years
- **Air source heat pumps:** 15 years
- **Electric boilers:** 20 years

5.4.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for the whole heating system, including water treatment, heat pumps, control valves, pumps, emitters and other ancillary equipment for the School/College to adopt/fund, if they so wish, from Practical Completion
- **Warranties:** 5-year manufacturer's warranty covering parts and labour for all heat pumps, control valves, pumps, pressurisation sets, heat emitters and distribution pipework

5.4.6 Operation and maintenance

- A Planned Maintenance Plan for the heat pump system shall be provided as part of the handover information
- A Water Treatment Plan for both the ground loop heating system and secondary side heating system shall be included in the Operation & Maintenance (O&M) Manual

Specific requirements

5.4.7 Determining the type of heat source

- **Ground Source Heat Pump (GSHP):**
 - Where a GSHP is technically feasible, a GSHP system shall be designed and installed for space heating
 - The technical feasibility shall be determined through ground loop modelling in accordance with the requirements outlined in 5.4.9 overleaf
 - A GSHP system is not required for domestic hot water generation
- **Air Source Heat Pump (ASHP):**
 - Only where it is demonstrated that a GSHP system is not technically feasible shall an ASHP system be designed and installed for space heating
- **District heating connection:**
 - Where a connection to an existing or planned community/district heat network is feasible or required by statute or local authority, a technical review shall be undertaken to assess the suitability of connecting to the network for review by the Employer's Representative
 - Subsequent design proposals, including the level of resilience provided, shall be subject to approval by the Employer's Representative

5.4.8 Heat pump sizing and resilience

- **Load calculations:** Accurate dynamic simulation heat load calculations shall be used to determine an hourly space (including ventilation) heating profile based on anticipated occupancy
- **Heat pump design:**
 - At least three heat pumps shall be provided
 - The heat pumps shall be sized to meet the 99.6th percentile peak space (including ventilation) heating load i.e., the peak load can exceed the capacity of the heat pumps for 0.4% of all hours throughout the year
 - GSHPs shall meet the design heating load at the minimum design ground loop temperature and at a flow temperature of 45°C
 - ASHPs shall meet peak heating load at minimum external design conditions and at a flow temperature of 45°C, factoring reduction in capacity from de-frost cycles
- **Resilience:**
 - Electric boiler(s) shall be provided, in addition to the heat pumps, to ensure the total space (including ventilation) heating capacity is 120% of the peak space (including ventilation) heating load

5.4.9 Ground Source Heat Pumps (GSHP)

- **Design and installation:** Shall:
 - Be carried out by a ground source heat pump specialist, including the boreholes
 - Be coordinated with all existing and proposed features within the Site to minimise impact on areas including, but not limited to, car parking, sports pitches, landscaping, vehicular routes, and buried services
 - Not be located beneath hard landscaping wherever practicable
 - Not increase the risk of flooding or interfere with underground water supplies
 - Utilise a closed loop system unless there is justification for an open loop system. Evidence in support of an open loop system shall be provided in the form of a report from a qualified hydrogeologist
 - Arrange borehole loops vertically
- **Borehole sizing requirements:**
 - Ground loop modelling shall determine the optimal, site specific borehole arrangement, analysing the local geology, hydrogeology, and ground thermal conductivity
 - For designs with less than 10 boreholes, where N is the number of borehole fields required to meet the 99.6th percentile peak load, N+1 boreholes are required
- **Borehole system design:**
 - For designs exceeding 10 boreholes, a sensitivity analysis shall demonstrate the impact of a borehole failing. The findings of the sensitivity analysis shall be submitted, and where agreed, N+1 boreholes may be required
 - Submit information including ground loop calculations and layouts showing the number, depth, location and separation of boreholes
 - Heat pump systems shall measure the ground loop temperature and be controlled accordingly
 - Heat pumps shall be located internally, inside a ventilated plant room
 - Borehole thermal response tests (TRT) shall be used to confirm modelling assumptions and inform design

- Boreholes shall be installed in a manifold arrangement
- The manifold shall be accessible for maintenance by authorised personnel only
- Borehole locations shall minimise pumping requirements
- Circulation pumps shall be rated for GSHP application
- Strainer locations to be in accordance with manufacturer's recommendations

5.4.10 Air Source Heat Pumps (ASHP)

- **Location:** Position externally in accordance with manufacturer's recommendations, factoring in weather protection, solar shading, visual impact, noise and thermal efficiency
- **Defrost cycle:**
 - Heat pumps shall incorporate an automatic defrost cycle and condensate drain
 - Multiple heat pump systems shall be controlled to stop simultaneous defrost cycles operating

5.4.11 General heat pump design requirements

- **Acoustics:** Shall comply with the local planning authority requirements for noise and noise disturbance

- **Refrigerant:**
 - Heat pump installation shall comply with the F gas Regulation
 - System refrigerant shall be selected to have an ozone depletion potential (ODP) of zero
 - Environmental impact of the refrigerant shall be minimised, considering both refrigerant charge and global warming potential (GWP)
 - Agreement with the Employer's Representative is required to use any refrigerant with a GWP greater than 1500¹⁴
- **Flow Temperature:** Low temperature hot water (LTHW) heat distribution systems shall operate at a maximum flow temperature of 45°C
- **System efficiencies:**
 - Heat distribution services shall be designed to ensure Seasonal Coefficient of Performance (SCOP) is maximised
 - Calculations shall be based on a SCOP value which is representative of the anticipated operation of the system i.e., the actual system flow/return temperatures, part-load efficiencies, heating load profile, and air/ground temperature profile

¹⁴ Potential Suppliers should note, it is likely maximum refrigerant GWP requirements will be lowered during the life of the CF25 Framework.

5.4 Heat source

- The SCOP value for a GSHP system shall include the energy consumption of the borehole circulating pumps
- Heat pump systems shall have variable speed compressors
- **Hydraulic design:**
 - Heat pump systems shall be designed and controlled to avoid excessive start-up cycles (e.g., three start up cycles per hour)
 - Refer to CIBSE AM17 for design guidance, including design guidance for buffer vessels

5.5

Heating and cooling systems

This sub-section outlines the performance and functional requirements for heating and cooling systems, including distribution systems and emitters. For heat generation, see [5.4 Heat source](#)

General requirements

5.5.1 Summary

- **Purpose:** Heating and cooling systems, when well designed and maintained, provide comfortable environmental conditions to suit the age and needs of the users and activities within the space(s)
- **Performance:**
 - Durability: Reliable and long-lasting heat provision
 - Efficiency and resilience: Accurately sized heating systems
 - Coordination: Required between heating and ventilation systems
 - Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.5.2 Technical Manual references

- **Low carbon heat source:** See [5.4 Heat source](#)
- **Fabric performance:** See relevant sub-section for each construction element within [2 Superstructure](#)
- **Ventilation design:** See [5.6 Ventilation and thermal comfort](#)

5.5.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - [The Workplace \(Health, Safety and Welfare\) Regulations 1992](#)
- **Standards:**
 - [Workplace health, safety and welfare. Workplace \(Health, Safety and Welfare\) Regulations 1992. Approved Code of Practice and guidance](#)
 - Systems shall be cleaned, disinfected, pressure tested and commissioned in accordance with BSRIA BG2, BSRIA BG29, and CIBSE Commissioning Code W
- **Best practice:**
 - For hydronic and heat pump design, follow the guidance in CIBSE AM17: Heat pump installations for large non-domestic buildings
 - For the design, installation and commissioning of variable flow water systems see BSRIA AG16

5.5.4 Minimum life expectancy

- **Storage cylinders, valves and pumps:** 20 years
- **Pressurisation units and expansion vessels:** 20 years

5.5 Heating and cooling systems

- **Pipework and insulation:** 30 years
- **Heat emitters:** 30 years

water treatment chemicals, system flushing and cleaning, and water treatment regime

5.5.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for the heating and cooling systems, including water treatment, heat pumps, control valves, pumps, pressurisation units, expansion vessels, heat emitters and distribution pipework for the School/College to adopt/fund, if they so wish, from Practical Completion
- **Warranties:** 5-year manufacturer's warranty covering parts and labour for all heating and cooling systems, including heat pumps, control valves, pumps, pressurisation units, expansion vessels, heat emitters and distribution pipework

5.5.6 Operation and maintenance

- The Building User Guide shall include explanations of all heating and cooling controls
- A Planned Maintenance Plan for the heating and cooling systems shall be provided as part of the handover information
- A Water Treatment Plan for both the heating and cooling systems shall be included in the Operation & Maintenance (O&M) Manual providing full details of the

Specific requirements

5.5.7 Heating systems

- **Low temperature hot water (LTHW):**
 - Heating shall be provided by LTHW systems
 - Heating systems shall be designed to achieve the operative temperatures set out in Table 17
 - These temperatures shall be used as the set point, with the heating system designed to be controlled within 2°C above and below this set point
 - The heating shall be set to a suitable set-back temperature outside of occupied hours
 - LTHW heat distribution systems shall operate at a maximum flow temperature of 45°C
 - Distributed refrigerant pipework heating systems (e.g., VRF or DX systems) are prohibited in all rooms except for communications rooms (e.g., for servers)
 - Direct electric heating (e.g., through electric panel heaters) shall only be used for frost protection in plant rooms
- **Hydronic design:**
 - The heating system shall comprise both primary and secondary circuits separated by either a header, plate heat exchanger or buffer vessel
 - Refer to CIBSE AM17 for design guidance
- Systems shall be variable flow and balanced under all load conditions
- **Zoning:**
 - Each space shall have individual and independent temperature control
 - As a minimum, the system shall be zoned so that the following areas can be independently controlled:
 - Sports facilities, including changing areas and toilets
 - Large spaces (e.g., main hall or lecture theatre), including associated catering facilities, toilets and connecting corridors
 - Each floor/level of the building except for buildings with an area under 500m²
 - Spaces identified in the Project Brief for independent or community use e.g., nursery, community facilities or admin offices
- **Heat emitters:**
 - Emitters shall be positioned in locations accessible for cleaning and maintenance
 - Trench heaters shall include a removable grille

5.5 Heating and cooling systems

- Radiators located in nurseries, Early Years and SEND accommodation shall be of low surface temperature (LST) type
- Radiant Temperature Difference (RTA) resulting from the use of radiant panels shall be a maximum of 7°C
- Where spaces in SEND accommodation are designed for pupils/students that cannot thermally regulate or have complex health needs, as specified in the Project Brief, the maximum RTA shall be 5°C
- Sound from heat emitters shall not exceed the maximum indoor ambient noise level
- Maximum underfloor heating surface temperatures shall be:
 - o 23°C in spaces designed for students with complex health needs and nurseries
 - o 26°C in teaching spaces, offices, multi-purpose halls and sports halls used for exams and other occupied spaces
 - o 29°C in atria, circulation areas/corridors and lobbies not continuously occupied
 - o 29°C in working areas, such as kitchens, workshops, and community sports halls (not used for exams)
- Underfloor heating shall not be installed in spaces where:
 - o The floor is likely to be covered in mats
 - o The positions of partition walls are likely to change
 - o Fixings into the floor substrate/screed are required
 - o There is retractable (or fixed) bleacher seating
 - o Children under 2 years of age may sleep at floor level
- Underfloor heating pipework shall be pressure tested and witnessed before screed/final floor coverings are installed

5.5.8 Cooling systems

- **Determining cooling requirements:**
 - Ground source heat pump systems shall be utilised to deliver peak load cooling. Where a GSHP system is not being utilised, see [5.4.7 Determining the type of heat source](#), a reversible ASHP may be used to provide peak load cooling. The use of full mechanical comfort cooling shall be avoided unless expressly agreed with the Employer
 - Spaces in SEND accommodation shall be designed to meet the needs of the pupils/students in the Project Brief (for example, be appropriate for those that cannot thermally regulate or have complex health needs), and may include mechanical cooling with a fixed temperature set-point

5.5 Heating and cooling systems

- Peak load cooling shall be delivered to kitchen areas to ensure a maximum temperature of 28°C is not exceeded. Fan coil units shall not be used in kitchen areas
- **Cooling system design:**
 - Cooling shall be interlocked with heating systems to prevent simultaneous heating and cooling
 - Systems shall be variable flow to ensure a balanced flow under all load conditions
 - The hydronic design of the system shall ensure suitable control and operation of the system in both heating and cooling mode
 - The arrangement of valves shall allow for room-by-room control of cooling loads
 - The maximum supply-to-room air temperature differential in cooling shall be 7°C

5.5.9 Air conditioning systems

- **Communications room provision:**
 - Cooling to maintain the optimal working temperatures in accordance with the requirements of the manufacturer(s) for the installed equipment in peak summertime periods
 - Maximum temperature measured at high level above communication cabinets shall not exceed 28°C

- Minimum temperature of the supply air shall be 15°C
- Cooling units and pipework to not be located above cabinets
- Turn on and return to preset temperature and settings after rebooting or power outage
- Condensate to operate under gravity and be taken to the nearest drain outside of the room
- Cooling loads to be based on the manufacturer's sensible heat loads for the installed equipment
- Allowance for 10% additional load for future expansion
- **Refrigerant:**
 - Pipework length(s) and the amount of refrigerant in the system shall be minimised
 - Installation shall comply with the F gas Regulation
 - System refrigerant shall be selected to have an ozone depletion potential (ODP) of zero
 - Environmental impact of the refrigerant shall be minimised, considering both refrigerant charge and global warming potential (GWP)

5.5 Heating and cooling systems

- Agreement with the Employer's Representative is required to use any refrigerant with a GWP greater than 1500¹⁵
- **Pipework:**
 - Pipework shall be routed in accordance with manufacturer's recommendations
 - Distribution pipework shall be insulated in accordance with [5.5.11 Pipework and fittings](#)
- **Access and maintenance:** Indoor and outdoor units to be positioned to provide effective cooling and ease of maintenance
- **Condensate drainage:** Indoor coils shall be connected to the main drainage system in accordance with manufacturer's recommendations
- **Leak detection:** Leak detection to be incorporated

5.5.10 Pumps and ancillary equipment

- **Pumps:**
 - All LTHW/CHW (chilled water system) pump sets shall be duty/standby in a parallel configuration, enabling auto changeover and duty rotation
 - Automatic changeover between standby/duty pumps shall be facilitated by the BMS
 - Pump sets shall have manual/auto/off local control
 - Pumps shall be variable speed

- **Ancillary equipment:**
 - Micro-bubble deaerator, dirt separator and strainers shall be placed in accordance with manufacturer's recommendations
 - Where a plate heat exchanger is utilised, micro-bubble deaerators, dirt separators and strainers shall be placed on both the primary and secondary LTHW circuits
 - A pressurisation unit and expansion vessel shall be sized for the full water content of the circuit with frost protection
 - Dosing pots shall be provided in the plant room for the addition of corrosion inhibitors, biocides and other water treatment chemicals
- **Commissioning and balancing:** Test points, temperature and pressure relief valves, temperature and pressure gauges, and draining devices shall be provided to allow full commissioning and balancing of the system, in accordance with manufacturers' recommendations

5.5.11 Pipework and fittings

- **Pipework routing:**
 - Main heating/cooling pipework in corridors to be routed at high level with branches to serve spaces

¹⁵ Potential Suppliers should note, it is likely maximum refrigerant GWP requirements will be lowered during the life of the CF25 Framework.

5.5 Heating and cooling systems

- Pipework to be routed at high level with drops to low level heat emitters
- Pipework shall not be distributed through, above, or on walls adjacent to, communications rooms and electrical plant rooms
- **Water velocities:**
 - Water velocities shall be in accordance with Table 16 below (reference BSRIA AG16)
 - Pressure drops for main distribution branches shall not exceed 200 Pa/m

Pipework diameter (mm)	Water velocity (m/s)
15 - 50	0.75 – 1.15
>50	1.25 - 3

Table 16: Pipework water velocity requirements

- **Microbore pipework:** Of less than 15mm diameter is prohibited
- **Access and maintenance:** Pipework, valves and ancillaries positioned to provide ease of maintenance
- **Valves:**
 - Drain down and isolating valves to allow entire drain down
 - Accessible automatic air vents to top of risers and high points within the system. Pipework shall be laid to falls to minimise the number of high points

- **Pipework and supports:** Shall allow for axial expansion
- **Audible effects:** Pipework shall be free from the audible effects of expansion, vibration and water hammer
- **Pipework insulation and identification:**
 - All pipework shall be insulated, except when left as exposed pipework connecting to heat emitters within a space (e.g., connecting to radiators)
 - All uninsulated, exposed pipework to heat emitters shall be finished in a suitable paint for metalwork to a colour agreed with the Employer's Representative
 - Pipework connecting to Low Surface Temperature (LST) heat emitters and within the reach of children shall be protected
 - All pipework used for cooling, including pipework connected to emitters, shall be insulated and provided with a vapour barrier due to condensation risk
 - Pipework shall be insulated in accordance with BS 5422
 - Insulated pipework to be identifiable using adhesive colour bands in accordance with BS 1710
 - All insulating materials shall have a Global Warming Potential (GWP) of zero

5.5 Heating and cooling systems

- Mineral wool pipe section insulation shall be installed in accordance with BS 3958-4 and BS 5422
- Pipework insulation shall be continuous over pipe supports
- Insulation within plant rooms shall be protected with aluminium sheet
- All external pipework, including refrigerant pipework, shall be clad in metal or rigid UV resistant plastic to prevent damage e.g., by birds
- **Pipework materials and fittings:**
 - Pipework shall either be copper or heavy grade steel in accordance with BS EN 10255
 - Push-fit connections are not permitted but press-fit connections are permitted
 - Install copper pipework in accordance with BS EN 1057. Copper fittings, jointing materials and supports all in accordance with British Standards
 - Pre-soldered capillary fittings shall be lead free copper or copper alloy complying with BS EN 1254 series
 - Screwed joints e.g., to valves and gauges shall be to BS EN 10226 series using PTFE tape to BS 7786
 - Maintenance joints in copper pipework up to and including 54mm diameter to be copper alloy union couplings, bronze to bronze navy pattern. Flanged

maintenance joints are to be used in pipework with a diameter greater than 54mm. Flanges are to be solid full face copper alloy, slip-on type suitable for brazing, complying with BS EN 1092-3

- Flanged joints shall be made with full face rubber insertion jointing rings to BS 7874 or BS EN 681 series and BS EN 682 as appropriate; brass nuts, bolts and washers complying with the requirements of the same British Standard and pressure rating or table as the flanges being connected
- Flexible connections shall not be used on classroom ventilation units
- Alternative pipework and jointing systems shall be subject to prior approval by the Employer's Representative

5.5.12 Corrosion prevention and water treatment

- The design of LTHW heating and CHW chilled water systems shall follow the design considerations outlined in 'BSRIA BG50: Water Treatment for Closed Heating and Cooling Systems' to prevent microbiological fouling, corrosion and scale
- Systems shall be designed to eliminate need for complex water treatment regimes. Different metals installed in a mixed metal system shall be fully documented, including all metal types used in heat exchangers, pipework and heat emitters

5.5 Heating and cooling systems

Type of space/activity	Required heating operative temperature (°C)
Spaces with transient occupancy (e.g., toilets, circulation, store rooms)	18°C
Kitchens	20°C
Spaces with normal levels of activity, including all teaching, practical and ICT-rich spaces, study and social spaces, libraries (LRC), multi-purpose/main halls, admin and staff areas and prep rooms	20°C
Sleeping accommodation	20°C
Spaces with less than normal levels of activity or where fewer items of clothing are worn, including medical inspection rooms, sick rooms, sports halls and dance/activity studios	21°C
SEND accommodation	23°C
Where pupils/students or adults may be wet and partially clothed for a significant length of time such as changing rooms and swimming pools	23°C in changing rooms and no more than 1°C above or below that of the water temperature in pool halls subject to a maximum of 30°C
Where young children or those with physical disabilities may be wet or partially clothed for a significant length of time such as changing rooms and hydrotherapy pools	25°C - the air speed in these environments should be as low as possible and not exceed 0.15m/s at 25°C

Table 17: Operative temperature requirements by space type

5.6

Ventilation systems and thermal comfort

This sub-section outlines the performance and functional requirements for ventilation systems and thermal comfort, from general principles to space specific requirements

General requirements

5.6.1 Summary

- **Purpose:**
 - Ventilation systems and thermal comfort form a key part of a holistic design approach to Indoor Environmental Quality (IEQ)
 - IEQ refers to the overall conditions inside a building that affect the health, comfort, and productivity of users
 - Good ventilation can help maintain thermal comfort, provides fresh air and can remove pollutants and odours
- **Performance:**
 - Durability: Reliable and long-lasting ventilation systems
 - Controls: Adaptable for all seasons
 - Coordination: Required between ventilation design and design approach to acoustics, daylighting, heating and cooling
 - Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.6.2 Technical Manual references

- **Radon:** See [1.1 Foundations and substructure](#) and [1.2 Lowest floor construction](#)
- **External windows and louvres:** See [2.6 External windows and doors](#)
- **Heating and cooling systems:** See [5.5 Heating and cooling systems](#)
- **Daylighting and electrical lighting:** See [5.8 Daylighting and electrical lighting](#)
- **BMS and controls:** See [5.11 BMS, controls and performance monitoring](#)
- **Trees and plants:** See [8.3 Soft landscape](#)

5.6.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Standards and best practice:**
 - For the design of ventilation systems, see CIBSE Guide B
 - For the design of natural ventilation systems, follow the guidance in CIBSE AM10
 - For the design of Local Exhaust Ventilation (LEV) systems, including fume cupboards, follow the guidance in HSG 258

5.6 Ventilation systems and thermal comfort

- The design of kitchen ventilation systems shall be in accordance with BESA DW/172 and BS EN 16282 series
- Ductwork systems, including insulation and dampers, shall be installed in accordance with BESA DW/144

5.6.4 Minimum life expectancy

- **Air handling units (AHUs), room-based ventilation units, extract fans and controls:** 20 years
- **Ductwork and insulation:** 30 years
- **Fume cupboards and Local Exhaust Ventilation (LEV) systems:** 20 years

5.6.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for the ventilation systems, including air handling units, room-based ventilation units, extract fans, fume cupboards and kitchen ventilation systems for the School/College to adopt/fund, if they so wish, from Practical Completion
- **Warranties:** 5-year manufacturer's warranty covering parts and labour for all ventilation equipment, including fume cupboards and LEV systems

5.6.6 Operation and maintenance

- A Planned Maintenance Plan for air handling units, room-based ventilation units, extract fans, fume cupboards and kitchen ventilation systems shall be provided as part of the handover information
- Maintenance and cleaning schedules for kitchen ventilation systems shall be included in Operation & Maintenance (O&M) Manual and a kitchen user guide produced as part of the Building User Guide

Specific requirements

5.6.7 Principles of ventilation design

- **Requirements:**
 - The ventilation performance requirements for individual spaces are outlined in 5.6.12 to 5.6.25 (inclusive)
 - Ventilation controls shall maintain both air quality and thermal comfort criteria
 - Where room-based ventilation units or Air Handling Units (AHUs) serve a space which requires an average CO₂ level to be maintained (see 'Ventilation requirements for specific spaces'), they shall have variable volume control
 - Designs shall promote the use of passive ventilation. Natural cross ventilation shall be provided to all teaching spaces, seminar rooms, fitness rooms, staff social rooms and sixth form social spaces utilising the dedicated, enclosed service spines (see DfE's Pattern Book) for stack ventilation. Teaching spaces for music do not require cross ventilation
 - Where DfE's Pattern Book allows landlocked spaces, and they have rooflights for daylighting, the rooflights can be used for passive ventilation
- Connections to stacks for cross ventilation shall be provided with protective/decorative grilles to ensure they are not completely open and subject to abuse
- Room-based ventilation units (e.g., local ventilation units that serve a specific space or group of spaces), and associated connections, shall be positioned to minimise impact on users and to not obstruct views to the outside i.e., they shall be positioned as high as is practicable in the space and above the clear height requirements of the space as outlined in DfE's Pattern Book. The positioning of these units shall be fully coordinated with the building structure, ceiling finish including acoustic ceiling panels, sprinklers (where applicable) and light fittings
- **Minimising the ingress of external pollutants:**
 - In accordance with AD F, systems shall be designed to minimise the intake of external air pollutants
 - Ventilation intakes and outlets shall be designed to minimise the ingress of external air pollutants
 - Filtration requirements shall be determined in response to project/site specific levels of external pollution

- **Air distribution:**
 - An effective distribution of air within spaces shall be maintained in all conditions
 - The positioning of supply and return air paths shall assist in effective air distribution
- **Ventilation openings:**
 - Openable windows and vents shall be coordinated with internal blinds to ensure that neither inhibits the performance of the other
 - Louvres used for night purging/cooling shall be secure, and openings used for night purging/cooling shall be access restricted
- **Acoustics:**
 - External noise levels from ventilation systems shall not exceed local planning requirements
 - Attenuation of natural and mechanical ventilation shall be provided where necessary to meet the Indoor Ambient Noise Levels (IANL) given in BB 93
 - The noise level from boosted ventilation, ceiling or wall mounted fans shall not exceed an IANL of 45 dBA, LAeq
 - Noise levels from practical ventilation equipment in teaching spaces, including cooker extraction hoods, fume cupboards and dust extract systems, shall be kept below 50dB in accordance with the [Acoustics of Schools: a design guide](#) from The

Institute of Acoustics and the Association of Noise Consultants

- **Fumes and dust transfer:**
 - Air containing fumes or dust shall not be transferred to another space i.e., contaminated air shall not be pulled/drawn through other spaces to be extracted
- **Ventilation controls and monitoring:**
 - See [5.11 BMS, controls and performance monitoring](#) for controls and monitoring requirements
 - Where electrically operating rooflights are provided, they shall be fitted with a rain sensor as [2.3.29 Glazed rooflights \(fixed and openable\)](#) and also fitted with a local manual override switch which automatically resets to the closed position
- **Ventilation calculations:**
 - Ventilation calculations shall be carried out for summer, winter and mid-season design conditions to ensure the performance criteria can be met throughout the year
 - Natural ventilation calculations shall be carried out in accordance with CIBSE AM10
 - Ventilation calculations shall assume an external ambient carbon dioxide (CO₂) concentration of 400ppm

5.6 Ventilation systems and thermal comfort

- Ventilation calculations shall be based on the 'maximum/design occupancy' figures against the individual space types in the Schedule of Spaces
- Ventilation calculations shall assume full occupancy from 09:00 to 16:00, Monday to Friday, with the exception of a one-hour lunch break (12:00 to 13:00) where the occupancy shall be assumed to be zero
- When occupancy levels are zero i.e., during lunch, the CO₂ concentration shall be excluded from the average
- **Ventilation opening areas:**
 - Opening areas shall be calculated in accordance with BB 101 Annex D: Definition of opening areas
 - Effective area (A_{eff}) shall be stipulated on design drawings and in overheating assessment reports
 - The impact of any insect/fly meshes shall be accounted for in the design
 - The effective area of windows and ventilators shall be obtained by testing the appliances in accordance with BS EN 13141 series and as quoted by manufacturers. Where tests are unavailable at earlier design stages, the Discharge

Coefficient Calculator can be used to estimate the effective area¹⁶

¹⁶ The Discharge Coefficient Calculator is available at [Building Bulletin 101: calculation tools - GOV.UK](#)

Ventilation systems and components

5.6.8 Air Handling Units (AHUs), extract fans and room-based ventilation units

- **Heat recovery:**
 - Where a ventilation unit provides mechanical supply and extraction, it shall have heat recovery, except where this is deemed unsuitable due to the level of grease in the extract air
 - Heat recovery can either be achieved through plate heat exchangers or thermal wheels. Run-around coils can be used on kitchen ventilation systems
 - Thermal wheel AHUs shall be designed to minimise cross contamination, which includes not placing both fans on the room side of the thermal wheel
- **Recirculation:** Where AHUs supply more than one space, recirculation is prohibited during normal occupied hours
- **Filtration:**
 - All particle supply air filters should be tested to BS EN ISO 16890 series and all molecular gas supply air filters should be tested to BS EN ISO 10121 series
 - Filter status shall be monitored remotely through the Building Management System (BMS), with the specific fault identified through the BMS head end
- **Fans:** Fans to be variable speed
- **AHU classification:** With reference to BS EN 1886, AHUs shall be equal to or better than:
 - Leakage Class - L2
 - Mechanical Strength - D1
 - Thermal Transmittance Class - T3
 - Thermal Bridging Class - TB3
- **Access and maintenance:** All ventilation units shall be positioned in locations safely accessible for cleaning and maintenance
- **Location:**
 - AHUs and extract fans shall be positioned in either plant rooms or rooftop enclosures and protected from inclement weather. They shall not be externally mounted on exposed roof areas
 - AHUs and extract fans located in rooftop enclosures shall be fully weatherproofed and rated for external conditions

5.6.9 Ductwork and dampers

- **Velocities:** Ductwork velocities shall be in line with CIBSE Guide B

- **Installation and support:**

- Ductwork systems, including insulation and dampers, shall be installed in accordance with BESA DW/144
- Fixings for ductwork supports shall be capable of supporting the combined load of the ductwork and insulation

Note: Tables 16 to 18 in DW/144 are for uninsulated ducts so the weight of insulation will need to be added

- Ventilation plant shall be separately supported and not rely on the ductwork support
- Wire rope support systems shall be UKAS safe working load certified
- External ductwork supports shall be designed to resist wind loading
- Penetrations for fixings into/through the roof finish/waterproofing layer are not permitted
- The support system for rooftop ductwork shall be designed in conjunction with the roof build-up to ensure the roof immediately beneath the ductwork can be maintained

- **Access and maintenance:**

- Ductwork shall be fully accessible for cleaning and maintenance
- Access points for the cleaning of ductwork shall be provided. Where installed in ceilings, access points

shall be coordinated with access panels or areas of gridded ceiling. Access points shall not be located where access panels or gridded ceilings are prohibited – see [3.3.17 Ceiling ancillaries](#) for restrictions

- All dampers (i.e., Volume Control Dampers (VCDs) and fire dampers) shall be mounted in locations that are safely accessible for maintenance and inspection. Dampers shall not be located in spaces where access panels or gridded ceilings are prohibited – see [3.3.17 Ceiling ancillaries](#) for restrictions
- All damper locations shall be clearly outlined on drawings and included in the O&M Manual

- **Insulation and cladding:**

- Ductwork shall be insulated in accordance with BS 5422
- All ductwork and external louvres shall be thermally insulated with the exception of:
 - Externally mounted fresh air intake and exhaust ductwork
 - Supply and return ductwork serving the room in which a ventilation unit is located and where there is no risk of condensation
- All external ductwork, that is required to be insulated, shall be clad in polyester powder coated

- metal or rigid UV resistant plastic to prevent damage e.g., by birds
- Ductwork shall be clearly identified and labelled
- **Coordination with project specific fire strategy:**
 - The design and installation of fire-stopping, fire dampers, fire and smoke dampers, and other fire protection shall satisfy the requirements of the project specific fire strategy. Also see [9 Fire safety](#)
 - Fire dampers, fire and smoke dampers, and ductwork shall be provided in accordance with AD B Volume 2
 - All fire-stopping, fire dampers, fire and smoke dampers, and other fire protection shall be documented using photographic records and included in the Health & Safety File
 - Maintenance, inspection and testing requirements for fire dampers, and fire and smoke dampers shall be included in the draft Fire Safety Management Plan and O&M Manual
- **Volume Control Dampers (VCDs):** Provide VCDs to balance and commission the entire system
- **Flexible ductwork:** Shall only be used where required for final connections to diffusers or for semi-mobile fume cupboards. The maximum length of flexible ductwork for final connections to diffusers (not fume cupboards) shall be 500mm

- **Testing of dampers:** Dampers to be tested in accordance with BS EN 1751

5.6.10 Ventilation intake and exhaust

- **Requirements:**
 - Ventilation intakes and exhausts shall be taken from/to outside the building
 - Ventilation intake and exhaust termination points shall be arranged to avoid recirculation
 - Ventilation pipes (soil stacks) shall terminate in accordance with AD H i.e., at least 900mm above any opening into the building within 3m. See [5.2 Drainage](#)
 - Ventilation intakes and exhausts shall be protected from vermin and bird ingress
 - Ventilation intakes and exhausts serving D&T food rooms and catering kitchens shall be protected from insect and fly ingress
- **Contaminated exhaust air:**
 - Contaminated exhaust air (i.e., toilet, fume cupboard and kitchen exhausts) shall be discharged away from intakes, clear of any roof recirculation zones and away from other buildings
 - Fume cupboards and associated exhausts shall be installed in accordance with the guidance in BS EN 14175. A discharge point at least 3m above the highest point is required, unless there is evidence

to support an alternative by fume dispersal experts, regulatory requirements or in specific circumstances. Applications of this nature shall be justified and agreed with the Employer's Representative

- Where stack heights are limited (e.g., by planning constraints), it may be necessary to increase the plume height by increasing the efflux velocity. Any proposed alternative shall be justified and agreed with the Employer's Representative
- **Fire dampers:** Fire dampers are not permitted in exhaust discharge ductwork from fume cupboards, other fume exhaust systems or kitchen exhaust systems. In exceptional circumstances where this is unavoidable, fume cupboard exhausts shall comply with the fire compartmentation and fire damper recommendations in BS EN 14175

5.6.11 Louvres, grilles and supply diffusers

- **Requirements:** Supply air diffusers and air intake louvres shall be selected and positioned to provide even air distribution within spaces and to avoid excessive temperature differences and air velocities in accordance with [5.6.28 Cold draughts](#)
- **External louvres:**

- Coordinate with the details of external walls and windows to allow access for maintenance and adequate drainage of rainwater
- Shall not be specified in dark colours to reduce the amount of heat absorbed
- External grilles and weather louvres shall meet the appropriate weather and airflow ratings to prevent rain and dust penetration as defined by BS EN 13030
- Air leakage and thermal performance of louvres to be tested in accordance with BS EN 1026

Ventilation requirements for specific spaces

5.6.12 General teaching spaces

- **Performance standard:** Sufficient outdoor air shall be provided to achieve a daily average concentration of CO₂ during the occupied period of less than 1000ppm and a maximum concentration not exceeding 1500ppm for more than 20 consecutive minutes

5.6.13 Office accommodation

- **Performance standard:** The ventilation of offices and staff workrooms shall be in accordance with AD F

5.6.14 Reprographics, cleaners' stores and kitchenettes

- **Reprographics performance standard:**
 - Extract ventilation to reprographics rooms and other areas that are specifically designed for multi-function devices (e.g., in service zones) shall be provided at an air extract rate of 20 l/s per machine
 - These spaces shall also meet the ventilation rates required for offices in accordance with AD F
- **Cleaners' stores performance standard:** Extract ventilation to cleaners' stores shall be provided at a rate of 6 air changes per hour (ACH). Extract ductwork may connect to toilet extract systems

- **Kitchenettes performance standard:** As per AD F requirements for food and drink preparation areas

5.6.15 Toilets, showers, hygiene rooms, medical inspection rooms, laundry rooms and changing rooms

- **Performance standard:**
 - For toilets, hygiene rooms and changing rooms provide extract ventilation to meet the following rates:
 - 15 litres per second per shower
 - 6 litres per second per WC pan or urinal
 - Medical inspection rooms, sick rooms, laundries and soiled holding shall have a minimum supply and extract ventilation rate of 10ACH
- **Design:**
 - For spaces with a small extract requirement i.e., less than 15 l/s, a local extract system may be provided with the make-up air taken from the surrounding corridors and internal spaces. These systems shall have local standalone controls
 - These spaces shall be on a dedicated ventilation system serving only these space types
 - Spaces shall be negatively pressurised

- Where a mechanical supply and extract system is implemented, the system shall have heat recovery

5.6.16 Sports halls, main halls, fitness rooms, activity studios, drama studios and dance studios

- **Performance standard:** Sufficient outdoor air shall be provided to achieve a daily average concentration of CO₂ during the occupied period of less than 1000ppm and a maximum concentration not exceeding 1500ppm for more than 20 consecutive minutes
- **Occupancy:** The ventilation design shall be based on the scenario with the highest occupancy density e.g., school exams, public performances or assemblies

5.6.17 Circulation spaces including atria, corridors and stairs

- **Performance standard:**
 - All circulation spaces shall be ventilated through either:
 - Natural ventilation by appropriately located ventilation opening(s) with a total opening area of at least 1/50th of the floor area of the circulation space, or

- Mechanical ventilation supplying outdoor air of 0.5 litres per second per m² (l/s/m²) of floor area of the circulation space
- Corridor doors and doors to stairs shall be assumed to be closed
- Where circulation spaces include occupied areas e.g., break-out or group spaces, the occupied area shall be ventilated in accordance with the 'general teaching spaces' performance standard outlined in 5.6.12
- All stairs shall be ventilated at high level

5.6.18 Design and technology (D&T) / art and design spaces

- **Performance standard:**
 - Ventilation in D&T spaces shall be in accordance with BS 4163 and CLEAPSS Guide G225 'Local Exhaust Ventilation in D&T'
 - Local Exhaust Ventilation (LEV) systems shall be designed by a qualified specialist
 - A risk assessment in accordance with HSG 258 shall be carried out to determine the correct provision of LEV
 - Dust extraction shall be provided for all fixed machines in workshops, prep rooms or D&T studios that produce dust

5.6 Ventilation systems and thermal comfort

- Fume extraction is required for, but not limited to, the following:
 - o Hot metal work and heat treatment processes
 - o Laser cutters
 - o 3D printers
 - o CAD/CAM machines
 - o Surface cleaning and finishing, and printed circuit board manufacturing (etching)
 - o Soldering of circuit boards
 - o For some paints and adhesives, including spray fix as used in art rooms
- **Ventilation rate:** A total extract ventilation rate of 2.5 l/s/m² is required for D&T, and art and design spaces. This ventilation rate can be provided by the general ventilation system, the LEV system or a combination of both
- **Controls:** Systems local to individual machines shall either be interlocked with the machine so they will not start without the LEV running or be provided with a local switch adjacent to the machine for user operation

5.6.19 D&T food rooms

- **Performance standard:**
 - The ventilation of domestic cookers in D&T food rooms shall be provided in accordance with AD F with air always extracted to the outside

- If gas-fuelled cooking equipment is provided, where agreed with the Employer, the ventilation provision shall also be in accordance with IGEM requirements – see [5.9 Fuel installations](#)
- The space shall be kept under negative pressure during all cooking activities
- Fume and particle filtration shall be provided
- General room extract shall be positioned to avoid excessive build-up of grease
- Vocational training kitchens in Colleges shall be treated as commercial kitchens and meet the 'kitchens' performance standard outlined in 5.6.22

5.6.20 Science laboratories, chemical stores and prep rooms

- **Performance standard:**
 - Science laboratories and studios shall have a minimum exhaust ventilation rate of 4 l/s/m²
 - Prep rooms shall have a minimum exhaust ventilation rate of 7.5 l/s/m²
 - Chemical stores shall be provided with 2ACH continuous ventilation i.e., 24 hours a day ventilation
 - When science laboratories are being used as conventional classrooms/general teaching spaces, the performance standard outlined in 5.6.12 shall be met

5.6 Ventilation systems and thermal comfort

- When gas is being used in science laboratories during practical lessons, the CO₂ level can be higher than those outlined in 5.6.12
- During practical lessons, the control of CO₂ levels shall comply with the gas safety requirements listed in IGEM/UP/11 – see [5.9 Fuel installations](#)
- **Purge ventilation:** A means shall be provided to increase the exhaust rate to at least 5 l/s/m² in science laboratories and studios
- **Fume cupboards:**
 - Fume cupboards shall be provided to 1 in 3 science laboratories and science studios, and in all science prep rooms
 - Fume cupboards shall be of the ducted type, unless otherwise specified in the Project Brief
 - Recirculatory fume cupboards shall only be used as additional fume cupboards and not in place of the minimum number of ducted fume cupboards required
 - Fume cupboards shall be fixed in position in prep rooms and be able to be pulled out from the wall on flexible connections in science teaching spaces for demonstration purposes, unless otherwise specified in the Project Brief
 - Both new and legacy recirculatory fume cupboards shall be tested and installed to comply with BS EN

14175 and CLEAPSS Guide G9 standards for recirculatory fume cupboards

- **Science prep rooms:** Coordination of the fume cupboard position in relation to windows and vents is required to ensure chemical fumes are not drawn out of the cupboard and into the space

5.6.21 SEND accommodation

- **Assessment:** An assessment shall be undertaken of the requirements of the occupants before commencing the ventilation system design. This assessment shall cover infection risk, thermal comfort and the needs of the pupils/students e.g., their ability to thermoregulate or adapt to higher temperatures
- **Performance standard:**
 - The performance standard outlined in 5.6.12 shall be applied to all teaching and therapy spaces
 - All spaces, including ancillary spaces, shall have a minimum constant ventilation rate of 2.3 l/s/m²
- **Spaces for non-ambulant pupils/students:** The design of ventilation systems for vulnerable pupils/students in these spaces shall:
 - Minimise recirculation to mitigate risk of cross-infection (areas with complex health and hygiene requirements may require precise control of air flows with pressure regimes, depending on pupils/students' needs)

- Ensure allergen and pollutant circulation is kept to a minimum

5.6.22 Kitchens

- **Performance standard:**
 - The design of kitchen ventilation systems shall be in accordance with DW 172 and BS EN 16282 series
 - Recirculation kitchen extract systems are not permitted
- **Specific requirements:**
 - Local variable speed control with marked settings for 'off', 'cold prep', 'hot prep' and 'maximum' shall be provided
 - Peak load cooling shall be provided to ensure that the maximum temperature does not exceed 28°C. This shall not be provided by a fan coil unit
 - Removable baffle type grease filters shall be installed and accessible for cleaning and maintenance
 - For the technical requirements for gas services, where unavoidable and agreed with the Employer – see [5.9 Fuel installations](#)

5.6.23 Communications rooms

- **Performance standard:**
 - Appropriate ventilation shall be provided for occupants and any batteries
 - Ventilation shall be provided with filtration to prevent dust ingress
 - The minimum temperature of supply air shall be 15°C
 - For air conditioning system requirements see [5.5.9 Air conditioning systems](#)

5.6.24 Basement heat and smoke ventilation

- **Performance standard:** Basements shall be vented in accordance with AD B and the project specific fire strategy

5.6.25 Specialist spaces in colleges

- **Performance standard:** Some spaces, such as those used for vocational teaching, may have specific ventilation requirements that are in addition to those set out in this document. Where this is the case, the ventilation provision shall be clearly outlined to the Employer's Representative for approval

Thermal comfort

5.6.26 Mitigating overheating

- **Performance standard:**

- Buildings shall incorporate external horizontal shading devices (brise soleil) to all south, south-east and south-west facing windows (i.e., within 45° of due south), to minimise peak solar gains and reduce the risk of overheating
- Buildings shall prioritise trees and planting around their perimeters to reduce solar gain and local ambient air temperatures, however, they shall not be included in the final overheating modelling used to demonstrate compliance with these technical requirements
- Buildings shall meet the requirements of the Overheating Risk Assessment (ORA) as set out in 5.6.27

- **Occupant control:**

- All windows in perimeter spaces shall have openable lights. This includes in areas with high external ambient noise levels; in this scenario, the ventilation design shall not rely on the openable windows to provide the required internal environmental conditions

- Local control shall be provided to room-based ventilation units to allow occupants to vary mechanical ventilation rates
- Ceiling or wall mounted fans are an acceptable solution for mitigating overheating, subject to a project specific risk assessment and agreement with the School/College
- Ceiling and wall mounted fans shall have variable speed control

- **Effects of local microclimate and building materials:**

- Ensure the heating impact of external surfaces (e.g., black tarmac, paving and roof coverings/finishes) is minimised
- Dark coloured materials and synthetic surfaces shall not be situated within 10m of the building
- The colour and thermal conductivity of building materials and surfaces, such as air intake louvres, hard paving and roof coverings, shall be accounted for in the Overheating Risk Assessment (ORA). The selection of external building materials and surfaces shall not contribute to an increased risk of overheating

- **SEND accommodation:**
 - Spaces in SEND accommodation shall be designed to meet the needs of the pupils/students in the Project Brief (for example, be appropriate for those that cannot thermally regulate or have complex health needs), and may include mechanical cooling with a fixed temperature set-point

5.6.27 Overheating Risk Assessment (ORA)

- **Calculation methodology:**
 - Thermal comfort calculations shall follow the methodology outlined in CIBSE TM52, including the acceptable temperature ranges outlined in Table 2 (of CIBSE TM52) for the different categories of space
 - Table 19 outlines how these categories apply to education space types for overheating risk assessments

Note: These comfort categories are based on the comfort criteria in BS EN 16798-1

 - A dynamic thermal simulation model shall be used
- **Weather files:**
 - The ORA shall use the CIBSE DSY1, 50th Percentile Low Emission 2080, most appropriate to the location of the School/College building. This weather file is considered representative of a +2°C global warming scenario

- All new buildings shall be able to adapt to overcome overheating when assessed against a CIBSE DSY1 50th Percentile High emission 2080 weather file, without requiring alteration or modification to any of the building elements under [2 Superstructure](#). This weather file is considered representative of a +4°C global warming scenario
- **Overheating criteria for perimeter spaces with openable windows or vents:**
 - Assess the performance of the occupied spaces against Criterion 1, Criterion 2 and Criterion 3, as defined in CIBSE TM52
 - The threshold for passing Criterion 1 shall be 40 hours (not 3% of occupied hours)
 - Criterion 1 and one of either Criterion 2 or 3 shall be met
- **Overheating criteria for internal, mechanically ventilated spaces:**
 - Assess the performance of the occupied spaces against a maximum operative temperature of 25°C
 - This maximum temperature shall not be exceeded for more than 3% of occupied hours
- **Modelling assumptions:**
 - The assessment shall be applied from 1st May to 30th September

- The assessment shall be modelled using continued occupation through the summer i.e., no holiday periods
- The occupied hours shall be 09:00 to 16:00 Monday to Friday i.e., excluding weekends
- A lunch break of one hour shall be assumed (12:00 to 13:00)
- **Internal gains:**
 - The Contractor shall clearly outline the internal gains that have been modelled, including time profiles and the basis for these assumptions
 - Modelled occupancies shall be based on the 'maximum/design occupancy' figures against the individual space types in the Schedule of Spaces
 - A sensible heat gain of at least 70W (and a latent heat gain of at least 55W) shall be modelled for all spaces. Where activity levels are anticipated to be higher, modelled heat gains shall be increased with reference to Table 6.3 of CIBSE Guide A
 - Internal gains from practical equipment shall be considered for all spaces; for example, the cooker loads in D&T food rooms shall be included

5.6.28 Cold draughts

- **Performance standard:**
 - Comfort categories to be applied to different space types for cold draughts are detailed in Table 18
 - Cold draughts shall be avoided in the occupied zone and the draught criteria to provide thermal comfort in cold conditions outlined in Table 20 shall be met
 - The window and damper draught calculator¹⁷ can be used to test the ventilation strategy, including the height of openings, to avoid draughts in the occupied zone
 - Alternatively, measurements made in test rooms or CFD models can be used

¹⁷ The Window and damper draught calculator is available at [Building Bulletin 101: calculation tools - GOV.UK](#)

5.6 Ventilation systems and thermal comfort

Space / activity	Comfort category
Spaces with transient occupancy e.g., toilets, circulation, store rooms	Category IV
Spaces with normal levels of activity, including all teaching, practical and ICT-rich spaces, study and social spaces, libraries (LRC), multi-purpose/main halls, admin and staff areas and prep rooms	Category IV
Sleeping accommodation	Category IV
Spaces with less than normal levels of activity or where fewer items of clothing are worn, including medical inspection rooms, sick rooms, sports halls and dance/activity studios	Category II
SEND accommodation	Category I
Where pupils/students or adults may be wet or partially clothed for a significant length of time such as swimming pools and associated changing rooms	Category II
Where young children or those with physical disabilities may be wet or partially clothed for a significant length of time such as hydrotherapy pools and associated changing rooms	Category I

Table 18: Comfort categories for cold draughts

Space / activity	Comfort category
Spaces with normal levels of activity, including all teaching, practical and ICT-rich spaces, study and social spaces, libraries (LRC), multi-purpose/main halls, admin and staff areas and prep rooms	Category II
Medical inspection rooms and sick rooms	Category II
Sports halls and dance/activity studios	Category III
SEND accommodation	Category I

Table 19: Comfort categories for Overheating Risk Assessments

Category of space / activity	ΔT (Min maintained operative temperature - plume local air temp)	Maximum air velocity (m/s)
I	1.5	0.15
II	2	0.2
III	3	0.25
IV	4	0.3

Table 20: Cold draught criteria

5.7

Electrical infrastructure

This sub-section outlines the performance and functional requirements for electrical infrastructure, including renewable energy generation. For lighting, see [5.8 Daylighting and electrical lighting](#). For access control, intruder alarm and other communication systems, see [5.10 Security and communication systems](#). For fire detection and alarm systems, see [9 Fire safety](#)

General requirements

5.7.1 Summary

- **Purpose:** Electrical infrastructure, when well designed and maintained, provides a safe and sufficient power supply
- **Performance:**
 - Durability: Reliable supply
 - Safety: Electrical infrastructure installed in accordance with BS 7671
 - Sustainable energy generation: Efficient renewable energy generation – see [0.1 Integrated environmental design](#)
 - Coordination: Required between electrical infrastructure and lighting, including emergency and specialist lighting, and between electrical infrastructure and life safety and fire protection systems, including electrical supplies for evacuation lifts and fire detection and alarm systems
 - Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.7.2 Technical Manual references

- **Sustainable design:** See [0.1 Integrated environmental design](#)

- **Roof build-ups and coverings:** See [2.3 Roofs](#)
- **Lifts:** See [2.4 Stairs, ramps and lifts](#)
- **Lighting including emergency and exterior lighting:** See [5.8 Daylighting and electrical lighting](#)
- **Access control and intruder alarm:** See [5.10 Security and communication systems](#)
- **Metering and sub-metering:** See [5.11 BMS, controls and performance monitoring](#)
- **Broadband:** See [5.12 Internet connectivity](#)
- **CCTV:** See [6.4 Building technologies](#)
- **Fire detection and alarm, fire suppression and emergency voice communications:** See [9 Fire safety](#)

5.7.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - [The Electric Vehicles \(Smart Charge Points\) Regulations 2021](#)
- **Standards:**
 - All electrical installations shall comply with BS 7671 IET Wiring Regulations
 - The inspection, testing and certification of electrical installations shall also be in accordance with IET Guidance Note 3

- The relevant standards for renewable energy systems are outlined in [5.7.9 Photovoltaic \(PV\) systems](#) and [5.7.11 Small scale wind generating systems](#)
- The relevant standards for EV charging installations are outlined in [5.7.19 Electric Vehicle \(EV\) charging installations](#)
- Electrical services, including electrical power supplies for life safety and fire protection systems, shall be provided in accordance with BS 8519 and BS 9999 – see [5.7.20 Electrical services for life safety and fire protection systems](#)

5.7.4 Minimum life expectancy

- **High voltage (HV) switchgear, transformers and packaged substations:** 35 years
- **Low voltage (LV) main switchgear and switchboards:** 35 years
- **Armoured cabling, busbars and supports:** 35 years
- **LV circuits and distribution boards:** 25 years
- **Conduits and cable trunking:** 30 years
- **Earthing and bonding systems:** 30 years
- **Lightning protection systems:** 30 years
- **PV systems including cells, panels modules and inverters:** 25 years
- **EV charging equipment:** 25 years

- **Socket outlets, fused connection units and light switches:** 15 years
- **UPS:** 10 years

5.7.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for the electrical infrastructure and all specialist electrical systems, including fire suppression systems, lifts, fire detection and alarms, EV charging equipment, battery systems, and renewable energy generating systems for the School/College to adopt/fund, if they so wish, from Practical Completion
- **Warranties:**
 - 5-year manufacturer's warranty covering parts and labour for the whole electrical installation including fire suppression systems, lifts, fire detection and alarms, EV charging equipment and battery systems
 - 10-year manufacturer's warranty covering parts and labour for wind turbines
 - 25-year manufacturer's warranty covering parts and labour for PV panels
 - 10-year manufacturer's warranty covering parts and labour for all other parts of renewable energy generating systems including cabling and inverters

5.7.6 Operation and maintenance

- A Planned Maintenance Plan for the electrical infrastructure and all specialist electrical systems shall be provided as part of the handover information and include all annual and 5 yearly tests and inspections

Specific requirements

Incoming electrical supplies

5.7.7 Incoming electrical supplies

- **Requirements:**

- Incoming electricity supplies shall be established in consultation with the Distribution Network Operator (DNO)/Independent Distribution Network Operator (IDNO)
- The required capacity of the new electrical supply shall be assessed with consideration for load diversity, ensuring that the required capacity is not overestimated. This shall be calculated based on hour by hour load assessments, not the application of diversity factors against rule-of-thumb loads
- Utility supply agreements shall not include a fixed Authorised Supply Capacity (ASC) so that the ASC can be reduced in the future if the School/College so wishes
- The Contractor shall:
 - Allow for the siting of any DNO/IDNO equipment on site if required
 - Establish the rating of the DNO/IDNO overcurrent device at the point of supply
 - Establish the characteristics of the supply including prospective short-circuit current,

external earth fault loop impedance and earthing arrangements

- Provide the DNO/IDNO with all of the load characteristics required for the project
- For a Partial School/College project, where the building is to be supplied from an existing building, the suitability of the upstream electrical infrastructure shall be assessed. If the upstream electrical infrastructure has an estimated service life of less than 15 years, it shall be replaced as part of the Contract, subject to agreement with the Employer
- **Power factor correction:** Provide power factor correction equipment to achieve a power factor of no less than 0.95 lagging, with balanced loads for each phase
- **Future expansion:**
 - A minimum 10% allowance shall be provided for future expansion
 - In consultation with the Employer's Representative, an assessment shall be made of any potential expansion or additional electrical loads on the site

Renewable energy generation

5.7.8 Renewable energy generation

- **Requirements:**

- Provide an onsite renewable energy source that generates at least 60% of the overall energy use and provides a minimum annual yield of 45 kWh/m² of the building footprint (this is not GIFA or available roof area)

Note: Where there are local energy export limits in place, the minimum yield requirement can be reduced to avoid generating electricity that will not be used on site and cannot be exported. Proposals shall be agreed with the Employer

Note: The overall energy use does not include out-of-hours consumption, energy use from electrical vehicle (EV) charging, and energy use from swimming/hydrotherapy pools and associated pool changing facilities, as per the EUI requirements outlined in [0.1.8 Energy Use Intensity \(EUI\)](#)

- **Coordination with the DNO/IDNO:**

- The renewable generation system shall supply the building and shall be installed and configured to export excess generated electricity to the grid
- The required export meters and licences shall be provided

- Testing shall include witness testing of the G98 or G99 mains protection for the DNO/IDNO and include confirmation that the export meter is functioning correctly

- **Certification:** Installations shall be certified either through the Microgeneration Certification Scheme (MCS) or equivalent approved certification scheme
- **Incentives:** The School/College shall be made aware of any available financial incentives relating to energy generation or exports

5.7.9 Photovoltaic (PV) systems

- **Requirements:**

- Systems shall be designed, installed and commissioned in accordance with the following:
 - BS 7671 IET Wiring Regulations
 - IET Code of Practice for Grid-connected Solar Photovoltaic Systems
 - EREC G98 or G99 requirements
 - BS EN 61427
 - BS EN 62446
 - RISC Authority RC62: Recommendations for fire safety with PV panel installations

- The GRO Green Roof Code and The GRO BioSolar Best Practice Design Guide, where installed as part of a BioSolar solution
- PV panels shall meet or exceed the minimum performance criteria detailed in Table 21
- Amorphous silicon (thin film) panels and those that present an end-of-life disposal issue e.g., containing Cadmium Telluride Solar Cells (CdTe) shall not be used
- PV systems shall have adequate arc-fault protection
- PV systems shall incorporate module-level rapid shutdown, to ensure that DC voltages are minimised in the case of a fault
- PV systems shall use MC4 connectors
- There shall be a fire service switch, that is readily accessible for firefighters, that disconnects the DC side of the PV system
- There shall also be a means of disconnecting the PV system from the mains electricity
- **Coordination with the building design:**
 - PV installation shall be compatible with the proposed roof design including full build-up and roof coverings – see [2.3 Roofs](#)
 - PV installation shall be coordinated with:
 - Roof finish (green or otherwise)
 - All rainwater outlets
 - Other roof mounted plant and equipment
 - Roof upstands and parapets (as applicable)
 - The design loads of the PV installation, including the mounting and fixing systems or mounting and ballast, shall be accounted for within the overall structural design
 - PV panels shall be positioned, oriented and spaced to optimise PV output, minimise overshadowing and, where a BioSolar roof, ensure planting thrives
 - PV panels shall be positioned to allow sufficient space between each row to allow for safe and practical maintenance of the PV panels, roof coverings, rainwater outlets, any rooflights, plant and equipment, and an extensive green roof (as applicable) in accordance with manufacturers' recommendations¹⁸
 - A minimum clear distance of 1000mm is required between PV panels and either parapets, rooflights (including guarding), atrium features or plant
 - Where integrated as part of a BioSolar roof, a minimum distance of 200mm shall be provided between the low point of each PV panel and the top of the growing medium – see [2.3.25 BioSolar roofs](#)

¹⁸ Whilst meeting the requirements of the wind load calculations.

5.7 Electrical infrastructure

- All components of the PV system such as panels, connections and inverters, shall be positioned to facilitate easy inspection, cleaning and maintenance
- The PV system shall be integrated into the building's lightning protection system
- **PV inverters:** Shall:
 - Be selected to match the output from the panels, optimise output and minimise losses
 - Be located in close proximity to the PV array or panel
 - Be located internally or within an IP68 enclosure
 - Have a minimum efficiency of 95%
 - Be well ventilated
- **System monitoring:** Shall provide:
 - Inverter and string level diagnostic fault monitoring information
 - Daily, weekly, monthly and annual totals for peak power generated by the PV array in kW
 - Daily, weekly, monthly and annual totals for electricity generated by the PV array in kWh
 - Electricity exported to the grid in kWh

Panel type	Monocrystalline silicon cells
Minimum efficiency	20%
Type	Single or bifacial
Cell size	Any
Solar cell arrangements	In series
Maximum degradation output	87% of initial output or better (maximum 0.52% degradation per year or better)
Linear power output warranty	25 years or better, in accordance with the maximum degradation output
Surface material	Tempered glass
Impact resistance	25mm hail
Temperature range	-40 to 90°C
Humidity resistance	85%
Inverter and external wiring connections protection	IP68

Table 21: PV requirements

5.7.10 Mounting systems for PV arrays

- **Requirements generally:**
 - PV arrays shall be frame mounted on a proprietary corrosion resistant framed system
 - Mounting systems shall:
 - Not penetrate, indent or damage the waterproofing or insulation to the roof
 - Spread the load across the roof rather than point loading
 - Not create trip hazards
 - Allow efficient rainwater runoff from the panels
 - Not impede rainwater runoff to rainwater outlets
 - Permit general roof access and inspection of the roof covering beneath the panels
- **Requirements for ballasted systems:**
 - Ballasted solutions shall be approved by the panel manufacturer and form part of an integrated mounting system
 - For BioSolar roof installations, integrated mounting frames shall be ballasted by the loose laid substrate/growing medium and vegetation to secure the array and prevent wind uplift in accordance with GRO guidance – see [2.3.25 BioSolar roofs](#)
- **Requirements for non-ballasted systems:**
 - PV arrays shall be secured to the roof using a non-penetrative fixing method compatible with the roof covering/build-up
 - System mounting plates/flanges/anchors shall be welded directly to the roof covering in accordance with manufacturer's recommendations
 - Frame supports shall be designed with movement tolerances that do not detriment the stability of the PV array nor cause damage to the roof membrane/waterproofing

Electrical distribution systems

5.7.11 Earthing and bonding systems

- **Requirements:**

- The earthing and bonding installation shall be in accordance with BS 7671 and BS 7430
- The Contractor shall liaise with the DNO/IDNO to determine the type(s) of earthing system required and to establish the demarcation of responsibilities

Note: Separate earthing arrangements may be needed for EV charging installations – see [5.7.19 Electric Vehicle \(EV\) charging installations](#)

- All earthing and bonding, including main incoming earthing, main earth electrode, main earth terminal, main equipotential bonding, supplementary equipotential bonding, circuit protective conductors, clean earths (where appropriate) and functional earths (where appropriate) shall be provided
- Where generators are required, the design of standby generator earthing shall ensure that sufficient earth fault current is generated to operate protective devices

5.7.12 Low Voltage (LV) distribution systems

- **Requirements:**

- The design of low voltage (LV) distribution systems shall be in accordance with the requirements of BS 7671
- Sub switchboards and final distribution boards shall be distributed to minimise the quantity and length of cables and containment
- Main LV switchboards, sub switchboards and final distribution boards shall be located in dedicated electrical riser cupboards, service risers or plant rooms. These spaces shall be accessed directly from circulation areas/corridors and not from teaching or administrative spaces
- Kitchens and communications rooms shall be fed by dedicated distribution boards

- **Space capacity:**

- The installation of the main LV switchboards shall allow for expansion to one side by one further cubicle without impact on access requirements within the switch room
- The design shall allow for 10% physical and electrical spare capacity throughout the LV distribution system, including:
 - Switchboards

- Distribution boards
- Sub-main circuit cable capacities
- Final circuit cable capacities
- Cable containment systems
- Each spare way on a local distribution board shall be fitted with a blanking plate
- **Switch rooms:**
 - The main LV switch room(s) shall be located at ground level with direct access from the outside for equipment replacement and maintenance
 - The switch room shall allow all switchgear and associated equipment, including power factor correction, harmonic filters and battery chargers, to be located in this space
 - Switch rooms shall be provided with rubber mats and fire rated to meet the requirements of the project specific fire strategy. Also see [9 Fire safety](#)
 - The construction of switch rooms shall provide sufficient support for wall mounted electrical equipment
 - Switch rooms shall be constructed to prevent the ingress of water
 - Underground cable entries shall be watertight
 - Switchgear shall not be located beneath wet services such as water tanks, drainage, piped water services, toilets and plant rooms nor within basements or spaces prone to flooding
- Notices shall be provided in the switch room, including a framed and wall mounted LV schematic diagram, statutory signage/posters and details of the earthing system
- **Switchgear and switchboards:**
 - LV switchgear and control gear assemblies shall be provided in accordance with the BS EN IEC 61439 series and shall be third party certified
 - LV switchgear assemblies shall be fitted with anti-condensation heaters where there is a risk of condensation
 - All conductive parts of LV switchgear and control gear assemblies accessible when a lid or door is open, shall be behind an insulating barrier with a minimum ingress protection rating of IP2X
 - The following forms of separation shall be provided, as a minimum:
 - Where there is not a requirement for cables to be terminated adjacent to live cables - Form 4 type 2 or better
 - Where cables may need to be terminated adjacent to live cables, most likely to occur in refurbishment schemes, or where an alternative supply route for evacuation lifts is adopted - Form 4b type 7
 - Moulded case circuit breakers shall be selected with service breaking capacity (Ics) no less than the

prospective short circuit or earth fault current at the point of use, whichever is the greater

- The equipment shall be provided with a durable label marked with the equipment's function and unique reference
- **Distribution boards:**
 - Distribution boards shall be provided with a lockable door
 - In accordance with BS 7671, final circuits that require overload, short circuit and earth leakage protection shall be fitted with Residual Current Breakers with Overload (RCBOs) located in local distribution boards – see [5.7.16 Small power systems](#)
 - Arc fault detection devices (AFDDs) conforming to BS EN 62606 shall be provided to single phase AC final circuits supplying socket outlets not exceeding 32A. Where used, AFDDs shall be placed at the origin of the circuit to be protected
 - System to achieve total or partial selectivity between all upstream and downstream protection devices
 - Selectivity of the system shall be demonstrated using time-current and energy coordination curves in a protective coordination study

- **Electrical distribution:**

- Sub-mains and final circuit cables shall have copper conductors
- Sub-mains and final circuits cabling shall be Low Smoke Zero Halogen (LSZH) type
- Outer sheath of sub-mains cables to be black and cable core colours as defined by BS 7671
- Sub-mains cables to comply with BS 6724 and to be tested in accordance with BS EN 60754 series
- Cables shall be BASEC Approved and, where required to be fire-resistant type, LPCB Approved
- Armour of sub-main cables can be used as a circuit protective conductor but shall comply with BS 7671. Where required to reduce the earth fault loop impedance to achieve disconnection times, a supplementary circuit protective conductor (CPC) shall be run with the cable. The CPC shall be capable of carrying 100% of the fault current
- Busbar systems shall be compliant with BS EN IEC 61439-6

5.7.13 Electrical services in practical spaces

- **Requirements:**

- All supplies to practical/specialist equipment in D&T spaces shall be designed in accordance with BS 4163

- Science laboratories and studios, prep rooms, D&T spaces, workshops, ICT rooms, kitchens and specialist facilities shall be fitted with a local master electrical shut off device which shall:
 - o Be easily accessible by the teacher
 - o Be provided with a key control to turn supplies back on as required
 - o Turn off power to all equipment in the room, including small power sockets
 - o Not control other services such as heating, ventilation or lighting, the teacher's computer or interactive screen, fridges/freezers or cleaners' sockets
 - o Not control critical circuits specifically installed to remove hazards e.g., fume cupboards and fume extractor fans, alarm circuits etc
- As well as the main shut off provision, there shall be emergency electrical stop buttons positioned around the space local to any power supplies used for practical work. These shall be:
 - o Provided in each pupil/student work area and shall only control that work area
 - o Of mushroom-headed design and clearly identifiable
 - o Mounted within easy reach/access at approximately 1.5m above the finished floor level

- Emergency stop switches (which could be the general 'off' switch) shall also be provided at all fixed machines
- Machine specific emergency stop buttons shall be easily actuated, controlling the power to the individual machine
- Emergency stops are also required in preparation areas which are for technician use only. These areas shall not be affected by the emergency system of any other area

5.7.14 Cable containment

- **Requirements:**
 - Each containment run shall only carry cables of one voltage band
 - Fire alarm, emergency lighting, data, security and BMS circuits shall each be appropriately segregated from other circuits
 - Cable containment shall not be suspended from other services
 - Cable containment shall be selected and arranged to take into account Electro Magnetic Compatibility (EMC) considerations
 - Cable baskets, trays and ladders shall comply with BS EN 61537; and cable trunking with BS EN IEC 61084-1
 - Cable baskets shall be high-sided

5.7 Electrical infrastructure

- Cable trays shall be medium duty with a return flange
 - For vertical cable runs within risers, the cable containment shall be selected to adequately support the cable weight as recommended by the containment supplier, with suitably spaced supports. For cables secured using cleats, ladders shall be used
 - Steel cable trays, baskets, ladders and trunking shall have a galvanised finish
 - Ensure metallic cable containment is electrically continuous by providing bonding straps on joints
 - Cable trunking shall have a minimum ingress protection rating of IP4X
 - In accordance with clause 522.10.202 of BS 7671, all wiring systems shall be supported to prevent premature collapse in the event of fire. Steel conduit, steel trunking and suspended steel cable tray or basket with steel fixings shall be used. All cables shall be laid in baskets
 - Inverted cable trays and baskets are prohibited
 - Metal cable ties or all-round bands shall be used for fixing cables
 - External, above ground, un-armoured cabling shall be contained within galvanised steel metal conduit or trunking
 - External, above ground armoured cabling shall be minimised and only used where unavoidable. Where it is used, it shall be secured and protected from damage
 - Fire-stopping shall be installed wherever cable containment penetrates a fire compartment wall or floor
 - All fire-stopping shall be installed and labelled to meet the requirements of the project specific fire strategy and documented via Fire-stopping Record Photographs provided to the Employer and School/College
 - Cables installed externally on roofs e.g., serving PV installations, shall be protected from UV degradation, mechanical damage and rodents/birds
 - Conduit installed externally, in plant rooms and in service risers shall be galvanised steel
 - Containment shall be routed to minimise impact on users and coordinated with other services. Visible containment shall be level
- **Buried cables:**
 - Follow [Streetworks UK Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus](#)
 - Where sub-mains cables are run externally, they shall be buried underground with mechanical protection as set out in BS 7671

5.7 Electrical infrastructure

- Where sub-mains cables run below hard standing, they shall be run in cable ducts to allow alteration and addition in the future
- Cable runs in trenches shall be fixed to cable containment within the duct and shall not be loose laid on the bottom of the trench
- Underground ducts shall be sealed to prevent rodents from entering
- Underground ducts and trenches shall be laid to fall and adequately drained
- Underground ducts and trenches shall allow for maintenance access
- Warning tapes and protection tiles shall be laid above buried cables
- Underground cable sheaths shall not be porous

5.7.15 Small power systems

- **Extent:**

- Each outlet as referenced below shall comprise a double socket
- Where agreed with the Employer's Representative, a single socket or fused spur may be provided
- For Whole School/College projects, the total number of outlets provided shall be:
 - Mainstream Primary School - 1.0 per pupil place
 - Mainstream Secondary School - 1.2 per pupil place

- College - 1.2 per student place
- Ambulant Special School/Special College - 2.0 per pupil/student place
- Non-ambulant Special School/Special College - 3.0 per pupil/student place
- Alternative Provision (AP) - 2.0 per pupil place
- For Partial School/College projects the quantities of small power outlets shall be specified in the Project Brief
- Power supplies shall be provided to serve building services systems; these supplies are not included in the above quantities
- Cleaners' sockets shall be provided to every room and each section of corridor; these are also not included in the above quantities
- **Circuit design:**
 - The number of sockets on each circuit shall be assessed to ensure earth leakage is controlled and there is no unwanted tripping of Residual Current Devices (RCDs)
 - Socket outlets shall be on 32A ring circuits or 20A radial circuits as defined by BS 7671
 - Socket outlet circuits shall be protected against overload, short circuit and earth leakage currents by RCBOs located in local distribution boards

- **Sockets and outlets:**

- Small power accessories shall comply with BS 1363 series
- Sockets can either be flush to the surface, surface-mounted or part of wall-mounted multicompartment trunking
- In sports halls and performance/stage areas, all sockets shall be flush to the surface; surface mounted ducting/trunking is not permitted. Sockets shall be positioned with consideration for the use of the space
- Sockets shall be provided on two walls in offices, teaching spaces and meeting rooms, except for teaching spaces where the distribution of outlets shall be designed specifically for the required equipment. This includes ICT-rich classrooms, D&T spaces including food rooms, art rooms, workshops, fitness suites, activity studios, sports halls and other specific vocational teaching spaces
- Socket outlet and wiring systems mounted to movable furniture shall comply with BS 6396
- Fused connection units and socket outlets shall have an Ingress Protection (IP) rating suitable for the environment
- Fused connection units shall be provided for tea points, hand driers, fridges, freezers, dishwashers and other similar equipment

- BS EN IEC 60309 series compliant socket outlets shall be provided for server racks with ratings appropriate to the load – see [6.1.15 Communication cabinets](#)
- Switches, outlets and controls shall be positioned in accordance with AD M
- Accessory plates shall contrast visually with the surrounding background by a Light Reflectance Value (LRV) difference of 30 points, in accordance with AD M

- **Wiring:**

- Wiring methods shall be robust, suitable for the environment, accessible, rewirable and, where visible/exposed, neat and tidy
- The preferred wiring methods for final circuits are:
 - Rigid thermosetting insulated single core cables (LSZH singles, H07Z) to BS 7211 Table 3a, run in rigid steel trunking and conduit
 - Flat twin and earth cabling (LSZH, 6242B) to BS 7211
- Prefabricated wiring systems may be proposed. Cables in prefabricated wiring systems shall be either rigid thermosetting insulated single core cables (LSZH singles, 6491B, H07Z-R) or flat twin and earth cabling (LSZH, 6242B) to BS 7211
- Circuit Protective Conductor (CPC) sizes shall be sufficient to ensure the fault current generated

operates the protective devices within safe time limits

- **Containment:**

- Mechanical protection using galvanised steel or rigid, high impact, LSZH conduit shall be provided where wiring is concealed within the building fabric
- Note:** RCBO/RCD circuit protection does not negate the need to provide this mechanical protection
- Where surface mounted cabling is used, it shall be run vertically and contained in rigid galvanised steel
- The grade of rigid galvanised steel conduit shall be selected for the environment in which it is to be installed
- Where wall mounted multicompartment trunking is provided, it shall cover two walls, be coordinated with FF&E layouts and mounted just above worksurface level

- **Spaces for complex medical needs:** Buildings or certain spaces within buildings catering for complex medical needs may need to refer to specific aspects of Health Technical Memorandum 06-01 and Section 710 of BS 7671

- **Swimming pools:** Shall be designed in accordance with Section 702 of BS 7671

5.7.16 Uninterruptible Power Supplies (UPS)

- **Requirements:**

- See [6.2.15 Uninterruptible Power Supplies \(UPS\)](#) for the provision of UPS for all firewalls, routers, servers and switches in communications rooms
- UPS systems shall comply with BS EN 62040 series

5.7.17 Lightning protection

- **Requirements:**

- Class of lightning protection to be determined by risk assessment in accordance with BS EN 62305. Installation shall meet the same standard
- All external roof-mounted plant and equipment and exposed metallic elements shall be bonded to the lightning protection system
- Transient overvoltage surge suppression devices shall be provided for mains power, data, telecom lines, communications rooms and to other vulnerable critical systems as appropriate to the required class of system determined by the risk assessment
- Surge suppression device alarms, where installed, shall be linked to the Building Management System (BMS) – see [5.11 BMS, controls and performance monitoring](#)

- Lightning protection systems shall be tamper proof, with earth electrodes positioned in accessible locations for regular testing

5.7.18 Electric Vehicle (EV) charging installations

- **Extent:**

- Quantity of EV charging points shall meet either the requirements of the local planning authority or Approved Document S (AD S), whichever is the greater
- The electrical supply capacity shall be checked to ensure that it can supply the number of charging points required

- **Requirements:**

- Installations shall comply with AD S, including the requirement that each charging point shall have a minimum nominal rated output of 7kW
- Chargers shall have the facility to take payment at the EV charging point
- Installations shall meet the requirements for the private charging of vehicles in The Electric Vehicles (Smart Charge Points) Regulations 2021, including:
 - Simultaneous charging of vehicles when all EV charging points are in use
 - A dynamic load management system to actively manage charging currents during periods of high load

- Installations shall meet the requirements of the IET Code of Practice for Electric Vehicle Charging Equipment Installation, 5th Edition or its replacement, including:
 - Mode 3 or Mode 4 charging in accordance with the BS EN IEC 61851 series
 - The appropriate type of RCBO/RCD for the chosen type of EV charger
 - Supply capacity and earthing arrangements to suit the type of supply provided by the DNO/IDNO and any new supply or transformer required from the DNO/IDNO
- The requirements for earthing when connected to a Protective Multiple Earthing (PME) supply
- A simultaneous contact assessment, if it is planned to use an additional supply from the DNO/IDNO or a new transformer for the EV charging installation
- The EV power supply shall be separately metered
- The chargers shall be IP67 rated
- The charging mechanism and Planned Maintenance Plan shall be agreed with the Employer's Representative
- Chargers shall be positioned to prevent the potential for damage due to vehicular impact/overrun and be protected behind impact protection bars. Chargers shall have an impact rating of IK10

- Testing and maintenance of EV charging installations shall be in accordance with the IET Code of Practice for Electric Vehicle Charging Equipment Installation using the checklists in Appendix B

5.7.19 Electrical services for life safety and fire protection systems

- **Requirements:** Electrical supplies for life safety and fire protection systems shall be provided in accordance with BS 8519 and BS 9999. This includes, but is not limited to, emergency lighting, fire suppression systems, evacuation lifts, fire detection and alarm systems, smoke ventilation systems and emergency voice communication systems
- **Evacuation lifts:** Power supplies, including an alternative power supply, shall be provided in accordance with BS 9999 clause G.2.2 (Annex G)
- **Generators:** Where generators are proposed, the proposals shall be agreed with the Employer

5.8

Daylighting and electrical lighting

This sub-section outlines the performance and functional requirements for daylighting and electrical lighting, including stage lighting and exterior lighting

General requirements

5.8.1 Summary

- **Purpose:**
 - Daylighting and electrical lighting provide visual comfort and task visibility to occupants with a variety of needs
 - Emergency lighting ensures occupants can escape safely in the event of an emergency in all lighting conditions
 - Specialist lighting (e.g., stage lighting) facilitates the performing arts in performance spaces including main halls and drama studios
- **Performance:**
 - Daylighting: To be prioritised over electrical lighting to improve overall health and wellbeing
 - Daylight access: To be provided in all occupied spaces with daylight dimming via photocell control
 - Shading: Trees and planting shall be used to reduce glare, however, they shall not be included in the final daylight modelling used to demonstrate compliance with these technical requirements
 - Blinds: Internal blinds to be provided to reduce glare, and blackout where required
 - Energy efficiency: Luminaires and lighting controls to limit energy consumption

- Sustainable: Ethically sourced and supporting circular economy principles through re-use, re-manufacturing and recycling
- Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.8.2 Technical Manual references

- **Glazing specification:** See [2.6 External windows and doors](#)
- **Internal finishes:** See [3.1 Wall finishes](#), [3.2 Floor finishes](#), and [3.3 Ceiling finishes](#)
- **Internal blinds:** See [4 Fittings, furniture and equipment \(FF&E\)](#)
- **Ventilation systems:** See [5.6 Ventilation systems and thermal comfort](#)

5.8.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - [The School Premises \(England\) Regulations 2012](#) applicable to maintained schools

5.8 Daylighting and electrical lighting

- [The Education \(Independent School Standards\) Regulations 2014](#) applicable to academies, free schools and sixth form colleges
- **Standards:**
 - BS EN 1838
 - BS 5266-1
 - BS 5489-1
 - BS 5499-4
 - BS EN 12193
 - BS EN 12464-1 and -2
 - BS EN 50172
 - BS EN 60598 series
 - BS EN 62717
 - BS EN IEC 62722 series
- **Best practice:** Refer to the following guidance:
 - The Society of Light and Lighting (SLL) Guides LG4, LG5, LG6, LG12 and LG14, and Factfile 7
 - Institute of Lighting Professionals (ILP) Guidance Notes 1 and 8
 - The Society of Light and Lighting (SLL) Code for Lighting (2022)

5.8.4 Minimum life expectancy

- **Internal luminaires, emergency lighting fittings and lighting controls:** 25 years
- **External luminaires and lighting columns:** 25 years

- **Emergency lighting batteries:** See [5.8.15 Emergency lighting battery systems](#)

5.8.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for lighting and emergency lighting systems for the School/College to adopt/fund, if they so wish, from Practical Completion
- **Warranties:** 5-year manufacturer's warranty covering parts and labour for lighting and emergency lighting systems, including batteries and lighting controls

5.8.6 Operation and maintenance

- All luminaires shall be aligned to [The Ecodesign for Energy-Related Products and Energy Information \(Lighting Products\) Regulations 2021](#)
- General purpose luminaires to be replaceable by a competent person without destroying/damaging the luminaire. Details for how this is achieved shall be provided as part of the handover information
- The Building User Guide shall include explanations of all lighting controls
- A Planned Maintenance Plan for all lighting and emergency lighting systems shall be provided as part of the handover information

5.8 Daylighting and electrical lighting

- Details shall be provided to the School/College on their responsibilities for maintaining and testing the emergency lighting system, aligned with the Emergency Lighting Risk Assessment, Fire Regulation Reform Order 2005, BS 5266-1 and BS EN 50172. These details shall be included in the Operation & Maintenance (O&M) Manual

Specific requirements

Daylighting

5.8.7 Daylight provision

- **Methodology:** Carry out climate-based daylight modelling for the whole building to ensure daylight performance requirements are met in the required spaces
- **Daylighting performance criteria:**
 - Daylight Autonomy - $sDA_{(300/50\%)}$ - is the percentage of the task plane which receives at least 300 lux for at least 50% of the annual occupied hours. An $sDA_{(300/50\%)}$ of at least 50% is required
 - Useful Daylight Illuminance - $UDI-a_{(100\sim 3000\text{ lux})}$ - is the percentage of occupied hours that the illuminance at each grid point is within the range 100-3000 lux. An average of at least 80% is required across the space
- **Daylighting requirements applied to spaces:**
 - All general teaching, practical and ICT-rich spaces, science and D&T spaces, prep rooms, staff social rooms, continuously occupied offices and staff workrooms shall meet both the Daylight Autonomy (sDA) and Useful Daylight Illuminance (UDI) performance criteria
 - Halls, dining areas and libraries (LRCs) shall meet the Useful Daylighting Illuminance (UDI) performance criteria
 - Toilets and changing rooms (with external walls) as well as kitchens, reception areas, corridors and stairs shall have their own external windows and/or rooflights
 - Daylight access is not required in store rooms, hygiene rooms and plant rooms
 - For daylight modelling, where SEN classroom clusters include a small group room or one to one room accessed directly off the teaching space, both spaces shall be modelled as one space (i.e., modelled with no partition walls between these spaces)
 - Where spaces are overshadowed and not able to meet the requirements, it shall be demonstrated that daylight has been optimised in the affected spaces
 - The Contractor's Integrated Environmental Design Report shall clearly outline how daylight has been

optimised throughout the building for approval by the Employer's Representative

5.8.8 Daylight analysis calculations

- **Weather file:** Use the Energy Plus Weather (EPW) climate-based weather file nearest to the School/College site
- **Calculation method:**
 - Use either the Radiosity or Ray tracing method
 - Ray traced calculations shall have at least 5 light bounces
- **Time increments:** Maximum time increments of <1 hour
- **Occupied hours:** 08.30 to 16.00
- **Model geometry and surface specifications:**
 - Daylight model geometry to include main structural elements, window fenestration and any external obstructions
 - Calculations shall be based on the light reflectance values for the proposed wall, floor and ceiling finishes
 - The modelled wall reflectance shall be area-weighted, assuming 20% of the surfaces are likely to be covered with items at 0.2 reflectance (e.g., posters etc)
 - The reflectance of desks shall be accounted for in the modelling
- **Calculation grid:**
 - The calculation points shall extend to within 500mm of the walls
 - A distance between calculation points of 250mm to 500mm
 - Height of working plane specific to space type shall correspond with the Horizontal Illuminance Task heights specified in Table 22
- **Maintenance factors:**
 - Reduce manufacturer stated surface reflectivity specifications by 10% to account for dirt build-up
 - Reduce manufacturer stated glazing light transmittance value by 5% to account for dirt build-up

Interior lighting

5.8.9 Interior lighting requirements

- **Illumination criteria:** See Table 22
- **Lighting equipment:**
 - The design and installation of lighting equipment shall be in accordance with BS EN 60598, BS EN IEC 62722 series and BS EN 62717
 - Lighting equipment for interior environments shall meet the criteria in Table 23
 - All electrical lighting shall have an average luminaire efficacy of no less than 105 luminaire lumens per circuit-watt. In addition, Lighting Energy Numerical Indicator (LENI) calculations shall be carried out in accordance with AD L2
- **Lighting calculations:**
 - In accordance with The Society of Light and Lighting (SLL) Code for Lighting (2022)
 - Calculations shall be based on the proposed light reflectance values for ceilings, walls and floor, and shall account for the surface reflectance of display boards and furniture

5.8.10 Interior lighting controls

- **Automatic controls:**
 - Automatic lighting controls shall be provided to all spaces, except for those where safety could be compromised
 - Where automatic lighting controls are provided, the quantity of detectors shall be sufficient to ensure occupancy can be detected across the whole space
- **Spaces where safety could be compromised:**
Include:
 - Plant rooms, kitchens, control rooms, kiln rooms, and areas with machinery and operable equipment
 - These spaces shall have a light switch at the entrance to the space to manually activate and deactivate the lighting
- **Absence detection:**
 - All regularly occupied spaces (where occupied for more than 30 minutes), except for managed spaces, shall have absence detection lighting control i.e., the automatic controls shall only deactivate the lighting system
- **Presence detection:** All spaces not regularly occupied shall have automatic presence detection i.e., automatically turning lighting on and off

5.8 Daylighting and electrical lighting

- **Managed spaces:**
 - For spaces where individuals do not expect to control the lighting, such as sports halls, halls, receptions, and dining and social areas, the system shall be fully controllable by a member of staff with a local manual key switch override
 - Lighting shall be deactivated when no occupancy has been detected for an hour and then turn on automatically when presence is detected
 - Managed spaces and circulation areas shall have the capability to be set to a lower lighting level for safety and security out of hours
- **Daylight dimming:**
 - All rooms with natural daylight shall have daylight dimming to minimum lux levels
 - All teaching spaces, offices and study spaces that span from the external wall to the central corridor shall have a minimum of 2 daylight sensors, one in the lighting row adjacent to the windows and another further into the space. Larger spaces may require more sensors to provide full daylight control across the whole space
- **Absence dimming:** Systems shall dim to 20% for 5 minutes prior to turning off
- **Teaching spaces:** Controls to be located on the main teaching wall, allowing either the first row or full room lighting to be turned on, off and/or dimmed
- **Time adjustment:** The control system shall allow for the time between no occupancy being detected and the lighting system responding to be adjusted
- **Performance spaces and halls:** Controls provided both at the door and in any control room(s) to allow lighting to be dimmed
- **Control devices:** Control devices shall be intuitive, with clear and permanent labelling of switches showing the use for each
- **Glare prevention:** Luminaire switching and location shall be designed to prevent glare to any audio visual (AV) installations
- **Sensor coverage:** Sensors shall cover all usable space minus a 500mm perimeter margin

5.8 Daylighting and electrical lighting

Types of Space	Horizontal Illuminance E_m lx	Horizontal Illuminance U_o	Horizontal Illuminance Task height (m)	Cylindrical Illuminance (WP height 1.2m) E_z lx	Cylindrical Illuminance (WP height 1.2m) U_o	Glare UGR Max	Vertical Illuminance of walls and all vertical surfaces ($U_o \geq 0.1$)	Ceiling Illuminance ($U_o \geq 0.1$)
Primary Basic Teaching Area, Primary School libraries	300	0.6	0.55	150	0.1	19	50% of horizontal E_m	30% of horizontal E_m
Secondary General Teaching spaces, music rooms, SEN and support spaces, art studios libraries (LRC), study areas	300	0.6	0.75	150	0.1	19	50% of horizontal E_m	30% of horizontal E_m
Technology/science classrooms	500	0.6	0.85	150	0.1	19	50% of horizontal E_m	30% of horizontal E_m
Dining and social areas	200	0.4	0.75	50	0.1	22	100	50
Staff areas	300	0.6	0.75	150	0.1	19	100	50
Halls and indoor PE spaces	300	0.6	0	100	0.1	19	200	n/a

5.8 Daylighting and electrical lighting

Types of Space	Horizontal Illuminance Em lx	Horizontal Illuminance U _o	Horizontal Illuminance Task height (m)	Cylindrical Illuminance (WP height 1.2m) E _z lx	Cylindrical Illuminance (WP height 1.2m) U _o	Glare UGR Max	Vertical Illuminance of walls and all vertical surfaces (U _o ≥ 0.1)	Ceiling Illuminance (U _o ≥ 0.1)
Sports halls	500 switchable to 300	0.6	0	100-150	0.1	22	200	n/a
Storage (excluding science prep room), other kitchen areas	100	0.4	0	n/a	n/a	25	n/a	n/a
Kitchen preparation areas	500	0.6	0.9	n/a	n/a	22	200	100
Circulation areas	100	0.4	0	50	0.1	25	50	30
Toilets, showers, hygiene rooms, changing rooms	open area 200 cubicles 100	0.4	0	n/a	n/a	25	n/a	n/a
Plant rooms	200	0.4	0	n/a	n/a	22	n/a	n/a
Comms/server rooms	300	0.8	0	n/a	n/a	22	n/a	n/a

Table 22: Interior illumination criteria

5.8 Daylighting and electrical lighting

Light source criteria	Interior lighting LED	Exterior lighting LED
Colour	CCT: 3500-4000K CRI: ≥ 80 MCAD: 3	Sports lighting for Multi Use Games Areas (MUGAs) and sports facilities to be in accordance with BS EN 12193 and SLL LG4 Exterior lighting other than MUGAs and sports facilities as below: CCT: 2700K , CRI: 70, MCAD: 5
Design life - Rated life	L90B50 $\geq 50,000$ hours at 25°C ambient	L90B50 $\geq 50,000$ hours at 25°C ambient
Driver	Power Factor: 0.9 min Flicker: PST LM ≤ 1 Limit of stroboscopic effects: (SVM) ≤ 0.4 Dimming range: 1-100% of measured output	Power Factor: 0.9 min Flicker: PST LM ≤ 1 Limit of stroboscopic effects: (SVM) ≤ 0.4 Dimming range: 10-100% of measured output
IP	General areas: IP2X Toilets and science areas: IP44 Plant rooms: IP65	Exterior areas: IP65
Thermoplastics	In accordance with Building Regulations and use of thermoplastics	n/a
Replaceability ¹	All components, including driver and LED light engine shall be removable and replaceable without damaging any other component. Evidence and clear instructions on how product can be upgraded shall be provided. Single life luminaires that can be classified as 'light sources' such as LED flat panels are prohibited	All components, including driver and LED light engine shall be removable and replaceable without damaging any other component. Evidence and clear instructions on how product can be upgraded shall be provided. Single life luminaires that can be classified as 'light sources' such as LED flat panels are prohibited

Table 23: Light source criteria

¹ Ecodesign Regulations 2021 requirement for general purpose luminaires

5.8.11 SEND lighting design

- **Lighting specialist:**
 - Where particular needs are identified in the Project Brief, obtain advice from a specialist where spaces shall be used by pupils/students with sensory and mobility needs
 - Where particular needs are identified in the Project Brief, the lighting design shall be agreed with the Employer's Representative
- **Lighting design:** Shall address the following:
 - Pupils/students with hearing needs require higher levels of lighting and clear visibility for lip reading and signing
 - Pupils/students with vision needs require higher levels of lighting to facilitate wayfinding and minimise risk of accident
 - Pupils/students sensitive to glare from direct or reflected sunlight
 - Avoidance of glare, particularly over changing beds or therapy couches
 - The suitability of automatic sensors for children with limited mobility
 - The benefits of localised dimming of lighting
 - Limits for lighting flicker and stroboscopic effect

5.8.12 Stage / performance lighting

- **Extent:**
 - Stage lighting system in all performance spaces in main halls and drama studios
 - The stage lighting system(s) shall use Digital Multiplex (DMX 512 Standard) controlled LED lights, unless stated otherwise in the Project Brief
- **Primary School main hall minimum provision:**
 - 1no. internally wired fixed lighting bar with power and control outlets to support at least 6no. DMX controlled LED lights
 - 4no. DMX controlled LED lights to be provided
- **Secondary School/College performance space in main hall minimum provision:**
 - 3no. internally wired lighting bars with mechanical rise and fall mechanism (see below) and power and control outlets to support at least 36no. DMX controlled LED lights in total (e.g., 12 lights per bar)
 - 24no. DMX controlled LED lights to be provided
- **Drama studio minimum provision:**
 - 4no. internally wired fixed lighting bars with power and control outlets to support at least 3no. DMX controlled LED lights on each bar. Bars shall be capable of being positioned in a T, +, or double X shape
 - 12no. DMX controlled LED lights to be provided

5.8 Daylighting and electrical lighting

- **Coordination:**
 - Stage/performance lighting shall be fully coordinated with the main (house) lighting
 - See [6.3 AV systems and fixed equipment](#) for further coordination
- **Mobile lighting control system:**
 - Shall be provided for use by pupils/students and staff for teaching purposes
 - The design shall allow pupils/students to alter light positioning and colour without working at height
- **Dimming of main/house lights:** House lights shall be operated with on/off and dimming from the lighting and audio control room
- **Fixing of lighting bars including rise and fall mechanisms as applicable:**
 - Shall be soffit mounted and independently supported from the primary structure using suitable fixings for the substrate and appropriate factors of safety
 - To be coordinated with other ceiling or soffit-mounted fixtures and services, particularly those in ceiling voids
- **Motorised rise and fall lighting bars in Secondary School/College main halls:**
 - To enable safe access and maintenance of lighting bars and lighting systems
 - Height adjustment from ceiling to finished floor level
- Automatic locking system at ceiling height
- Remote control operation with emergency stop and manual override
- Load sensors to prevent overloading
- Safety brakes to prevent free fall

Emergency lighting

5.8.13 Emergency lighting requirements

- **Requirements:**
 - The Contractor shall assess the level of risk across the building(s), associated roofs and surrounding outdoor environment with the Employer's Representative and the School/College and use this as a basis for the emergency lighting design
 - Emergency lighting systems shall meet the requirements of BS 5266-1, BS EN 1838 and BS EN 50172, and shall effectively mitigate against any building specific risks
 - Emergency luminaires shall meet the requirements of BS EN 60598-2-22
 - Emergency lighting shall be provided on roofs
- **Safety signs:**
 - All exit signs shall be internally illuminated, of maintained design, and in compliance with BS 5499-4
 - All safety signs other than internally illuminated exit signs shall be illuminated to 100 lux on the vertical plane during normal conditions and 5 lux on the vertical plane in emergency lighting scenarios as in BS 5499-4
 - Photoluminescent safety signs are prohibited

- Adhesive legends mounted on luminaires are not acceptable for exit signs
- Undertake exit sign viewing distance calculations to determine final positioning of signs
- Document positions of all signs in the O&M Manual

5.8.14 Emergency lighting battery systems

- **Type of battery system:**
 - Central or integral battery systems may be used (noting exceptions below)
 - Integral battery systems shall not be used when the number of emergency luminaires and signs exceeds 100 units in a building
 - Centralised systems shall be installed in accordance with BS EN 50171
 - Centralised systems shall utilise low maintenance batteries (e.g., sealed Lead Acid VRLA) with a guaranteed lifetime of 10 years
 - Ni-Cd batteries are prohibited for emergency lighting systems
 - NI-mH or LiFePO₄ may be used for integral battery systems

5.8 Daylighting and electrical lighting

- **Battery location:**
 - Centralised systems shall be located within a dedicated emergency lighting switch room
 - Centralised batteries shall be contained within ventilated cabinets
 - Distributed low energy battery systems of less than 500w may be installed within fire rated cupboards or enclosures
 - All battery rooms shall be ventilated to prevent the build-up of hydrogen and other gases
- **Battery duration:** Shall be a minimum of 3 hours

5.8.15 Emergency lighting testing and monitoring

- **Requirements:**
 - All systems shall have automatic testing and monitoring in accordance with BS EN 62034 and BS 5266-1
 - Automatic testing systems shall not be incorporated into the BMS or general lighting controls

Exterior lighting

5.8.16 Exterior lighting requirements

- **Light source criteria:** Exterior lighting system shall meet the illumination performance criteria in Table 24. The figures in this table are based on BS EN 12464-2
- **Security lighting:** Security lighting for permanent and temporary buildings shall be provided to meet the requirements in the Project Brief
- **Lighting equipment:**
 - Lighting equipment for exterior environments to be in accordance with criteria in Table 23
 - Light columns to be in accordance with BS EN 40 series

Areas	Horizontal Illuminance ² E _m lx	Horizontal Illuminance U _o
Pedestrian only walkways, including on roofs, and general security lighting ¹	5	0.25
Pedestrian passages, vehicle turning, loading/unloading points	50	0.4
Parking areas	20	0.25
External plant areas	50	0.4

Table 24: Exterior illumination criteria

¹ Advised illumination levels, uniformity, transition zones etc for external pedestrian lighting are found in BS EN 12464-2

² Horizontal illuminance measured at ground level

Note: All areas require a Unified Glare Rating (UGR) of no more than 50

5.8.17 Exterior lighting for sport

- **MUGA lighting:** Shall be installed only if specified in the Project Brief, and be designed to meet the Class II lighting standards as defined by BS EN 12193
- **Underground ducts for MUGA lighting:** Shall be installed to all MUGAs to enable future provision of lighting, even if lighting is not required by the Project Brief

5.8.18 Exterior lighting controls

- **Control system:**
 - All exterior lighting shall be controlled from a lighting control system. This may be linked to the internal lighting control system
 - All exterior lighting shall have photocell control with override facility and time scheduling capability

5.8.19 Obtrusive light

- **Control of light spill:** Shall comply with ILP Guidance Note 1

5.9

Fuel installations

This sub-section outlines the performance and functional requirements for (gas) fuel installations to science and practical spaces, including D&T spaces and construction workshops. For low carbon heat sources, see [5.3 Heat source](#)

General requirements

5.9.1 Summary

- **Purpose:** Fuel installations via bottle, tank or mains gas systems, when well designed and maintained, provide safe and sufficient gas supplies to practical spaces
- **Performance:**
 - Durability: Reliable and long-lasting systems
 - Safe: Operationally safe gas supplies
 - Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.9.2 Technical Manual references

- **FF&E:** See [4 Fittings, furniture and equipment](#)
- **Ventilation design:** See [5.6 Ventilation and thermal comfort](#)
- **BMS and controls:** See [5.11 BMS, controls and performance monitoring](#)

5.9.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - The design, installation, commissioning and maintenance of bottle, tank or mains gas systems

shall comply with the [Gas Safety \(Installation and Use\) Regulations \(GSIUR\)](#)

- **Standards:**
 - The design, installation, commissioning and maintenance of bottle, tank or mains gas systems shall also be in accordance with the guidelines set out in IGEM/UP/11: Gas installations for educational establishments, other applicable IGEM standards, relevant British Standards and [Liquid Gas UK](#) codes of practice
 - All supplies to specialist equipment within practical spaces shall be designed in accordance with BS 4163

5.9.4 Minimum life expectancy

- **Gas pipework and storage, above or below ground:** 30 years
- **Gas meters, booster sets, valves and proving systems:** 25 years
- **Gas sensors and detectors:** 15 years

5.9.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for

the gas installation for the School/College to adopt/fund, if they so wish, from Practical Completion

- **Warranties:** 5-year manufacturer's warranty covering parts and labour for the gas installation

5.9.6 Operation and maintenance

- A Planned Maintenance Plan for the gas installation shall be provided as part of the handover information
- The operation and maintenance associated with gas and liquefied petroleum gas (or LPG) installations shall be fully discussed and agreed with the School/College and Employer. Suitable training and handover documentation including certification shall be provided

Specific requirements

5.9.7 Provision of gas

- **Extent:**
 - Gas supplies shall be provided to science laboratories to serve gas taps
 - Where other gas supplies may be required e.g., to serve gas-fuelled specialist equipment within practical areas including D&T/construction workshops or main School/College catering facilities, these shall be specified in the Project Brief and agreed with the Employer's Representative
- **Science laboratories:**
 - Natural gas and localised bottle storage (e.g., LPG) systems are both suitable for use
 - The suitability of either connecting to an existing natural gas supply or using an LPG system shall be evaluated
 - The chosen solution shall be agreed with the Employer and School/College
- **Natural gas supply:** Where a natural gas supply is proposed, the Contractor shall be responsible for all aspects of liaising with the utility supply company to provide the necessary gas connection. The gas supply shall be without the use of gas boosters wherever possible
- **LPG requirements:** Where an LPG supply is proposed, the Contractor shall liaise with the LPG supply company and provide the necessary supply and storage system including gas bottles or tanks as required
- **School catering:** Main School/College catering facilities, where required to be fuelled by gas, shall comply with IGEM/UP/19 and BS 6173
- **Gas isolation:**
 - Emergency control valves (ECVs), additional emergency control valves (AECVs) and automatic isolation valves (AIVs) shall be designed and installed according to IGEM/UP/11
 - As outlined in IGEM/UP/11, an emergency stop mechanism shall be positioned near the teacher's desk/board with a second at the exit from the room. The stop device shall be shielded unless in a protected position
- **Gas interlocks:** Gas supplies shall be interlocked with the ventilation systems in accordance with IGEM standards, including both IGEM/UP/11 and IGEM/UP/19

5.9.8 Carbon monoxide detectors

- **Extent:**
 - Carbon monoxide (CO) detectors shall be provided in accordance with IGEM/UP/11
 - CO detectors shall be hard wired

5.9.9 Carbon dioxide detectors

- **Requirements:**
 - Carbon dioxide (CO₂) detectors used for gas safety interlocking shall be designed and installed in accordance with IGEM/UP/19. All sensors shall be specified to a level that is suitable for commercial catering environments
 - CO₂ detectors are required to give an audible alarm and be linked with an automatic gas shut off system, which shall be fail safe and require manual intervention in order to restore the gas supply
- **Placement:** Where CO₂ detectors are used as part of a gas safety interlocking or alarm strategy, the detectors shall be placed in an area that reflects the general CO₂ levels within the practical or cooking area. They shall be wall mounted, fitted horizontally between 1m and 3m from cooking or practical areas, and approximately 2m above floor level. They shall not be located in high velocity air streams such as close to the edge of an

extract canopy/hood, other extract position or within 1m of an inlet air supply or openable window

- **Installation:** CO₂ detectors shall be hard wired and installed in accordance with manufacturer's instructions

5.10

Security and communication systems

This sub-section outlines the performance and functional requirements for security and communication systems, including access control, intruder alarms, public address, class change, assistance alarms, and induction loops. For emergency voice communication, see [9 Fire safety](#). For data cyber security, see [5.12 Internet connectivity](#). For audio visual (AV) systems, see [6.3 AV systems and fixed equipment](#). For CCTV, see [6.4 Building technologies](#)

General requirements

5.10.1 Summary

- **Purpose:**
 - Security systems, including access control, intruder alarms and CCTV, shall provide an integrated and balanced approach to meeting the security and operational requirements in the Project Brief
 - Communication systems, including public address and class change systems, assistance alarms and assistive listening devices, provide an inclusive, safe and smooth operating education environment
- **Performance:**
 - Durability: Reliable and long-lasting security and communication systems
 - Coordination: Required between access control, intruder alarms and CCTV systems, and between assistive listening systems and AV systems
 - Operation and maintenance: To not be overly complicated; straightforward to operate and maintain for the School/College following training

5.10.2 Technical Manual references

- **External doorsets:** See [2.6 External windows and doors](#)
- **Internal doorsets:** See [2.8 Internal doors and glazed screens](#)
- **Electrical infrastructure:** See [5.7 Electrical infrastructure](#)
- **Broadband:** See [5.12 Internet connectivity](#)
- **CCTV:** See [6.4 Building technologies](#)
- **Boundary treatments, walls and fencing:** See [8.4 Boundary treatments, walls and fencing](#)
- **Emergency voice communications:** See [9 Fire safety](#)

5.10.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Standards:**
 - Relevant British Standards, NSI standards and codes of practice
 - Companies employed to design, install and maintain security systems, including alarm monitoring systems, access control, intruder alarms

5.10 Security and communication systems

and CCTV systems, shall be certified by the National Security Inspectorate (NSI)

5.10.4 Minimum life expectancy

- **Access control:** 15 years
- **Intruder alarm systems:** 15 years
- **Public address and voice alarm systems:** 15 years
- **Class change systems:** 15 years
- **Audio systems:** 15 years

5.10.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for the security and communication systems for the School/College to adopt/fund, if they so wish, from Practical Completion
- **Warranties:** 5-year manufacturer's warranty covering parts and labour for all security and communication systems

5.10.6 Operation and maintenance

- A Planned Maintenance Plan for the security and communication systems shall be provided as part of the handover information

Specific requirements

5.10.7 Access control

- **Extent:**
 - Provide, coordinate and integrate all access control systems to external and internal doorsets and external gates to meet the security and operational requirements in the Project Brief
 - As a minimum, door entry systems operated by staff shall be provided at the main entrance and as specified in the Project Brief, including for out of hours/community use
- **Standards:** To be designed, installed and commissioned in accordance with BS EN 60839-11-1, BS EN 60839-11-2 and the NSI Code of Practice for the design, installation, commissioning and maintenance of Access Control Systems (NCP 109)
- **Locking mechanism options:** To be appropriate for the level of security required e.g.,
 - Mechanical pin coded mortice latch lock (low security)
 - Electromagnetic proximity/pin code activated mortice latch lock (medium security)
 - Electromagnetic proximity/pin code activated multi-point mortice lock with minimum 20mm bolt projections and hardened steel locking components at various points to head and leading edge (high

security), with a minimum holding force of 545kg

Note: May be required in pupil areas in SEMH schools and AP

- **Coordination with fire alarm:** In the event of the fire alarm being activated, the access control system shall not inhibit escape
- **Emergency egress:** In the event of system failure, or power failure, the system shall allow emergency egress
- **Data and security requirements:** For data and cyber security requirements see [6.4 Building technologies](#)

5.10.8 Intruder alarm systems

- **Extent:**
 - Intruder alarm systems shall meet the security and operational requirements in the Project Brief
 - Unless stated otherwise, the system shall, as a minimum, provide detection via door contacts to all external doors, as well as dual technology volumetric detection to all ground floor spaces with external windows, any other spaces potentially accessible via external windows or doors (e.g., from lower-level roofs or canopies), upper floor circulation areas including stairs, and any high value spaces

5.10 Security and communication systems

- The system shall be zoned to allow for out of hours use
- **Standards:**
 - Designed, installed and commissioned to meet the requirements of BS EN 50131 series, BS 8243, BS 9263, BS 8473, PD 6662 and the NSI Code of Practice for Intruder Alarms (NCP 120)
 - Installers shall be certified by a UKAS (United Kingdom Accreditation Service) accredited certification body
- **Control panels:** Shall:
 - Include remote keypads with display at specified entry/exit locations to enable the system to be set and unset
 - Be located in secure areas that are themselves, or the approach to, protected by the intruder alarm
 - Be fully programmable and enable required lock down zones by authorised users with the alarm set via the integral keypad and display
 - Be tamper proof
 - Have a standby battery to enable continued operation in the event of a mains power failure
- **Remote monitoring:**
 - The intruder alarm system shall be capable of remote monitoring

Note: It is likely that any new system will require confirmation technology (the ability to confirm that

the alarm activation is actually due to an intruder) before being granted Level 1 Police response

- **Detectors:**
 - Passive infra-red (PIR) and dual technology volumetric detectors situated at strategic locations to provide coverage of all identified areas
 - Concealed or surface mounted magnetic contacts provided to all external doors
 - Additional detection technologies shall be provided where required to meet the security and operational requirements in the Project Brief including, but not limited to, vibration sensors and break-glass detectors
- **Alarms:**
 - Internal and external audible alarm devices shall indicate that an alarm has been activated
 - Cabling and detection devices shall incorporate an alarm circuit and a 24-hour tamper circuit

5.10.9 Public Address and Voice Alarm (PAVA) systems

- **Extent:** Where the Project Brief or project specific fire strategy requires a combined Public Address and Voice Alarm (PAVA) system for broadcasting announcements and voice instructions in response to fire and security incidents (i.e., during evacuation, lockdown etc) as part of planned emergency strategies

5.10 Security and communication systems

- **Standards:** To be designed, installed and commissioned in accordance with BS 5839-8
- **Requirements:**
 - Public address systems shall be zoned to enable announcements to be broadcast to specific zones as required
 - Acoustic analysis shall determine optimal speaker layouts, sound pressure levels and a design that has a speech intelligibility of at least 0.5 STI
 - Central equipment shall be located in a secure room e.g., communications room to prohibit unauthorised access
 - Microphones shall be located in restricted areas e.g., offices and staff rooms

5.10.10 Class change systems

- **Extent:** Where specified in the Project Brief
- **Requirements:**
 - Class change systems shall have adaptable controls to deal with timetable changes
 - Tones/bells shall be distinguishable from the sound signals used for the fire and intruder alarms
 - Tones/bells shall be set at a comfortable noise level and also be adjustable
 - System shall be supported by distinguishable visual alerts

- Shall have pre-set timings with manual override and accommodate individuals with hearing or communication needs

5.10.11 Assistance alarms

- **Extent:**
 - Each accessible toilet and hygiene room shall be fitted with an emergency assistance alarm
 - A panic alarm system shall be provided to the main reception/general office and/or interview room, as specified in the Project Brief
- **Requirements:**
 - The accessible toilet/hygiene room emergency assistance alarm shall be activated via an easily identifiable pull cord reachable from the toilet and/or shower/changing seat and from the floor close to these appliances
 - This emergency assistance alarm shall have an over door visual and audible indicator (corridor side), a reset control reachable from a wheelchair and the toilet and/or shower/changing seat, and a signal that is distinguishable visually and audibly from the fire and intruder alarms
 - Each assistance alarm shall be connected to a central control unit located where specified in the Project Brief

5.10 Security and communication systems

- The panic alarm system in the reception area shall be activated via a discreet push button in a location agreed with the Employer's Representative and be an extension of either the emergency assistance alarm system or intruder alarm system

at the main reception. They shall be designed, installed and tested in accordance with PD IEC TR 63079

5.10.12 Audio systems

- **Extent:**
 - See [6.3 AV systems and fixed equipment](#) for the technical requirements for AV systems in classrooms, meeting rooms and large spaces
 - Sound field systems shall be installed where specified in the Project Brief
 - Radio aid systems shall be provided for use in classrooms where specified in the Project Brief
- **Requirements:**
 - Sound field systems shall be fitted with a facility to connect to remote microphone systems (e.g., radio aids) for use by individuals with hearing or communication needs
 - Sound field systems shall be integrated with any AV system in the space

5.10.13 Hearing loop systems (HLS)

- **Extent:** Hearing loop systems (HLS), also known as audio-frequency induction loops (AFILS), shall be provided in public areas e.g., performance spaces and

5.11

BMS, controls and performance monitoring

This sub-section outlines the performance and functional requirements for Building Management Systems (BMS), controls and performance monitoring, including meters and sub-meters

General requirements

5.11.1 Summary

- **Purpose:**
 - Building Management Systems (BMS) provide automatic control and monitoring of building systems including, but not limited to, energy and water consumption, internal air quality and temperature, hot and cold water, and heating, cooling and ventilation systems
- **Performance:**
 - Graphics: Simple and intuitive
 - Fault indication: Clear and accurate indication of system fault(s) and underperformance
 - Access: To be able to accommodate varying levels of authorised access for different users
 - Zoning: System zoning to allow for partial building/site use e.g., for out of hours/community use
 - Design information: Clear descriptions of how systems will be controlled
 - Metering: A comprehensive metering/sub-metering strategy allowing energy and water consumption to be measured for various end uses
 - Coordination: Required between heating, cooling and ventilation system designs

- Operation and maintenance: Control/monitoring philosophies to not be overly complicated; straightforward to operate and maintain for the School/College following training

5.11.2 Technical Manual references

- **Energy performance:** See [0.1 Integrated environmental design](#)
- **Low carbon heat generation:** See [5.4 Heat source](#)
- **Heating and cooling systems:** See [5.5 Heating and cooling systems](#)
- **Ventilation systems:** See [5.6 Ventilation systems and thermal comfort](#)
- **Lighting controls:** See [5.8 Daylighting and electrical lighting](#)
- **Data exchange and backup:** See [6.4 Building technologies](#)
- **Access and security:** See [6.4 Building technologies](#)

5.11.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
- **Standards:**
 - Power metering and monitoring devices to be in accordance with BS EN IEC 61557-12
 - BMS to comply with ISO/IEC 27001, ISO/IEC 27002 and ISO/IEC 27005
- **Best practice:**
 - Control strategies to be based on BSRIA AG 7
 - BMS and control strategies to be based on a Class B system as defined by BS EN ISO 52120-1

5.11.4 Minimum life expectancy

- **BMS panels and cabling:** 25 years
- **Sensors and actuators:** 15 years

5.11.5 Warranties and servicing

- **Service support arrangement:** The Contractor shall outline a cost-effective service support arrangement for the BMS and associated controls including sensors, actuators, data storage and analysis for the School/College to adopt/fund, if they so wish, from Practical Completion

- **Warranties:** 5-year manufacturer's warranty covering parts and labour for the BMS and associated controls, including sensors and actuators

5.11.6 Operation and maintenance

- A Planned Maintenance Plan for the BMS and controls shall be provided as part of the handover information

Specific requirements

Building Management System (BMS)

5.11.7 Building management system

- **Extent:**
 - Design, install and commission a complete BMS including outstation control panels, data network, all sensors, final control element devices (e.g., valves, dampers etc), actuators, control wiring and containment
- **Resilience:**
 - The BMS shall be hardwired between the central BMS panel and local system controllers
 - The BMS shall not rely on the internet and be able to function for at least a week without an internet connection
- **Open protocol:**
 - The BMS shall utilise open protocols e.g., the latest generation BACnet 'open' communication protocols as defined in ANSI/ASHRAE standard 135
 - Protocol implementations and system software shall be fully documented and transferable to third party control houses for ongoing maintenance
 - Ongoing revenue overheads, such as software license charges and periodic costs associated with supervisor packages, shall be clearly outlined to the Employer's Representative
- **Future expansion:**
 - Each BMS controller shall have a minimum 20% spare capacity for future expansion
 - The use of digital input multiplexers and/or relay modules to increase the overall controller point capacity, connected from either analogue or digital outputs of the main BMS controllers, shall not be accepted as a means of meeting the spare capacity requirement
 - Only main manufacturer I/O expansion modules shall be used in conjunction with the BMS controllers. Use of third party manufacturers' I/O expansion modules is not acceptable
- **Lighting, fire and security:** Lighting controls, fire and security systems shall be independent of the BMS
- **Interfaces:** Provide a user-friendly virtual mirror head end that users can access easily
- **Power supply:** The main BMS control panel shall be protected by Type 3 surge arresters complying with BS EN 62305-4

5.11 BMS, controls and performance monitoring

- **Meter and sensor data:**

- The BMS shall capture the real-time consumption data from the meters and sub-meters, and environmental data from sensors, at a minimum frequency of every 15 minutes
- The BMS shall have the capability to analyse the data automatically
- The BMS shall provide a minimum of 5 years of data storage from meters, sub-meters and sensors including analytics e.g., graphing of daily, weekly, monthly and annual trends for analysis by the School/College
- See [6.4 Building technologies](#) for data exchange and backup requirements

5.11.8 BMS display and graphics

- **Extent:** A comprehensive graphics package for each major plant item shall be provided which:
 - Aligns with the common standard across the site, if there is one
 - Displays the current real-time status of every monitored point and command output, and updates continuously
 - Displays the current value of all control set points
 - Displays the current operating status of plant e.g., normal operation, set back operation, frost protection etc

- Clearly displays monitoring and control data of all major plant items
 - Provides global and individual control of operating times/temperatures for each operating zone
 - Displays reporting of fault/trip conditions and critical alarms
 - Provides the facility to manually adjust all set points. It shall be possible to manually alter all control set points via the graphics subject to password access levels
 - Provides the facility to override plant on/off, or valves open/close etc. It shall be possible to manually alter the status of every monitored point and every command output from the graphics subject to password access levels
 - Provides the facility to start and stop individual plant items via a single software override switch on the associated plant graphic
- **Plant graphics:**
 - Graphic icons shall be in accordance with ASHRAE Standard 134
 - Graphics shall allow the operators to logically navigate through the system without having to constantly return to the main menu
 - Naming conventions shall be easy to understand
 - Plant layouts shall be displayed schematically

5.11 BMS, controls and performance monitoring

- Meters shall be displayed schematically, showing the location, function and distribution board reference where applicable
- Graphics shall update with live information within 5 seconds of being loaded
- **Background images:** Ensure that the graphics pages support open, interoperable CAD file formats for background images (such as .dxf) for the display of building floor plans

Integrated systems

5.11.9 Heating, cooling and ventilation controls

- **Control strategies:** To be based on BSRIA AG 7
- **Monitor, log and control:**
 - Monitoring, logging and control of the following shall be provided:
 - Primary and secondary LTHW/CHW system flow and return temperatures
 - Internal temperature of each space, except for risers
 - CO₂ concentration of each occupied space
 - Supply air temperatures
 - Night purge ventilation
 - Fan operation
 - Actuators for ventilation openings
 - Monitoring and logging of the following parameters shall be provided:
 - Fault status of all connected plant e.g., pumps, heat pumps, ventilation equipment, pressurisation unit, and other ancillaries
 - Return, exhaust and fresh air temperatures
 - System pressures
 - External air temperature
 - Filter status of ventilation equipment
- **Environmental sensors:** Shall:
 - Be positioned to reflect an accurate representation of the space conditions; away from draughts, direct sunlight and sources of heat and at the height of occupants or as specified for the particular control function
 - Be hardwired not battery powered
 - Be designed for use in an education environment i.e., tamper proof, robust casings not easily openable by pupils/students
 - Have a range and accuracy of:
 - CO₂: NDIR type with self-calibration functionality. Range: 0 to 5,000ppm; Accuracy: +/- 5%
 - Temperature: Range 0 to 50°C; Accuracy +/-1 °C
 - Humidity: Range 5 to 95% relative humidity (RH); Accuracy ± 5% RH
 - Where used for gas interlock systems be provided in accordance with IGEM/UP/11 and IGEM/UP/19 – see [5.9 Fuel installations](#)
 - Where project specific requirements require the additional measurement of particulate matter, humidity and volatile organic compounds, integrate

5.11 BMS, controls and performance monitoring

this functionality into the sensors measuring CO₂ levels and temperature

- **Zoning:**

- The heating and/or cooling system shall be zoned to allow the following areas to be independently controlled:
 - Sports facilities including sports halls, changing areas, showers and toilets
 - Large spaces (e.g., main hall or lecture theatre) including any catering facilities, associated toilets and connecting corridors
 - Each floor/level of the building except for buildings under 500m² in total
 - Spaces identified in the Project Brief for independent or community use e.g., nursery, community facilities or admin offices
- If centralised mechanical ventilation is used, the control zones shall align with the heating and/or cooling zones

5.11.10 Domestic hot and cold water controls

- **Monitor, log and control:**

- Monitoring, logging and control of the following shall be provided:
 - Domestic hot water flow and return temperatures
 - Domestic hot water storage temperatures

- Heat generator flow and return temperatures
- Monitoring and logging of the following shall be provided:
 - Incoming mains water temperature
 - Cold water storage tank temperature (including Category 5 water systems)
 - Cold water storage tank water level
 - Non-storage (or low storage) 'point of use' electric hot water heater flow temperatures

5.11.11 Metering and sub-metering

- **Energy meters:** Meters and sub-meters shall be provided to allow energy consumption to be separately measured and reported for the following end uses:
 - Heating
 - Hot water
 - Internal lighting
 - Small power (including Technology equipment, active infrastructure, CCTV and access control)
 - Catering
 - Fans and pumps
 - Cooling
 - Lifts
 - Exterior lighting
 - Other miscellaneous uses
- **Independent or community use:** Specific sub-metering shall be provided for spaces or areas that

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have independent or community use, as specified in the Project Brief

- **EV charging and swimming/hydrotherapy pools:**

EV charging points, swimming/hydrotherapy pools and their associated pool changing facilities shall be separately metered with energy use also reported separately

- **Renewable energy generation:** Metering shall be provided to measure and report the amount of energy generated by renewable technologies and the proportion of generated electricity that is either exported or utilised on site

- **Water meters:** Meters and sub-meters shall be provided to allow for the measurement of the incoming water supply and distributed water supplies i.e., at each cold water storage tank and Category 5 break tank

- **Heat meters:** Heat meters shall be provided to allow for measurement and reporting of monthly Coefficient of Performance (COP) values for heating

- **Requirements:**

- Meters shall be installed with real-time interface units for connection to the BMS to allow remote meter reading and data collection
- Pulse meter outputs shall not be used
- The BMS shall record the total consumption for all the water sub-meters as separate items

- For each utility, a dedicated meter shall be installed alongside the main utility meter to measure the consumption data for each utility. These dedicated meters shall be connected to the BMS. The utility provider's meter(s) shall not be relied upon

- **Standard:**

- Power metering and monitoring devices (PMD) shall be in accordance with BS EN IEC 61557-12
- The Class of PMD shall be stated and shall suit the application
- Heat pumps shall have PMD2 meters
- PMD1 shall be used for final circuit monitoring
- Main energy end use monitoring shall be via PMD2 devices
- PMD3 may be required for PV monitoring to allow export

Soak testing

5.11.12 Soak testing

- **Requirements:**

- Soak testing of all mechanical and electrical services in normal/auto operation mode shall be carried out prior to Practical Completion, as if the building is occupied and in use
- Soak testing shall be programmed to occur after completion of all commissioning and testing of the mechanical and electrical services
- The soak testing is to prove the reliability of systems and to correct calibrations over a continuous period of at least 7 days
- The Contractor shall provide a Soak Test Report summarising the outcomes of the soak test. This shall include a summary of measured data including meter, sub-meter and sensor data, as well as any fault reports
- Any faults and subsequent corrective action shall be documented, included in the O&M Manual and shared with the Employer's Representative
- During the soak test, normal occupied time settings shall be applied to:
 - Heating and/or cooling systems
 - Domestic hot and cold water
 - Gas services

- Ventilation systems
- Control systems
- Energy metering and monitoring systems
- Electrical distribution and small power
- Lighting and emergency lighting
- Fire detection and fire alarm systems
- Lifts
- All other alarm and communication systems
- Renewable energy systems

- **Fire detection and fire alarm systems:**

- Soak test for the fire detection and alarm system(s) shall be carried out in accordance with BS 5839-1, clause 35.2.6

Note: Soak testing shall be carried out for all sizes of fire alarm system, not just systems incorporating more than 50 automatic fire detectors

- Until the successful completion of the soak test, the fire detection and alarm system(s) shall not be regarded as fully operational

Building Performance Evaluation (BPE)

5.11.13 Overarching requirements

- **Overview:** Following Practical Completion, the Contractor shall carry out Building Performance Evaluation (BPE) comprising the following:
 - Monthly reporting: Monthly reports on energy, water consumption, CO₂ levels and air temperature for 15 months following Practical Completion
 - Initial building performance review: An assessment of the first 3 months following Practical Completion. The Contractor shall summarise the data from the first 3 months and outline any issues with building performance and/or monitoring
 - Final building performance review: An assessment of the first 12 months of the building's operation. The Contractor shall summarise the data from the first 12 months and outline how all the issues with building performance and/or monitoring have been resolved
- **Requirements:**
 - Monthly reporting, the initial building performance review and the final building performance review shall be completed using the Building Performance Evaluation Report template
 - Building performance data shall be automatically measured through meters, sub-meters and environmental sensors. The collected data shall be sampled at a minimum frequency of every 15 minutes
- The Contractor shall ensure that the building performance data is complete, accurate and sufficient for reporting against the required metrics. The Contractor shall outline how they will ensure that data is complete, sufficient and accurate for review and approval by the Employer's Representative
- The Contractor shall clearly outline what the costs would be for the School/College to continue with this service after the completion of all post Practical Completion activities
- Where there is a phased handover with different sectional completion dates, data shall be reported for the scope of each sectional completion in its own reporting template. This shall commence from the point that the building/section is completed and continue on a monthly basis until there is at least 15 months of data from the final completed building/section
- All reports shall be completed using DfE's Building Performance Evaluation Report template

- **Report sharing:** Monthly reports, the initial building performance review and the final building performance review shall be promptly shared with the following parties:
 - School/College
 - DfE Project Team (where applicable)
 - Employer's Representative
 - TS.DATA@education.gov.uk

5.11.14 Initial building performance review

- **Reporting requirements:**
 - Summarise performance data for the first 3 months including total energy use (excluding energy saved through renewables), renewable energy generation, energy breakdown by end use, heating Coefficient of Performance (COP), water consumption, CO₂ levels and air temperature
 - Evaluate the first 3 months of data, provide a forecast of performance over a 12-month period
 - Outline any issues with building performance
 - Identify any gaps in the reported data and any issues with monitoring and reporting
 - Provide a clear outline of how all issues with building performance, monitoring and reporting will be rectified
 - Each identified issue with building performance, monitoring and reporting, including any aspects

which do not meet the Employer's Requirements, shall be recorded as a defect on the Defects Register

- Provide a clear outline of the methodology used to validate and process the data

5.11.15 Final building performance review

- **Reporting requirements:**
 - The final building performance review shall be provided 1 month before the end of the Rectification Period. If this occurs prior to 12 months of complete data being available (i.e., 12 months of data post occupation and use), then two versions of the final performance review shall be submitted. The first shall outline the performance of the systems to enable the closing of the Rectification Period, and the second shall provide a full 12 months of data after the building is occupied
 - Summarise performance data for the first 12 months including total energy use (excluding energy saved through renewables), renewable energy generation, energy breakdown by end use, heating Coefficient of Performance (COP), water consumption, CO₂ levels and air temperature
 - Evaluate the first 12 months of data and compare against the Contractor's design targets and DfE's Employer's Requirements. Include a statement as

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to whether the measured performance meets the Employer's Requirements

- Provide a clear outline of how all the issues with building performance, monitoring and reporting that were outlined in the initial performance review have been rectified
- Provide a clear outline of the methodology used to validate and process the data

5.12

Internet connectivity

This sub-section outlines the performance and functional requirements for internet connectivity, including main and backup broadband connections

General requirements

5.12.1 Summary

- **Purpose:** Main internet infrastructure via a primary fibre based internet circuit and at least one backup internet connection by inclusion of:
 - Data cabling
 - Ducting
 - Terminations
 - Patch cords
 - All active equipment for the backup internet connection including, but not limited to, modems and routers
- **Performance:** Gigabit capable infrastructure to support an internet service of the School/College's preference

5.12.2 Technical Manual references

- **Security and communication systems:** See [5.10 Security and communication systems](#)
- **Active networking:** See [6.2 Active networking](#)
- **Telephone systems:** See [6.5 Telephony](#)

5.12.3 Legislation, standards and best practice

- **Legal requirements:** To comply with UK data protection and child protection legislation
- **Minimum standards:**

- [DfE broadband internet standards for schools and colleges](#)
- [DfE filtering and monitoring standards for schools and colleges](#)
- [DfE cyber security standards for schools and colleges](#)
- [DfE network cabling standards for schools and colleges](#)
- BS EN 50173 series – Information technology: Generic cabling systems
- BS EN 50174 series – Installation technology: Cabling installation
- BS EN 50310 – Telecommunications bonding networks for buildings and other structures
- BS 6701 – Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance
- Cabling shall be handled, installed and tested in accordance with the manufacturer's guidance and warranty terms and conditions

5.12.4 Minimum life expectancy

- **Structured data cabling:** 25 years
- **Active equipment:** 5 years

5.12.5 Sustainability

- **Procurement:** Ethically sourced and supporting circular economy principles through re-use, re-manufacturing and recycling
- **Specification:** Materials shall be selected and integrated to minimise construction embodied carbon
- **Design:** Reduce over-specification or unnecessary redundancy

5.12.6 Health and safety

- **Design and installation:** To ensure the health and safety of all users
- **Fire rating:** As outlined in the latest iteration of BS 6701 or its replacement

5.12.7 Warranty requirements

- **Active equipment:** 3-year manufacturer's product and application performance warranty
- **Cabling system warranty:** 25-year manufacturer's product and application performance warranty for the complete cabling system

5.12.8 Installation

- **Site registration:** In the School/College's name with communications infrastructure providers

- **Onsite coordination:** Connection, groundworks, last mile, onsite equipment, and active connection
- **Maintenance:** Existing connections inside and outside red line/site boundary maintained during construction
- **Internet connectivity live:** Ahead of any commissioning activity
- **Revenue costs:** During the commissioning period to be the responsibility of the Contractor
- **Certification:**
 - Certification of ducting and external cabling
 - Internet provider site completion certificate(s)

Specific requirements

5.12.9 Main internet infrastructure

- **Extent:** All passive infrastructure and works inside and outside the red line/site boundary
- **Infrastructure requirements:** Capable of supporting the following service types:
 - Gigabit capable fibre ethernet (EAD or equivalent) service
 - Gigabit capable fibre to the premises (or equivalent) service
- **Provider's guidance:** Followed for:
 - Fibre cable ducting
 - Services arrangement
 - Joint boxes
 - Footways
 - Frames and covers
- **Termination location:** In main communications room
- **Alarms:**
 - Capable of supporting security and lift alarms
 - Backup connectivity provided using an approved solution by the security and lift supplier
- **Session Initiation Protocol (SIP) trunking services:** Supported

5.12.10 Backup internet connectivity

- **Extent:** All passive and active infrastructure provided
- **Infrastructure requirements:** One of the following:
 - Low earth orbit satellite service
 - 5G or higher bandwidth cellular network service
 - Fixed Wireless Access (FWA) service
 - Fibre to the premises (where not used as the main internet connection)
- **Receiving/transmission equipment:**
 - Satellite dishes or mobile telephony antenna provided
 - To be located on building roof or fixed to external wall
- **Connection location:** Directly to main communications room
- **Active equipment:** At a minimum, modems and routers provided

6

Technology

6.1

Passive networking

This sub-section outlines the performance and functional requirements for passive data cabling infrastructure and communication cabinets

General requirements

6.1.1 Summary

- **Purpose:**
 - Enterprise level passive networking to support all networked technology solutions by inclusion of:
 - Data cabling
 - Ducting
 - Containment
 - Modules
 - Faceplates
 - Patch panels
 - Patch cords
 - Communication (comms) cabinets to accommodate servers and network equipment including, but not limited to:
 - Patch panels and cable management
 - Servers and associated technology
 - Network switches
 - Wireless, telephony and building technology controllers
 - Broadband terminating equipment
 - Connections to equipment in additional comms cabinets
 - Uninterruptable power supplies (UPS)
 - Power distribution units (PDU)

- **Performance:**
 - To pass all cable tests
 - All cables capable of supporting a minimum of 10 gigabits per second (10gbps)
 - All equipment securely installed in cabinets

6.1.2 Technical Manual references

- **Cooling:** See [5.5 Heating and cooling systems](#)
- **Ventilation:** See [5.6 Ventilation systems and thermal comfort](#)
- **Broadband:** See [5.12 Internet connectivity](#)
- **Active networking:** See [6.2 Active networking](#)
- **Building technologies:** See [6.4 Building technologies](#)
- **Cable containment:** See [5.7 Electrical infrastructure](#)

6.1.3 Legislation, standards and best practice

- **Minimum standards:**
 - [DfE cyber security standards for schools and colleges](#)
 - [DfE network cabling standards for schools and colleges](#)
 - BS EN 50173 series – Information technology: Generic cabling systems

- BS EN 50174 series – Installation technology: Cabling installation
- BS EN 50310 – Telecommunications bonding networks for buildings and other structures
- BS 6701 – Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance
- All cabling and equipment shall be handled, installed and tested in accordance with the manufacturer's guidance and warranty terms and conditions

6.1.4 Minimum life expectancy

- **Passive networking:** 25 years
- **Communication cabinets:** 25 years

6.1.5 Sustainability

- **Procurement:** Ethically sourced and supporting circular economy principles through re-use, re-manufacturing and recycling
- **Specification:** Materials shall be selected and integrated to minimise construction embodied carbon
- **Design:** Reduce over-specification or unnecessary redundancy
- **Cooling:** Strategy for all comms cabinets to be aligned with the overall sustainable design approach

6.1.6 Health and safety

- **Design and installation:** To ensure the health and safety of all users
- **Secure installation:** In accordance with manufacturer's recommendations including patting and fixings
- **Cabinet doors:** To open in a direction to ensure a person cannot be trapped in the case of an emergency
- **Earthing:** All extraneous metal parts, including cabinet door frames, to be electrically earth bonded
- **Cable fire rating:**
 - CPR Euroclass Cca as outlined in the latest iteration of BS 6701 or its replacement
 - Low smoke and zero halogen (LSZH)

6.1.7 Training

- **Location:** On site
- **When:** Prior to handover
- **Audience:** Tailored for users
- **Type:** Delivered by a manufacturer approved installer

6.1.8 Warranty requirements

- **Cabling system warranty:** 25-year manufacturer's product and application performance warranty for the complete cabling system

- **Cabinet warranty:** 25-year manufacturer's product and application performance warranty

6.1.9 Interoperability

- **Standard:** Open standards shall apply wherever possible
- **Design:** To use consistent design standards

6.1.10 Design

- **Patch cord and tag colours:** Suitable for users with Colour Vision Deficiency
- **Faceplate and patch panel labelling:** Clearly and permanently labelled numbering scheme
- **Grade of cable:** Suitable for the installation location and environmental conditions
- **Splicing:** No intermediate patch panels or splices used

6.1.11 Installation

- **Planning and practices:** To comply with manufacturer's installation guidelines and relevant British Standards including specifically:
 - Containment type, size and fill ratios
 - Cable laying strategies, cable protection and support and bundling
 - Cable separation from power
 - Mitigating the effects of remote powering applications

- Minimum backbox depth and cable entry points
- Minimum bend radius (MBR) during installation and when installed
- Earthing and bonding

6.1.12 Testing

- **Cable testing:** All installed cables tested to demonstrate that the system meets or exceeds the link performance defined in the respective standards
- **Test equipment:** Approved by the cabling system manufacturer and calibrated in accordance with their installation and testing guidance
- **Testers:** To be manufacturer approved installers
- **Manufacturer's installation audit:** May be requested by the Employer
- **Results:**
 - To include the name of the equipment used to carry out the test, the calibration date of the test equipment, and the date the test was completed
 - Cable length shown in metres (m)
 - To reflect the test limits for the relevant British Standard
 - To be submitted to the Employer and approved before active infrastructure installation
 - Marginal or *Pass results shall be considered a fail and shall be remedied and retested to pass

Specific requirements

6.1.13 Copper cabling

- **Extent:** As specified in the Project Brief or where not provided:
 - Primary School: 0.6 data points per pupil + 48
 - Secondary School: 0.8 data points per pupil/student + 48
 - Special Schools, Special Colleges and AP: 2.0 data points per pupil/student + 48
 - College: 1.0 data points per student + 48
 - Additional points will be required for equipment in [6.4 Building technologies](#)
 - The final number and location of data points to be agreed during the design process
- **Cable standards:**
 - Minimum of Category 6A/Class EA
 - Minimum of U/FTP (Unshielded outer shell/Foil shielded Twisted Pair)
 - Support IEEE 802.3bt PoE++
- **Sockets:** Registered Jack 45 (RJ-45)
- **Permanent link cable maximum length:**
 - Category 6A/Class EA: 90 metres
 - Category 8: 24 metres
 - Provide 30 centimetres slack close to cable ends

- **Component certification:** Complete copper cabling system from a single manufacturer
- **Patching strategy:**
 - Patch panels in the same cabinet as their associated switches
 - Patch cable length to be minimised
 - Patch cable colours to reflect project specific requirements as specified in the Project Brief
- **Cable management:** Horizontal cable management bars utilised wherever a patch cable spans more than 2U
- **Modular components:** Keystone jacks, patch panels and faceplates

6.1.14 Optical fibre cabling

- **Extent:** Between the communications room and all hub rooms
- **Cable standards:**
 - Minimum of optical multimode OM4 (50/125)
 - Minimum 16 cores per cable
- **Diverse routing:**
 - Backbone connection to consist of 2no. cables
 - Separate, diverse and direct routes between communications rooms

- Connections between buildings routed in separate underground ducts, no less than 1m apart
- **Permanent link cable maximum length:**
 - Optical multimode 4 (OM4): 400 metres
 - Optical singlemode 2 (OS2): To support greater bandwidth and/or distances
 - Provide 3 metres of slack, coiled to manufacturer's guidelines, at cable ends
- **Component certification:** Complete optical fibre cabling system from a single manufacturer
- **Terminations:** Terminated on a dedicated fibre patch panel

6.1.15 Communication cabinets

- **Extent:** See 3.23.3 Spaces and Places of DfE's Pattern Book
- **Layout:**
 - Considering the cooling strategy of the space
 - Minimum of 1.2 metres clearance at front and rear and 1.4 metres to any exposed cabinet sides
 - Doors to open in a direction to ensure that a person can easily evacuate the space
- **Specification:**
 - 1000mm x 800mm with a minimum height of 42u
 - Full height perforated mesh doors to front and rear
 - Baying kits for two or more cabinets to meet manufacturer's recommendations

- Plinths for all floor standing cabinets to meet manufacturer's recommendations
- **Power requirements:**
 - Power distribution units to support all active infrastructure, servers and associated components
 - Surge protection to protect all active infrastructure, servers and associated components
 - A dedicated clean supply on a separate circuit to be provided for each communications room
 - Sub-meter provided for each communications room
 - 1no. 32A power socket above each server cabinet
 - 1no. 16A power socket above each network equipment cabinet
 - Additional, or higher amperage power sockets provided if required by UPS or network equipment
- **Environmental design:** Shall maintain the optimal working temperature for the space in accordance with the requirements of the manufacturer(s) for the installed equipment
- **Acceptable operating temperature:** Range rated as per the requirements of a working space, occupied by staff with all equipment powered on
- **Temperature and humidity sensors:**
 - To be installed within the server cabinet
 - To be capable of sending email and push notification alerts and initiating a controlled shutdown of equipment

- **Environmental control units:**
 - Positioned to provide effective cooling and ease of maintenance
 - Turn on and return to preset temperature and settings after rebooting or power outage
- **Leak protection:**
 - Cooling units and pipework not located above cabinets
 - Condensate to operate under gravity and be taken to the nearest drain outside of the room

6.2

Active networking

This sub-section outlines the performance and functional requirements for an enterprise level wired and wireless network to connect all devices to servers and the internet

General requirements

6.2.1 Summary

- **Purpose:**
 - Enterprise level wired and wireless active network to connect all user devices and building technologies to servers and the internet
 - Uninterruptible Power Supply (UPS) units to provide battery backup for all servers and active network equipment
- **Performance:**
 - Fast and efficient connectivity to all existing and planned wired and wireless devices
 - Maximises the connection speed to servers and the internet
 - Wireless coverage for all devices in all parts of the building
 - Wireless coverage to a distance of 30 metres around the perimeter of the building(s) where this area falls within the boundary of the School/College
 - Wireless coverage at all fire muster points
 - Battery supply to support the kVA/kW load of all connected equipment and provide a minimum uptime of 30 minutes

6.2.2 Technical Manual references

- **Cooling:** See [5.5 Heating and cooling systems](#)

- **Ventilation:** See [5.6 Ventilation systems and thermal comfort](#)
- **Broadband:** See [5.12 Internet connectivity](#)
- **Passive networking:** See [6.1 Passive networking](#)
- **Building technologies:** See [6.4 Building technologies](#)
- **Communication cabinets:** See [6.1.15 Communication cabinets](#)
- **Communications rooms:** See 3.22.4 Spaces and Places of DfE's Pattern Book

6.2.3 Legislation, standards and best practice

- **Legal requirements:** To comply with UK data protection and child protection legislation
- **Minimum standards:**
 - [DfE cyber security standards for schools and colleges](#)
 - [DfE network switching standards for schools and colleges](#)
 - [DfE wireless networking standards for schools and colleges](#)
 - All relevant British Standards
 - BS EN 62040 – Uninterruptible power systems (UPS)
 - All relevant NCSC guidance

6.2.4 Minimum life expectancy

- **Wired active networking:** 5 years
- **Wireless networking:** 5 years
- **UPS device:** 10 years
- **UPS batteries:** 5 years

6.2.5 Sustainability

- **Procurement:** Ethically sourced and supporting circular economy principles through re-use, re-manufacturing and recycling
- **Specification:** Devices shall be selected and integrated to minimise construction embodied carbon
- **Configuration:**
 - Maximise energy efficiency without compromising performance
 - Record energy use data that can be shared
 - Use time-defined shutdown profiles

6.2.6 Health and safety

- **Design and installation:** To ensure the health and safety of all users
- **Secure installation:** In accordance with manufacturer's recommendations including pattering and fixings

6.2.7 Security

- **Design:** Resilient to cyber attack without negatively impacting on the network's performance by implementing, at a minimum:
 - Network segregation
 - Zero trust architecture
 - Real-time threat detection
 - Dynamic security policies
- **Configuration:** Secure to intrusion from unauthorised users including 2 factor authentication
- **Handover:** Security shall be evidenced and demonstrated to the Employer

6.2.8 Training

- **Location:** On site
- **When:** Prior to handover
- **Audience:** Tailored for users
- **Type:** Manufacturer approved

6.2.9 Licence and warranty requirements

- **Warranty type:** Manufacturer provided next business day
- **Switching and wireless warranty period:** A minimum of 5 years
- **Switching and wireless licence period:** A minimum of 5 years

- **Switching and wireless licence type:** Management software and firmware
- **UPS warranty period:** A minimum of 3 years including battery

6.2.10 Interoperability

- **Design:** All active technology on a single network utilising active network segregation
- **Standard:** Open standards shall apply wherever possible
- **Configuration:** Where a technology utilises a network protocol other than TCP/IP, it shall integrate with the network in a secure manner

6.2.11 Information sharing and access

- **Feature:** All technologies that store data shall support information sharing and access
- **Configuration:** Shall:
 - Permit sharing by allowing direct, secure access to data stores where possible
 - Provide an Application Programming Interface (API) if direct access is not possible
 - Provide the end user access to all their data

6.2.12 Management

- **Design:** Manufacturer cloud management system to allow the user to configure all features and functions of the solution
- **Existing solution:** Match any specified in the Project Brief

Specific requirements

6.2.13 Wired active networking

- **Extent:** To connect all terminated data points, servers and associated equipment
- **Installation:** In communication cabinets using manufacturer approved fixings
- **Energy efficiency:** Support 802.3az or equivalent implemented
- **Power over Ethernet (PoE):** IEEE 802.3af/at/bt standard or its replacement implemented
- **Spanning Tree:** MST/RST implemented or equivalent
- **Quality of service (QoS):** Implemented
- **POE+ switches:** LLDP-Med implemented
- **Server network interfaces:** Utilise the maximum bandwidth for current and planned broadband equipment, servers and associated equipment
- **Patching:** All data points must be patched into switch ports
- **PoE ports:** Provided for all devices that require them
- **Resilience for Core:** Resilient against the failure of any single component including, but not limited to power supply and management modules
- **Resilience for PoE switches:** Resilient against the failure of any single component including, but not limited to, power supply
- **Connections to the Core:**
 - A minimum of 10 Gbps for each switch in the edge stack
 - Edge stack to be connected to the core using a minimum of two bonded active links
- **Connectivity to each user device:** 1 Gbps at a minimum
- **Multi-gigabit ports:** To be provided to support devices and infrastructure equipment that require a higher bandwidth
- **Stacking:**
 - 50 Gbps interconnects between switches in a stack, without the use of link aggregation, bonding of links or similar technologies
 - Use ports dedicated to stacking
 - Utilise a resilient ring topology architecture or similar
- **Manufacturer's recommendations:** Network designs to meet manufacturer's recommendations
- **Chassis switches:** Can incorporate a minimum of one additional module per chassis
- **Scalability:** Can be expanded when additional capacity is required in the future

- **Switches memory:** A minimum of 512MB of memory
- **MAC addresses:** To support a minimum of 16,000 concurrently
- **Switch fabric:** Non-blocking
- **Multiple core switch solutions:** To be connected/stacked with appropriate bandwidth coherent with the wider infrastructure design

6.2.14 Wireless active networking

- **Extent:** Blanket wireless coverage throughout the buildings, around the perimeters and at fire muster points
- **Installation:** Attached to walls or ceilings using manufacturer approved fixings
- **Wireless standard:** The latest certified by the Wi-Fi Alliance at handover
- **Users:** Support high number and density of users
- **Number of Wireless Access Points:** Maximise access point numbers to ensure high backhaul bandwidth to all spaces, in line with planned occupancy levels
- **Roaming:** Connectivity shall not be lost whilst roaming
- **External wireless coverage:** At fire muster points and around the perimeter of the building(s) to 30 metres where this area falls within the boundary of the School/College

- **Guest access:** For authorised devices and/or authenticated users
- **Wireless Access Point connections:** To a minimum of two switch ports, one of which shall be at least 5 Gbps
- **Quality of service (QoS):** Implemented
- **Wireless bands:**
 - Internal Wireless Access Points to be tri-band Wi-Fi at a minimum throughout the building
 - External Wireless Access Points to be dual-band Wi-Fi at a minimum
- **External Wireless Access Points:** To have appropriate lightning protection, grounding and surge protection
- **Signal management:** Active signal management and load balancing of user/device connectivity
- **Interference:** Minimised from building technologies and other wireless networks
- **Energy usage:** Energy saving by powering down radios when full wireless functionality is not required or when wireless bandwidth is not being utilised

6.2.15 Uninterruptable power supplies (UPS)

- **Extent:** For all firewalls, routers, servers and switches
- **Battery storage requirement:** Capable of providing energy for a minimum of 30 minutes during grid disconnection

- **Installation:** Rack-mounted UPS provided for servers, storage, backup systems, Power over Ethernet (PoE) switches, core switches, and broadband equipment
- **Power compatibility:** Compatible with the load, connecting cables, and incoming power supply
- **Shutdown software:** Installed to enable controlled shutdowns with notifications for all servers within the UPS battery runtime
- **Compliance standards:** UPS must comply with UL1973 or its replacement
- **Operational mode:** UPS must operate in online mode
- **Battery specification:** Batteries must be Lithium-Ion compliant with UL1642 and UL1973, and integrated into the UPS enclosure
- **Dual power supply:** Devices with dual power supplies shall have both connected but not to a single UPS
- **Single point of failure:** The UPS shall not create a single point of failure
- **Power output connections:** UPS shall have sufficient power output connections of appropriate ratings to support the required range of equipment, including power distribution units
- **Power smoothing requirement:** To be provided to any cabinet containing servers, associated storage, backup systems, Power over Ethernet (PoE), core

switches, wireless controllers, and broadband equipment

- **Equipment compatibility:** Ratings of the power smoothing equipment must be compatible with the load, connecting cables, and incoming power supply

6.3

AV systems and fixed equipment

This sub-section outlines the performance and functional requirements for classroom, meeting room and large space audio visual (AV) systems, digital signage, and sign-in and cashless catering stations. For stage lighting in performance spaces and drama studios, see [5.8 Daylighting and electrical lighting](#). For audio-frequency induction loop (AFILS) and radio aid systems, see [5.10 Security and communication systems](#)

General requirements

6.3.1 Summary

- **Purpose:**
 - Audio visual (AV) equipment in general teaching spaces, specialist teaching spaces, activity studios, library resource centres and conference meeting rooms to support teaching, learning and digital communication
 - Audio visual (AV) equipment in all halls and performance spaces to provide fully integrated, flexible, digital communication solutions that allow future expansion and interoperability
 - Installation of fixed equipment including digital signage for information, sign-in and cashless catering systems for audit purposes
- **Performance:**
 - Video images shall be stable and clearly visible from all locations in each space
 - Sound shall be clearly audible in all locations of each space, where provided
 - To be suitable for an education environment

6.3.2 Technical Manual references

- **Passive networking:** See [6.1 Passive networking](#)
- **Building technologies:** See [6.4 Building technologies](#)

- **Stage lighting:** See [5.8 Daylighting and electrical lighting](#)
- **Induction loops and radio aids:** [5.10 Security and communication systems](#)

6.3.3 Legislation, standards and best practice

- **Legal requirements:** To comply with UK data protection and child protection legislation
- **Minimum standards:**
 - [DfE cyber security standards for schools and colleges](#)
 - All relevant British Standards

6.3.4 Minimum life expectancy

- **Classroom and Large space AV:** 10 years

6.3.5 Sustainability

- **Procurement:** Ethically sourced and supporting circular economy principles through re-use, re-manufacturing and recycling
- **Specification:** Devices shall be selected and integrated to minimise construction embodied carbon
- **Configuration:**
 - Maximise energy efficiency without compromising performance

6.3 AV systems and fixed equipment

- Record energy use data that can be shared
- Use time-defined shutdown profiles

6.3.6 Health and safety

- **Design and installation:** To ensure the health and safety of all users
- **Secure installation:** In accordance with manufacturer's recommendations including pattressing and fixings
- **Pattressing:**
 - All classrooms and meeting rooms, and any other walls with AV equipment shall have an appropriate pattressed area from floor to ceiling of no less than 3 metres width to support a total loading of 125kg mounted with a 300mm offset
 - Pattress to have a mark visible at high level showing the dimensions and supported weight of the pattress
- **Working at height:** Minimise the need to work at height

6.3.7 Security

- **Design:** Resilient to cyber attack without negatively impacting on the network's performance
- **Configuration:** Secure to intrusion from unauthorised users including 2 factor authentication

- **Handover:** Security shall be evidenced and demonstrated to the Employer

6.3.8 Training

- **Location:** On site
- **When:** Prior to handover
- **Audience:** Tailored for users
- **Type:** Delivered by a manufacturer approved installer

6.3.9 Warranty requirements

- **Warranty period for hardware:** A minimum of 5 years
- **Warranty period for cables:** A minimum of 10 years

6.3.10 Interoperability

- **Standard:** Open standards shall apply wherever possible
- **Configuration:** Where a technology utilises a network protocol other than TCP/IP, it shall integrate with the network in a secure manner

6.3.11 Information sharing and access

- **Feature:** All technologies that store data shall support information sharing and access
- **Configuration:** Shall:
 - Permit sharing by allowing direct, secure access to data stores where possible

6.3 AV systems and fixed equipment

- Provide an Application Programming Interface (API) if direct access is not possible
- Provide the end user access to all their data

Specific requirements

Classrooms and meeting rooms

6.3.12 Interactive screen

- **Extent:** As specified in the Project Brief
- **Installation:** Secured to the wall or height adjustable mount using fixings appropriate for the substrate and weight of equipment
- **Grade:** Commercial grade education-class device
- **Robustness:** Toughened glass and appropriate durability and resilience for as-installed environment
- **Resolution:** To support 4k resolution at a minimum, with a 16:9 image ratio
- **Frame rate:** 60 frames per second (60fps) at a minimum at 4k resolution
- **Interactivity:**
 - Multi-touch
 - Minimum of 20 points of touch
 - Support multi-gesture
- **Audio:**
 - To support teaching, learning and digital communication from all locations in each space
 - Minimum of 20 Watts per speaker
- **Location:**
 - Centre of the teaching wall for classrooms
 - Coordinated with furniture for meeting rooms
- **Visibility:**
 - To minimise glare and reflections, accounting for the ambient light levels
 - To ensure sight lines and viewing angles for all pupils/students
- **Screen size:** Meet the AVIXA DISCAS standards appropriate for the dimensions of the space with a typical element height of 3.75%
- **Maximum weight:** 75kg
- **Lifespan:** A minimum of 50,000 hours
- **Network connectivity:**
 - Wireless connectivity no older than one generation before the latest wireless standard certified by the Wi-Fi Alliance
 - Wired connectivity of 1Gb via an ethernet port
- **AV connectivity:**
 - 3 HDMI
 - USB C (supporting data and power)
- **Features:**
 - To support media casting and screen mirroring from all authorised user devices
 - To have OPS module compatibility

6.3 AV systems and fixed equipment

- Freeze frame functionality
- **Built in operating system:** The latest software available at the time of installation
- **Management:** To include network management software for onsite and remote access
- **Video conferencing for meeting rooms:**
 - Integrated or screen mounted webcam
 - External microphone
 - Built in video conferencing software compatible with School/College systems defined in the Project Brief

6.3.13 Height adjustable mounting

- **Extent:** As specified in the Project Brief
- **Installation:** Secured to the wall and floor using fixings appropriate for the substrate and weight of equipment
- **Mechanism:** Electrical or manual
- **Operation:** With minimal physical exertion
- **Screen size supported:** 42" to 95" screens
- **Screen weight supported:** Screen plus 50kg
- **Vertical travel distance:** 750mm
- **Distance from floor:**
 - In lowered position: 520mm to centre of screen
 - In raised position: 1270mm to centre of screen

6.3.14 Cabling loom

- **Extent:** In all teaching spaces and meeting rooms

- **Location:** Between the AV faceplate and the screen connection point
- **Ports required at a minimum:**
 - 1 x USB-C
 - 2 x HDMI
- **AV faceplate:** At teacher desk or presentation point
- **Screen connection point:** Behind the interactive screen
- **AV and USB patch cords:**
 - For links between the AV faceplate and the current or planned user equipment in each space
 - Length to suit the specific layout in each space, with a minimum 2m cable
 - Simultaneously supporting the maximum resolution and refresh rate of the display
 - If longer than 5m cables are required, active boosted modules or cables shall be used
- **Cable specification:**
 - Latest certified standard agreed six months prior to handover
 - Low smoke and zero halogen
- **Installation:**
 - Accessible containment, managed/segregated to eliminate any interference from adjacent power cables
 - To manufacturer's recommended tolerances before signal regeneration

6.3 AV systems and fixed equipment

- For use with height adjustable mounting solutions where required
- **Testing:**
 - All looms and patch cords to be tested
 - Results to be submitted to the Employer and approved

Large spaces

6.3.15 Projector

- **Extent:** As specified in the Project Brief
- **Brightness and contrast:** To compensate for increased light levels in the space
- **Resolution:** To support 4k resolution at a minimum, with a 16:9 image ratio
- **Frame rate:** 60 frames per second (60fps) at a minimum at 4k resolution
- **Type:** LED laser-based
- **Connectivity:** Wired and wireless connectivity
- **Zoom and focus:** Motorised and controlled using a remote control
- **Image size:** To fill provided screen see [6.3.17 Screen](#)
- **Features:**
 - To support media casting and screen mirroring from all authorised user devices
 - Freeze frame functionality
- **Installation:**
 - Mounted to the structure of the building or fixed to lighting bars (with adequate load strength), using mounting methods and fixings suitable for substrate and weight of equipment
 - Cage required around the projector to protect it from damage

6.3.16 Cabling loom

- **Extent:** In all halls and performance spaces
- **Location:** Between the projector or AV switch and 2 presentation locations
- **Ports required for each loom at a minimum:**
 - 1 x USB-C
 - 2 x HDMI
- **Presentation:** AV faceplate or brush plate
- **AV and USB patch cables:**
 - For links between the AV faceplate and the current or planned user equipment in each space
 - Length to suit the specific layout in each space, with a minimum 2m cable
 - Simultaneously supporting the maximum resolution and refresh rate of the display
 - If longer than 5m cables are required, active boosted modules or cables shall be used
- **Cable specification:**
 - Latest certified standard agreed six months prior to handover
 - Low smoke and zero halogen
- **Installation:**
 - Accessible containment, managed/segregated to eliminate any interference from adjacent power cables

6.3 AV systems and fixed equipment

- To manufacturer's recommended tolerances before signal regeneration
- For use with height adjustable mounting solutions where required
- Faceplate locations shall be coordinated with all possible lectern locations
- Cable management above ceiling, such as cable tray/basket, allowing segregation of low voltage and high voltage cabling
- **Testing:**
 - All looms and patch cords to be tested
 - Results to be submitted to the Employer and approved

6.3.17 Screen

- **Extent:** As specified in the Project Brief
- **Size/proportion:** Appropriate to the space and calculated using the AVIXA DISCAS method ([Display Image Size for 2D Content in Audiovisual Systems](#)) to ensure all viewers are able to discern sufficient information from the viewable area at the maximum distance in the space
- **Mounting:**
 - At a height to ensure all viewers can view the images comfortably from all seating locations
 - Useable when any main stage curtains are closed

- **Mechanism:** Motorised and controlled using a remote control and lockable key switch
- **Visually unobtrusive:** When the space is used as a performance space

6.3.18 Lectern

- **Extent:** As specified in the Project Brief
- **Product:** Robust, mobile, secure, easy to use, clearly labelled, active AV interface suitable for School/College use
- **Maintenance:** Removable rear or side panels to allow access to equipment connections
- **Design:** Provide space for a presentation device such as a laptop or tablet
- **Control:** All audio, mechanical, lighting and projection sources
- **Ventilation:** Appropriate ventilation plates and blanking plates to ensure cabling is protected and equipment has sufficient airflow
- **Light:** Switchable gooseneck light

6.3.19 Sound reinforcement system

- **Extent:** As specified in the Project Brief
- **Use:** Easy to use, appropriate for AV presentations and able to support sound reinforcement for performing arts
- **Microphones required, at a minimum:**

6.3 AV systems and fixed equipment

- 1 x gooseneck microphone attached to control lectern
- 1 x handheld radio microphone
- 2 x lavalier radio microphones
- **Audio:**
 - Audio to be clearly heard from anywhere within the space using repeater speakers
 - Speaker placement shall be suitable for speaker polar pattern, bracket type and orientation
 - Provide network-based audio solutions to bring flexibility to the system
- **Power:**
 - To contain inbuilt power management sufficient to power all necessary equipment in cabinet
 - Active power conditioning for reliable performance on any unstable power supply
- **Secure:** To prevent unauthorised access and use
- **Installation:** Cabling installed protected in cable management, such as spiral wrap/sock

6.3.20 Lighting control system

- **Use:** Easy to use, appropriate for AV presentations and to support stage lighting for performing arts. Also see [5.8.12 Stage / performance lighting](#)

Fixed equipment

6.3.21 Digital signage

- **Extent:** As specified in the Project Brief
- **Installation:**
 - Secured to wall using fixings appropriate for the substrate and weight of equipment
 - At high level to provide clear sightlines
 - Vertically and horizontally pivoted for best viewing angle
- **Power and data:** Located behind the screen

6.3.22 Sign-in stations

- **Extent:** As specified in the Project Brief
- **Installation:** Installed on a height adjustable arm secured to the wall using fixings appropriate for the substrate and weight of equipment
- **Location:** To be installed in main reception outside the secure line
- **Power and data:** Located behind the sign-in station

6.3.23 Cashless catering top-up stations

- **Extent:** As specified in the Project Brief
- **Installation:** Secured to wall using fixings appropriate for the substrate and weight of equipment
- **Location:** Accessible to pupils/students and visiting parents/carers

- **Accessibility:** Height adjustable or multiple units at different heights
- **Power and data:** Located behind the station

6.4

Building technologies

This sub-section outlines the performance and functional requirements for environmental sensors and Closed-circuit Television (CCTV), and the digital components only for Building Management Systems (BMS), access control and intruder alarms. For access control and intruder alarms, see [5.10 Security and communication systems](#). For BMS, see [5.11 BMS, controls and performance monitoring](#)

General requirements

6.4.1 Summary

- **Purpose:**
 - Building technologies support the management of the building and are integrated into the network in a secure and performant manner
 - Dedicated smart environmental sensors to monitor air quality and noise in identified spaces
 - Closed-circuit Television (CCTV) to enhance safety and security by monitoring activities, deterring misconduct, and providing visual evidence in case of incident
 - Integration of Building Management Systems (BMS), access control and intruder alarm systems into the network
- **Performance:**
 - Environmental sensors to detect carbon dioxide, total volatile organic compounds, particulate matter, humidity, vaping, and ambient noise
 - CCTV cameras must be capable of providing clear images that can identify individuals and car licence plates
 - Securely installed and tamper proof

6.4.2 Technical Manual references

- **Access control and intruder alarms:** See [5.10 Security and communication systems](#)
- **BMS and controls:** See [5.11 BMS, controls and performance monitoring](#)
- **Passive networking:** See [6.1 Passive networking](#)
- **Active networking:** See [6.2 Active networking](#)

6.4.3 Legislation, standards and best practice

- **Legal requirements:** To comply with UK data protection and child protection legislation
- **Minimum standards:**
 - [Government Buying Standards](#)
 - [DfE cyber security standards for schools and colleges](#)
 - ETSI EN 303 645 – Cyber Security for Consumer Internet of Things: Baseline Requirements
 - All relevant NCSC and British Standards
 - Police requirements for CCTV systems' guidance (2022) or its replacement

6.4.4 Minimum life expectancy

- **Environmental sensors:** 15 years
- **CCTV:** 10 years

6.4.5 Sustainability

- **Procurement:** Ethically sourced and supporting circular economy principles through re-use, re-manufacturing and recycling
- **Specification:** Devices shall be selected and integrated to minimise construction embodied carbon
- **Configuration:**
 - Maximise energy efficiency without compromising performance
 - Record energy use data that can be shared
 - Use time-defined shutdown profiles

6.4.6 Health and safety

- **Design and installation:** To ensure the health and safety of all users
- **Secure installation:** In accordance with manufacturer's recommendations including pattressing and fixings

6.4.7 Security

- **Design:** Resilient to cyber attack without negatively impacting on the network's performance by implementing, at a minimum:
 - Network Segregation
 - Zero Trust Architecture

- **Installation:** Secured to the wall, ceiling or doorset using manufacturer approved fixings appropriate for the substrate, weight of equipment and environment (tamper proof)
- **Configuration:** Secure to intrusion from unauthorised users including 2 factor authentication
- **Handover:** Security shall be evidenced and demonstrated to the Employer

6.4.8 Warranty requirements

- **Environmental sensors:** 5 years
- **CCTV:** 5 years

6.4.9 Interoperability

- **Standard:** Open standards shall apply wherever possible
- **Configuration:** Where a technology utilises a network protocol other than TCP/IP, it shall integrate with the network in a secure manner

6.4.10 Information sharing and access

- **Feature:** All technologies that store data shall support information sharing and access
- **Configuration:**
 - Permit sharing by allowing direct, secure access to data stores where possible

- Provide an Application Programming Interface (API) if direct access is not possible
- Provide the end user secure access to all their data

6.4.11 Network provision

- **Passive and active networking:**
 - Passive networking for Building Technologies shall be provided in addition to any data points specified in [6.1 Passive networking](#) and the Project Brief
 - Active networking shall be provided to support such additional data points in addition to those specified in [6.1 Passive networking](#) and the Project Brief
 - Copper or fibre connections shall be considered for remote locations such as barriers and secure line devices

Specific requirements

6.4.12 Environmental sensors

- **Extent:** In a minimum of 10% of all general teaching spaces, specialist teaching spaces, activity studios, libraries (LRC) and conference meeting rooms, with at least one in each type of space. This requirement is in addition to any sensors required for BMS, ventilation and heating controls, and building performance monitoring
- **Licence:** 5 years
- **Power supply:** Power over Ethernet (PoE) from the building infrastructure, receiving a constant power supply
- **Monitor:**
 - Temperature
 - Carbon dioxide
 - Volatile Organic Compounds (VOCs)
 - Particulate matter
 - Humidity
 - Vaping
 - Ambient and occupant noise
- **Data:**
 - Upload and retain data within a secure central database
 - Stored for hourly, daily, monthly and multi-year analysis
- **Data dashboards:** Provide graphical insights on near/real time and long-term trends
- **Alerts:**
 - Provide to site staff and remote monitoring/support parties for faults or maintenance requirements
 - Provide School/College Senior Leadership Team/teaching staff with email or push notification alerts when sensor thresholds are exceeded
- **Training package:** Onsite, manufacturer approved, system administrator training package

6.4.13 BMS digital components

- **Data:** To accept inputs from a range of endpoints including, but not limited to:
 - Temperature
 - Air quality
 - Mechanical positioning (e.g., of windows and doors)
 - Power meters/monitors
 - Lighting
 - CCTV
 - Access control

- Renewables
- Batteries
- Environmental sensors
- **Exchange of data:**
 - With other proprietary management software such as planned maintenance packages, databases and spreadsheets
 - Provide the facility to extract data including, but not limited to, JSON and CSV
 - Provide a 2-way Application Programming Interface (API) for users
 - Provide actionable feedback to actuators and controls to support environmental management
- **Logic commands:** Accommodate 'if this then that' based on near real-time data, to action mechanical or electrical changes
- **Data dashboards:** Provide graphical insights on near/real time usage trends
- **Alerts:** Email or push notification alerts to site staff and remote monitoring/support parties for faults and maintenance requirements
- **Reporting:**
 - Inform staff of potential configuration improvements that could reduce energy use and/or carbon emissions
 - Analysis to provide long term usage and impact of applied changes
- **Automation:** The ability to semi/automatically reconfigure elements of BMS programming, based on proactive trend analysis/machine learning reporting
- **Maintenance:**
 - Pre-handover, post-handover and seasonal checks for calibration and performance, including manufacturer and configuration defects
 - Configurable by trained School/College support team
 - Full maintenance reports following checks with completed and outstanding actions
- **Configuration:**
 - Create user profiles and groups aligned to full admin control, delegated admin control, and read only access
 - Allow each user's access to be restricted to specific parts of the building and/or specific systems only
 - Ability to display and export monitored data, initiate data logging, change user-adjustable set-points and time schedules, or change control strategies, schematic/graphic functions or password assignment
- **Data backup:**
 - Backup and archive data automatically and manually
 - Integrated with the existing backup solution as specified in the Project Brief

- **Audit:**
 - Ensure that the system creates a log of the date and time of each occasion when each user logs onto and logs off from the system
 - Ensure that all changes made by the operator are logged and identified by operator/time stamp
- **Security:**
 - Provide each user with a unique username and password
 - Ensure the passwords permit at least eight alphanumeric characters
 - Ensure no default or generic passwords are left configured at handover
 - Ensure that the BMS software is protected from unauthorised entry
 - Ensure that password protected operator access is set up for both BMS operator workstations and field controllers which have an operator interface
 - Ensure that the BMS complies with ISO/IEC 27001, ISO/IEC 27002 and ISO/IEC 27005

6.4.14 Closed-circuit Television (CCTV)

- **Extent:** Cameras at the reception entrance, the main entrance through the secure line and where specified in the Project Brief
- **Video Management System:** Enterprise level meeting 'Police requirements for CCTV systems' guidance

(2022) or its replacement, Police and Home Office evidential imagery and forensic video recovery standards, and NSI code of practice for design, installation and maintenance of CCTV surveillance systems

- **Management:** All features of the solution shall be available on the network via software or a web interface
- **Power supply:** Power over Ethernet (PoE) from the building infrastructure, receiving a constant power supply
- **Backup power:** An uninterruptable power supply (UPS) shall continue to power the CCTV solution for 30 minutes during a power outage
- **Security:**
 - CCTV solution will reside behind a firewall, virtually segregated from the educational network, protected from external interference
 - No generic/default usernames to be used/enabled
 - All CCTV users will have unique credentials with 2 factor authentication
 - Shall support secure local and remote access
 - All unused protocols and network ports shall be disabled
 - Encryption of data in transit and at rest

- **Integration:** Reside on the main IP network infrastructure aligned with active networking and passive networking requirements
- **Digital/Network Video Recorders (NVRs):**
 - Sized to support the required number of cameras as per the contractor commissioned CCTV Security Design recommendations, plus any decanted legacy CCTV equipment in the Project Brief
 - Minimum of 31 days storage of video at 24fps
 - Video older than 31 days can be stored at 15fps
 - Physical NVRs will backup video daily to a second secure location, local or cloud, configured to not affect the performance of curriculum delivery
 - Capable of exporting video to an external secure storage device for viewing without the need for proprietary software
 - Support camera offline alerting
 - Support motion alerting
 - Where provided, physical NVRs shall be rack mounted in the communications room
 - Log all access, data exports and changes to the solution
 - Allows reset to configuration set at Practical Completion, and logging of changes up to Rectification Period
- Will support Application Programming Interface (API) integration with access control or other applicable solutions
- **Cameras:**
 - Internal: Minimum of 4 megapixels (4MP) and 24 frames per second (24fps) video
 - External: IP66 rated with infra-red night capability, minimum of 8 megapixels (8MP) and 24 frames per second (24fps) video
- **Statutory information panels/signs:** Supplied and fitted adjacent to external School/College entrances and at the entrance to the main entrance/secure line
- **Support and maintenance:** 1-year onsite support including 2 site visits for maintenance
- **Licensing and storage:** 5 years
- **Training package:** Onsite, manufacturer approved, system administrator training package
- **System integration:** To be integrated with existing School/College CCTV systems specified in the Project Brief
- **AI capability:** Provide enhanced video analytics and security through AI driven intelligence

6.4.15 Access control digital components

To be reviewed with [5.10.7 Access control](#)

- **Licence:** 5 years
- **Integration:** Where IP based, align to the requirements outlined in [6.1 Passive networking](#) and [6.2 Active networking](#)
- **Data point quantity:**
 - Not included within feasibility data port count. Where IP based and required as specified in the Project Brief, additional outlets to be provided for each access control location
- **Data Integration:** Enable Application Programming Interface (API) features for integration with other solutions e.g., CCTV time stamps and intruder alarms
- **Security:**
 - Where IP based shall be virtually segregated from the curriculum network using the main IP network infrastructure
 - Encryption of data in transit and at rest
- **Audit:** Log all user/fob access activity for audit/reporting purposes
- **Power:**
 - Use a mix of hardwired and environmental harvesting solutions as appropriate

- Fail secure in the event of power outage, whilst allowing authorised egress
- **Management:**
 - Provide secure local and/or remote management access
 - Requirement of 2 factor authentication for all admin/management users with unique accounts/credentials
 - Ability to promptly revoke user/fob access
 - Ability to update software/firmware without significant downtime
 - Support policy-based controls based on time of day, type of user, incident response, or temporary access
- **Alerts:** Support email or push notifications including, but not limited to, out of hours access/attempts and unauthorised access attempts
- **Support and maintenance:** 1-year onsite support including 2 site visits for maintenance

6.4.16 Intruder alarm digital components

- **Reporting:** To provide alerts and reporting
- **Integration:** With access control systems

6.5

Telephony

This sub-section outlines the performance and functional requirements for telephone systems

General requirements

6.5.1 Summary

- **Purpose:** A Voice over Internet Protocol (VoIP) telephone system for the transmission of internal and external voice calls, facilitated by phones on all office desks and in staff rooms and meeting rooms, and a dedicated switch board phone for the main reception
- **Performance:** All calls must be clearly audible

6.5.2 Technical Manual references

- **BMS and controls:** See [5.11 BMS, controls and performance monitoring](#)
- **Broadband:** See [5.12 Internet connectivity](#)
- **Passive networking:** See [6.1 Passive networking](#)
- **Active networking:** See [6.2 Active networking](#)
- **Building technologies:** See [6.4 Building technologies](#)

6.5.3 Legislation, standards and best practice

- **Legal requirements:** To comply with UK data protection and child protection legislation
- **Minimum standards:**
 - [DfE cyber security standards for schools and colleges](#)
 - All relevant British Standards

6.5.4 Minimum life expectancy

- **Telephone system:** 10 years

6.5.5 Sustainability

- **Procurement:** Ethically sourced and supporting circular economy principles through re-use, re-manufacturing and recycling
- **Specification:** Devices shall be selected and integrated to minimise construction embodied carbon
- **Configuration:**
 - Maximise energy efficiency without compromising performance
 - Record energy use data that can be shared
 - Use time-defined shutdown profiles

6.5.6 Health and safety

- **Design and installation:** To ensure the health and safety of all users
- **Secure installation:** In accordance with manufacturer's recommendations including patting and fixings

6.5.7 Security

- **Design:** Resilient to cyber attack without negatively impacting on the network's performance

- **Configuration:** Secure from intrusion by unauthorised users including 2 factor authentication
- **Handover:** Security shall be evidenced and demonstrated to the Employer

6.5.8 Training

- **Location:** On site
- **When:** Prior to handover
- **Audience:** Tailored for users
- **Type:** Manufacturer approved

6.5.9 Licence and warranty requirements

- **Warranty period:** A minimum of 5 years
- **Licence period:** A minimum of 5 years

6.5.10 Interoperability

- **Standard:** Open standards shall apply wherever possible
- **Configuration:** Where a technology utilises a network protocol other than TCP/IP, it shall integrate with the network in a secure manner

6.5.11 Information sharing and access

- **Feature:** All technologies that store data shall support information sharing and access
- **Configuration:** Shall:

- Permit sharing by allowing direct, secure access to data stores where possible
- Provide an Application Programming Interface (API) if direct access is not possible
- Provide the end user access to all their data

Specific requirements

6.5.12 Telephone system

- **Session Initiation Protocol (SIP) lines:** SIP lines across the broadband connection
- **Call management:** Internal and external calls including hold, transfer, divert, forward, paging, and call back when free
- **Call information:** Caller ID and call waiting at a minimum
- **Hunt groups:** Including group pick up and rules-based call queues
- **Call recording:**
 - Allow a user of the system to record an incoming or outgoing call before, beginning or during the call, and that all parties are aware that recording is happening
 - Recorded calls retained for 30 days
 - Recorded calls can be downloaded
- **Voicemail:**
 - Playing a pre-recorded message if the number dialled is not answered, allowing the caller to record a voicemail message, and automatically sending an email notification to the extension's user containing the voicemail as an attached sound file
 - Voicemail services to be located in the Cloud so that outages do not cause the School/College to miss important messages
- **Accessibility features:**
 - Text-to-speech for calls and voicemails
 - Visual alerts for incoming calls
- **Hot desking:** Allowing users to log into a shared phone so that they can make and receive calls and check their messages
- **Mobile twinning:** Allowing users to link an external number to their desk extension so that incoming calls ring on both devices at the same time
- **Out of hours:**
 - A service which plays pre-recorded messages to inform callers of details such as opening hours, website address, when the School/College is closed, or information about ongoing incidents
 - Pre-recorded messages to be edited remotely
 - Date and time-based scheduling
- **Automated attendant:**
 - Provided through voice and/or key menu options
 - Allows callers to choose to be transferred to an operator, named extension or extension number

- Date and time-based scheduling
- **Conference calls:**
 - For up to 6 participants
 - Multiple simultaneous calls
- **Monitoring and manipulation:** Call queues with caller priority
- **Call parking:** Calls can be held on one extension and then retrieved on another
- **Blocking:** Ability to block outgoing calls with certain characteristics such as premium rate or international
- **Call monitoring:** Allowing a supervisor to listen to a call as it is happening with the option to intervene
- **Public address (PA):** Supports PA or Tannoy functionality, or interfacing to a separate PA or Tannoy system
- **Management:** To facilitate the configuration of the system and reporting of its usage, remotely and from the school LAN, to allow changes to be made from an authorised user connecting via the internet
- **Diversion:** Of incoming calls to external numbers in the event of an emergency including, but not limited, to a power failure
- **Scalable:** To accommodate future developments and flexibility of deployment
- **Soft phone support:** Users to make and receive calls without using a physical handset

- **Licences:** For all teaching and support staff
- **Mobile app:** Staff to use a work mobile device as if they were originating from a school owned number
- **Support:** Hardware support, including firmware and software upgrades (telephone, email, and web), providing 1 year of cover at a minimum
- **Integration:** Compatible with School/College unified communications platform and Management Information System (MIS) as specified in the Project Brief

6.5.13 Physical handsets

- **Extent:**
 - All office desks, coordinated with furniture layouts
 - All meeting rooms
 - All staff rooms
- **Connection:** To utilise the structured cabling and IP network
- **Power supply:** Power over Ethernet (PoE) from the building infrastructure, receiving a constant power supply
- **Features:** Capable of utilising all telephony system functions

6.5.14 Switchboard

- **Extent:** At the main reception desk
- **Connection:** To utilise the structured cabling and IP network

6.5 Telephony

- **Power:** Supports Power over Ethernet (PoE) power and allows data passthrough
- **Features:** Capable of utilising all telephony system functions
- **Buttons:** Button box featuring 20 programmable buttons to streamline common switchboard functions
- **Headsets:** Hands-free operation for reception staff

6.5.15 Soft phones

- **Extent:** Licensed for and capable of being installed on all teacher devices
- **Features:** Capable of utilising all telephony system functions

7

Work to existing buildings

Not used

8

External works

8.1

Surfaces for play, sport, paths and roads

This sub-section outlines the performance and functional requirements for surfaces for play, sport, paths and roads, including asphalt, resin bound gravel, reinforced grass systems, safety play surfaces, natural and artificial pitches, kerbs and edging

General requirements

8.1.1 Summary

- **Purpose:** Surfaces for play, sport, paths and roads, when well designed and maintained, provide:
 - Safe and inclusive places appropriate for learning, socialising and physical activity
 - Access to, and connection with, nature and natural systems
 - Low-maintenance and easily replaceable solutions that are long lasting and adaptive to climate change
 - A sense of place, complementing the local context, character and geo-ecology
- **Performance:**
 - Movement and wayfinding: The siting of circulation routes shall be considered at the outset of the design as part of an inclusive movement and wayfinding strategy for the Site for both day-to-day and out of hours/community use. Pedestrian routes at the start of the day, lunch and break times, and at the end of the day shall be prioritised
 - Access: Surfaces adjacent to areas requiring maintenance access (e.g., to building facades) shall have gradients, surface finishes and sub-bases designed for the manoeuvring and loading of a MEWP and/or scaffolding
 - Context: Palette of materials/surfaces shall be simple and respond to the local context
 - Arrangement: Placement and choice of surfaces shall visually connect indoor space to the outdoor environment and promote play and physical activity, and tactile and visual stimulation with patterns, textures and shapes
 - Accessibility: All routes to be fully inclusive and be designed to minimise the need for ramps and stairs
 - Overheating and site microclimate: Ensure the heating impact of external surfaces (e.g., black asphalt and paving) is minimised. Dark coloured materials and synthetic surfaces shall not be situated within 10m of the building
 - Safety: See [8.1.6 Health and safety](#)
 - Sustainable drainage: Paved surfaces to be an integral part of a coordinated site-wide SuDS strategy prioritising nature-based SuDS solutions
 - Weed prevention: Weed membranes shall be installed to manufacturer's recommendations under hard surfaces to prevent weed growth
 - Ecological conservation/enhancement: To be based on site specific survey findings, protection plans and methods

8.1 Surfaces for play, sport, paths and roads

- Materials: Durable and resilient and able to withstand the elements (e.g., corrosion resistant and UV stable) and the expected impact/wear from daily use within an education environment
- Sustainable: Ethically sourced (e.g., FSC or PESCO) and supporting circular economy principles through re-use, re-manufacturing and recycling

8.1.2 Technical Manual references

- **Foundations and retaining structures:** See [1.1 Foundations and substructure](#)
- **Building thresholds:** See [1.2 Lowest floor construction](#), [2.5 External walls](#) and [2.6 External windows and doors](#)
- **Surface water drainage systems:** See [5.2 Drainage](#) and [8.7 External drainage \(nature-based SuDS\)](#)
- **Category 5 water supplies and outdoor taps:** See [5.3 Water installations](#) and [8.6 External furniture](#)
- **Exterior lighting:** See [5.8 Daylighting and electrical lighting](#)
- **Subsoil and topsoil:** See [8.2 Topsoil, subsoil and ameliorants](#)
- **Trees and plants:** See [8.3 Soft landscape](#)
- **Boundary treatments, walls and fencing:** See [8.4 Boundary treatments, walls and fencing](#)
- **Play equipment:** See [8.5 Play equipment and nature habitats](#)

- **External furniture:** See [8.6 External furniture](#)

8.1.3 Legislation, standards and best practice

- **Statutory guidance:**
 - All areas of the outdoor environment to comply with [AD C](#), [AD K](#) and [AD M](#)
 - [The Statutory Biodiversity Metric: User Guide](#)
- **Standards:**
 - General landscape: To BS 4428, BS 6187 and BS 8300-1
 - Drainage: To BS EN 752 and BS EN 124
 - Slip resistance: To BS EN 16165, BS 7976 and BS 7932
- **Best practice:**
 - [Urban Greening Factor for England User Guide \(Natural England\)](#)
 - [Environmental Benefits from Nature User Guide \(Natural England\)](#)
 - [Artificial Sports Surfaces for Outdoor Sport Guidance Note \(Sport England\)](#)
 - [Natural Turf Sports Surfaces Design Guidance Note \(Sport England\)](#)
 - [Carpet-Hybrid Pitches for Community Sport guidance \(SAPCA\)](#)
 - [Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure](#)

8.1 Surfaces for play, sport, paths and roads

- [Cycle Infrastructure Design \(Department for Transport\)](#)
- [Accessible and inclusive sports facilities \(Sport England\)](#)

8.1.4 Minimum life expectancy

- **Roads and paving:** 40 years in general
- **Hard surfaced play areas:** 20 years
- **Interlocking rubber mats:** 10 years
- **Rubber crumb:** 10 years
- **Hybrid pitches:** 10 years
- **Synthetic pitches:** 10 years

8.1.5 Prohibited materials

- **Synthetic grass:** Except artificial grass sports pitches
- **Glazed panels:** To external guarding, balustrades and barriers
- **Rubber crumb:** To play surfaces, except artificial grass pitches

8.1.6 Health and safety

- **Requirements:**
 - Keep vehicular and pedestrian/cycle routes separate
 - Follow a managed or proportionate approach to risk assessment in the design of surfaces in relation to avoiding slips, trips, falls and collisions

- Materials and elements shall not have small openings that could trap fingers or sharp edges
- All raised kerbs and edges to have a round or rolled top
- Guarding, balustrades, barriers and handrails shall be provided to protect users from falls including from height
- Use of loose stones and gravel shall follow a managed or proportionate approach to risk assessment, ensuring child safety by minimising risks like tripping, slipping or misuse in accessible areas

8.1.7 Drainage of surfaces

- **Permeable:** Lay with a permeable sub-base to civil engineer's recommendations
- **Impermeable or semi-impermeable:** Generally, laid to falls toward soft landscape

8.1.8 Root protection areas for existing trees

- **Standard:** To BS 5837
- **Location:** As identified in the Arboricultural Survey Information, Arboricultural Method Statement, Arboricultural Impact Assessment and Tree Removal, Protection and Retention Plan
- **Protection material:** As per arboriculturist's recommendations

8.1.9 Circulation paths

- **Standards:**
 - Accessible design standards: To BS 8300-1
 - Slip resistance: To BS EN 16165
- **Inclusive access:**
 - All pupils/students shall have easy and quick access to play and sports areas via similar routes
 - Spectators and participants shall have access to all sports locations
- **Path widths:**
 - Entrance path: 3.6m
 - Main circulation path and '[Daily Mile](#)': 2.4m ('Daily Mile' is an accessible path contributing to the daily mile circuit. It is not a full mile as the mile will be achieved in laps)
 - Auxiliary circulation path: 1.8m
- **Safety:** 500mm minimum wide and level strip of soft landscaping shall be provided to the side of paths before any adjacent slope

Specific requirements

Roads, paving and hard surfaced areas

8.1.10 Asphalt

- **Extent:** In general, to roads and paths (see below), vocational training areas, Entrance Landscape, Courtyard Garden and Learning Landscape
- **Standards:** To BS 594987, BS EN 13108-1 and BS EN 13043
- **Material:** Reclaimed content to BS EN 13108-1
- **Colour options:**
 - Light-coloured asphalt: As agreed with the Employer and School/College to reduce thermal mass in the pupil realm (i.e., within 10m from buildings)
 - Black asphalt: Use for pupil realm, vehicular access routes, drop off areas and car parking (disabled and visitor parking bays only), mobility and/or cycle routes. Not within 10m from buildings
- **Depth:** To meet loading requirements
- **Surface water:** Site-wide drainage strategy prioritising nature-based SuDs and permeable asphalt over impermeable, unless otherwise agreed with the Employer
- **Thermoplastic line markings:**
 - To BS EN 1871 and BS EN 1436

- To clearly define pedestrian/cycle paths, car parking bays and communal games areas
- Communal games markings to be agreed with the Employer and may include: Four square, hopscotch, snakes and ladders, alphabet/numbers, target games and scooter/cycle/tricycle tracks

8.1.11 Reinforced gravel grid system

- **Extent:** All car parking spaces in non-net areas (e.g. staff car parking bays, not disabled and visitor parking bays)
- **Standard:** To BS 7533 series
- **Material:** Rigid HDPE grid with interlocking cells infilled with gravel
- **Depth:** To meet use and loading requirements
- **Surface water:** Permeable
- **Contrasting demarcation inserts:** To be used to mark parking bays

8.1.12 Reinforced grass grid system

- **Extent:** Parkland and Playing Fields for intermittent overflow car parking

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- **Standard:** To BS 7533 series
- **Material:**
 - Recycled plastic grid cells or mesh
 - Infill of pre-grown amenity grass or topsoil and amenity grass seed mix
- **Depth:** To meet use and loading requirements
- **Surface water:** Permeable
- **Topsoil preparation:** To be prepared with multi-purpose topsoil as [8.2 Topsoil, subsoil and ameliorants](#) and firmed to manufacturer's recommendations

8.1.13 Self-binding gravel

- **Extent:** Pupil realm surfaces (pedestrian), Playscape, and Parkland and Playing Fields, 'Daily Mile' and nature trails. All areas shall be located 10m (minimum) away from building entrances
- **Surface water:** Permeable/semi-permeable

8.1.14 Resin bound gravel

- **Extent:** Courtyard Garden, Entrance Landscape
- **Standard:** Sub-base to BS 8204-6
- **Material:** UV resistant resin bound gravel in a light colour as agreed with the Employer and School/College to reduce thermal mass in the pupil realm (i.e., within 10m from buildings)
- **Depth:** To meet loading requirements
- **Surface water:** Permeable

- **Safety:** Slip resistant

8.1.15 Modular paving units

- **Extent:** Courtyard Garden and Entrance Landscape
- **Standard:** To BS EN 1338, BS EN 1342 and BS 7533 series
- **Material options:** Pavers, interlocking block pavers, setts, reconstituted stone, slabs, flags and reclaimed material
- **Depth:** To meet loading requirements
- **Colour:** Light-coloured paving units as agreed with the Employer and School/College to reduce thermal mass in the pupil realm
- **Surface water management hierarchy:**
 - Permeable paving units
 - Impermeable drainage channels to move surface water
 - Impermeable paving units laid to fall to adjacent nature-based SuDS
- **Safety:**
 - Slip resistant
 - Chamfered edges

Steps, ramps, balustrades, guarding and handrails

8.1.16 Steps

- **Standard:** Design to BS 8300-1
- **Treads:**
 - To be consistent throughout a flight
 - 300mm depth (minimum)
- **Risers:**
 - To be consistent throughout a flight
 - 160mm height (maximum)
 - 3no. risers per flight (minimum)
- **Gradient:** Cross fall 1 in 50 (maximum)
- **Landings:**
 - Minimum length: Equivalent to clear width of the steps, 1.2m minimum
 - Level landing: To be provided at the top and bottom of flights, 1.5m minimum in length, width to match steps
- **Handrails:**
 - To both sides of a step flight at a height of 900mm above the nosing line
 - If specified in the Project Brief, an additional lower handrail to both sides of a flight at a height of 600mm above the nosing/gradient line shall be provided in a Primary School or Special School

- Width between handrails: 1m (minimum)
- Clearance from wall (if applicable): 50-75mm
- Warm touch handrail as per BS 8300-1 and AD M
- **Safety:**
 - Tactile/blister surfaces shall be provided at top and bottom of each flight
 - Contrasting nosings shall be provided to full width of stair on both tread and riser
 - Single steps shall be avoided

8.1.17 Ramps

- **Standard:** Design to BS 8300-1
- **Layout:** Maximum of 3no. consecutive ramp sections
- **Gradient:**
 - The shallowest practicable gradient compliant with The Building Regulations
 - Gradients greater than 1 in 12 that are not ramps or part of play slopes to be in non-net site areas only
 - Clear width: 1.5m (minimum)
- **Landings:**
 - Minimum length: Equivalent to clear width of the ramp, 1.5m minimum

8.1 Surfaces for play, sport, paths and roads

- Level landing: To be provided at the top and bottom of ramps, 1.5m minimum length, width to match ramp
- **Handrails:**
 - To both sides of a ramp at a height of 900mm above the gradient line
 - If specified in the Project Brief, an additional lower handrail to both sides of a ramp at a height of 600mm above the gradient line shall be provided in a Primary School or Special School
 - Width between handrails: 1.5m (minimum)
 - Clearance from wall (if applicable): 50-75mm
 - Warm touch handrail as per BS 8300-1 and AD M
- **Safety:**
 - Tactile/blister surfaces shall be provided at top and bottom of each ramp

8.1.18 External guarding, balustrades and barriers

- **Standards:** Design to AD K, BS 8300-1 and BS 6180
- **Balustrades:** To both sides of path, step flight or ramp where change of level is greater than 600mm
- **Heights of guarding:** 1100mm, or higher subject to a risk assessment, the outcome of which shall be specified in the Project Brief
- **Protection from vehicles:** Street furniture and landscape detailing shall be provided to prevent

accidental or deliberate vehicular contact with buildings and structures to BS 6180 in vehicular areas

- **Prohibited:** Glazed panels

Edgings and kerbs

8.1.19 Edgings

- **Timber:**
 - Extent: Paths in Parkland and Playing Fields to sand pit
 - Standard: To BS 8417
 - Finish: FSC treated timber, Use Class 4, play grade
 - Types: Flush to paths, stepped edges to mud kitchen or sand pit (150-180mm in height)
- **Paving used as edging:**
 - Extent: Entrance Landscape and Courtyard Garden
 - Finish: To match adjacent materials/finishes
 - Edge: Chamfered
 - Safety: Slip resistant
- **Steel:**
 - Extent: Entrance Landscape and Courtyard Garden
 - Standard: To BS EN 10346
 - Finish options:
 - Hot dip galvanised to BS EN ISO 1461
 - Powder coated to BS EN 13438. Colour to be agreed with the Employer and School/College
 - Corten steel to BS EN 10025
 - Types: Stepped edges to planting beds in Entrance Landscape and Courtyard Garden or mud kitchen and/or sand pit (150-180mm in height). Perforated

sections shall be provided where retaining soft landscape

8.1.20 Concrete kerbs

- **Extent:**
 - Kerbs for SuDS and raingardens and roads/paths
 - Pin kerb in flush locations
- **Standards:** To BS EN 1340, BS EN 1343 and BS 7533 series
- **Types:**
 - Kerbs shall be between 150-180mm in height. Include gaps between kerbs and adjacent paving for surface water flow
 - Pin kerbs to be flat edged
 - Dropped/flush kerbs where required to meet BS 8300

Play surfaces

8.1.21 Rubber safety matting

- **Extent:** Courtyard Garden, Playscape, and Learning Landscape where there is play equipment, high foot trafficked areas and/or to meet critical fall height requirements
- **Standard:** Impact performance to BS 7188 and BS EN 1177
- **Material:** Slip resistant, interlocking, recycled safety rubber mats with holes for amenity grass growth
- **Colour:** Green, or as agreed with the Employer and School/College
- **Depth:** To meet critical fall height as per BS EN 1177 and [The Association Of Play Industries \(API\) Code of Practice for Provision of Impact Attenuating Surfaces](#)
- **Surface water:** Permeable
- **Amenity grass preparation:** See [8.2 Topsoil, subsoil, ameliorants](#) and prepared as per manufacturer's recommendations

8.1.22 Loose play surfaces

- **Soil for mud kitchens:**
 - Extent: Courtyard Garden, Playscape, and Learning Landscape
 - Standard: To BS 3882
 - Material: Loamy soil (balance of clay, sand and silt)

- Edging: Where containment is required, provide as [8.1.19 Edgings](#)
- Depth: To facilitate play
- Safety: Path adjacent to kitchen elements to be permeable and fully washable. Soil to be free from chemicals, bacteria, foreign and sharp objects, chemical or pieces of wood
- Category 5 water supplies as [5.3 Water installations](#) and outdoor tap with lockable tap cover as [8.6 External furniture](#) to all mud kitchens
- **Play sand for sand pits:**
 - Extent: Courtyard Garden, Playscape, and Learning Landscape
 - Material: Washed, clean sand with 0.15mm-1.25mm sub-rounded to rounded particles
 - Edging: Where containment is required, provide as [8.1.19 Edgings](#)
 - Depth: To facilitate play
 - Safety: Sand shall be non-toxic, non-staining and free from contaminants, including dusty clay and organic matter and safe to handle
 - Surface water: Permeable
 - Cover: A cover shall be provided for daily use

8.1.23 Decking and bridges

- **Extent:** Courtyard Garden, Playscape, and Learning Landscape
- **Standards:** BS 5756, BS EN 1176 and BS EN 16165 (for slip resistance)
- **Types:**
 - Decking for performance area
 - Decking over pond
 - Timber stepping pads
 - Bridge over swale/rain garden
- **Material options:**
 - As agreed with the Employer and School/College
 - FSC treated timber to BS EN 338
 - Composite decking to BS EN 15534 series
- **Safety:**
 - Slip resistant
 - Decking to ponds and/or bridges shall include a raised edge
- **Surface water:** Permeable to avoid heavy ponding
- **Prohibited:** Timber shall not come into direct contact with the ground to prevent rotting

Surfaces for sport

8.1.24 Natural pitches

- **Extent:** Parkland and Playing Fields
- **Standards:** Refer to following Sport England Design Guidance Notes (DGN):
 - [Natural Turf Sports Surfaces](#)
 - [Comparative Sizes of Sports Pitches & Courts \(OUTDOOR\)](#)
 - [Life Cycle Costings of Natural Turf Pitches](#)
- **Dimensions:** Refer to Table 25
- **Surface options:**
 - Sports grass – see [8.3.11 Grass for natural pitches](#)
 - Carpet hybrid comprising artificial grass carpet with root penetrable backing, allowing for natural grass growth
- **Pitch construction:**
 - Pitch construction to be agreed with the Employer
 - Refer to Part B ‘Playing Fields’ of DGN for [Natural Turf Sports Surfaces](#) in relation to the choice of construction and details of following pitch types
 - Pitch type 6 – pipe drained with topsoil and drainage layer (for grass)
 - Pitch type 8 – pipe drained with carpet-hybrid system
- **Surface water:** To adjacent swale and/or attenuation pond where required. To meet Local Authority/Lead

Local Flood Authority/Environment Agency requirements. Also see [8.7 External drainage \(nature-based SuDS\)](#)

- **Pitch margins and runoffs:** Margins and runoffs to only overlap with the same type of pitch
- **Heavy use areas:**
 - Overlap between goal mouths, cricket squares and/or athletics track to be avoided
 - Allow space for relining pitches on a seasonal basis and for regrowth of areas of heavy use (e.g., goal mouths and centre circles)
- **Pitch rotation:** Allow seasonal pitch movement/repairs
- **Gradient:** To BS 7370 series and to comply with Natural Turf Sports Surfaces
- **Layout:**
 - Line markings: Provide markings, margins and runoffs for the sports specified in the Project Brief to comply with DGN for Comparative Sizes of Sports Pitches & Courts (OUTDOOR)
 - Orientation: In accordance with DGN for Natural Turf Sports Surfaces for where feasible and without compromise to site organisation

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- Athletics: Allow for marking out/overlay on pitches of athletics grassed track. Length shall be 100m, 200m or 400m (space dependent)
- **Overlaying seasonal sport provision:** In accordance with DGN for Natural Turf Sports Surfaces
- **Primary School provision (minimum):**
 - Football: U9/10 size pitch on natural grass
 - Athletics: 100m, 200m or 400m running track
- **Secondary School provision (minimum):**
 - Rugby on hybrid pitch or natural grass
 - Football on hybrid pitch or natural grass
 - Athletics: 200m or 400m running track
 - Cricket field and pitch
 - Rounders

Note: Football and rugby pitch quantities and size(s) shall be agreed with the Employer
- **Special School/AP provision (minimum):**
 - Football: U9/10 size pitch on natural grass

8.1 Surfaces for play, sport, paths and roads

Sport	Pitch dimensions
Football - U7/U8 (mini soccer 5-a-side)	37m x 27m (with runoff: 43m x 33m)
Football - U9/U10 (mini soccer 7-a-side)	55m x 37m (with runoff: 61m x 43m)
Football - U11/U12 (youth 9-a-side)	73m x 46m (with runoff: 79m x 52m)
Football - U13/U14 (youth 11-a-side)	82m x 50m (with runoff: 88m x 56m)
Football - U15/U16 (youth 11-a-side)	91m x 55m (with runoff: 97m x 61m)
Football - U17/U18 (youth 11-a-side), and senior (over 18)	100m x 64m (with runoff: 106m x 70m)
Rugby Union - U7	20m x 12m (with runoff and in-goal areas: 36m x 18m)
Rugby Union - U8	45m x 25m (with runoff and in-goal areas: 61m x 31m)
Rugby Union - U9	60m x 35m (with runoff and in-goal areas: 76m x 41m)
Rugby Union - U10	60m x 35m (with runoff and in-goal areas: 80m x 45m)
Rugby Union - U11/U12	60m x 43m (with runoff and in-goal areas: 80m x 53m)
Rugby Union - U13 to adult	100m x 70m (with runoff and in-goal areas: 130m x 80m)
Rugby League - U7/U8/U9	50m x 30m (with runoff and in-goal areas: 54m x 34m)
Rugby League - U10/U11 (11-a-side)	80m x 50m (with runoff and in-goal areas: 84m x 54m)
Rugby League - U12 to adult (11-a-side)	92m x 55m (with runoff and in-goal areas: 104m x 59m)
Rugby League - U12 to adult	100m x 68m (with runoff and in-goal areas: 116m x 74m)
Hockey	91.4m x 55m (with runoff: 97.4m x 61m)
Cricket	See Sport England's DGN for Comparative Sizes of Sports Pitches & Courts (OUTDOOR)
Rounders	20m x 12m pitch area (U11 outfield: 60m x 40m) (over 11 outfield: 100m x 60m)

Table 25: Pitch sizes

8.1.25 Junior cricket pitch and nets

- **Extent:** Parkland and Playing Fields, and only when expressly agreed with the Employer
- **Standards:** Refer to following England and Wales Cricket Board (ECB) Guidance:
 - [Developing Your School Site](#)
 - [Performance Standards for Non-Turf Cricket Pitches Intended for Outdoor Use](#)
- **Surface options:**
 - Primary Schools: Junior (under 12)
 - Secondary Schools: Club/recreational
- **Requirements:**
 - Match pitch
 - Practice pitch for bowling practice including cricket practice cage and overhead netting
 - Cricket pitches shall not be overlaid onto sports pitches
- **Surface water runoff:**
 - To meet Local Authority/Lead Local Flood Authority/Environment Agency requirements
 - In accordance with ECB Performance Standards for Non-Turf Cricket Pitches Intended for Outdoor Use

8.1.26 Artificial grass pitches

- **Extent:** Parkland and Playing Fields

- **Standards:** Refer to following Sport England Design Guidance Notes (DGN):
 - [Artificial Surfaces for Outdoor Sport](#)
 - [Selecting the Right Artificial Surface for Hockey, Football, Rugby League and Rugby Union](#)
 - [Comparative Sizes of Sports Pitches & Courts \(OUTDOOR\)](#)
 - [Recycling of Artificial Grass Carpets](#)
 - [Artificial Grass Pitch \(AGP\) - Acoustics](#)
 - [Artificial Sports Lighting](#)
- **Dimensions:** Refer to Table 26 overleaf
- **Surface water runoff:**
 - To meet Local Authority/Lead Local Flood Authority/Environment Agency requirements
 - In accordance with DGN Artificial Surfaces for Outdoor Sport
- **Acoustics:** Refer to DGN Artificial Grass Pitch (AGP) - Acoustics
- **Lighting:** Refer to DGN Artificial Sports Lighting and [5.8 Daylighting and electrical lighting](#) where there is a community use requirement identified in the Project Brief
- **Removal of material:** A containment and recycling strategy for rubber crumb shall be developed

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- **Small multi-purpose pitch requirements:**
 - Surface: Multi-purpose synthetic turf (sand-filled, sand dressed, or needle punched) with shock pad
 - Line markings: For football and hockey
- **Medium multi-purpose pitch requirements:**
 - Surface: Short pile with rubber crumb 3G all-weather artificial pitch with shock pads
 - Line markings: For football and hockey
- **Large multi-purpose pitch requirements:**
 - Surface: Long pile with rubber crumb 3G all-weather artificial pitch with shock pads
 - Line markings: For football and rugby

Pitch size	Pitch dimensions
Small	61m x 97m (including runoff)
Medium	70m x 106m (including runoff)
Large	80m x 120m (including runoff)

Table 26: Artificial grass pitch sizes

8.1.27 Multi use games areas (MUGAs)

- **Extent:** Playscape
- **Standards:** Refer to following Sport England Design Guidance Notes (DGN) and SAPCA Code of Practice:
 - [Artificial Surfaces for Outdoor Sport](#)
 - [Comparative Sizes of Sports Pitches & Courts \(OUTDOOR\)](#)
 - [Artificial Sports Lighting](#)
 - [SAPCA Code of Practice for the Construction of Outdoor Multi Use Games Areas](#)
- **Surface material:** To be agreed with the Employer and be based on priority sport(s) to be played. Refer to Table 1 in Sport England DGN for Artificial Surfaces for Outdoor Sport
- **Edging:** To be agreed with the Employer and School/College, options are:
 - Flush concrete
 - Steel
- **Containment strip around polymeric surfaced MUGA:** Kickboard, toe board or suitable containment to perimeter of playing surface
- **Surface water runoff:**
 - To meet Local Authority/Lead Local Flood Authority/Environment Agency requirements
 - In accordance with DGN Artificial Surfaces for Outdoor Sport

8.1 Surfaces for play, sport, paths and roads

- **Fencing:** For MUGA (including height) to be assessed on a project specific basis. If required, see [8.4.25 MUGA and artificial grass pitch fencing](#) for technical requirements
- **MUGA provision:** Quantity and size of MUGA(s) shall be agreed with the Employer but subject to a default minimum of, as Table 27 below:

Typology	MUGA	MUGA size (including runoff)
Primary / Special / AP	Mini	20m x 35m
n/a	Small	40m x 35m
Secondary	Medium	35m x 60m
n/a	Large	64m x 43m

Table 27: MUGA sizes

- **Line marking requirements:**
 - Mini: 1no. futsal court, 1no. tennis court, ½ court for netball/basketball
 - Small: 1no. 5-a-side pitch, 2no. tennis courts, 2no. netball courts, 2no. basketball courts
 - Medium: 1no. 7-a-side pitch, 3no. tennis courts, 3no. netball courts, 3no. basketball courts
 - Large: 4no. tennis courts, 3no. netball courts, 4no. basketball courts, 1no. mini soccer pitch (U9/U10)

8.1.28 Boot cleaners

- **Extent:** Playscape, and only when expressly agreed with the Employer
- **Options:**
 - 1no. boot cleaner near artificial grass pitch entrance gate
 - 1no. boot cleaner near MUGA entrance gate – see [8.4 Boundary treatments, walls and fencing](#)
 - 1no. outside of (external) changing rooms

8.1.29 Athletics surfaces

- **Extent:** Parkland and Playing Fields, and only when expressly agreed with the Employer
- **Standards:** Refer to following Sport England Design Guidance Notes (DGN) and SAPCA Code of Practice:
 - [Athletics](#)
 - [Artificial Surfaces for Outdoor Sport](#)
 - [Compact Athletics Facilities](#) (for use on constrained sites, and only when expressly agreed with the Employer)
 - [SAPCA Code of Practice for the Construction and Maintenance of Athletics Tracks](#)
- **Surfaces:** In accordance with DGN on [Athletics](#) level 2 provision for:

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- High and long jump track including take-off board, foundation trough, blanking board and jump indicator
- Sand to pit
- Shot put and hammer throwing area
- **Provision:**
 - High jump track
 - Long jump track
 - Landing pit(s) and cover
 - Shot put and hammer throwing areas
- **Surface water runoff:**
 - To meet Local Authority/Lead Local Flood Authority/Environment Agency requirements
 - In accordance with SAPCA Code of Practice for the Construction and Maintenance of Athletics Tracks

8.2

Topsoil, subsoil and ameliorants

This sub-section outlines the performance and functional requirements for topsoil, subsoil and ameliorants, and the construction of typical topographical landforms, including play slopes, mounds and amphitheatre terraces

General requirements

8.2.1 Summary

- **Purpose:** Topsoil, subsoil and ameliorants can benefit:
 - Resource efficiency through the management, retention and reuse of existing topsoil where feasible
 - Wellbeing by enabling ecosystems to thrive, which in turn supports pupil/student and staff wellbeing
 - The learning environment through thriving habitats which provide important opportunities to learn about ecosystems and soil health
- **Performance:**
 - Ecological impact: Minimise soil movement and soil compaction
 - Conservation/enhancement: Provide timescales, sequencing and processes for soil management, conservation and improvement
 - Soil structure: Enhance water infiltration and retention through incorporation of organic matter
 - Biodiversity: Providing thriving habitats to meet government targets and statutory obligations
 - Carbon sequestration: Using soil, to be demonstrated through Environmental Benefits from Nature tool metrics
 - Integrate level changes for play, social seating and nature-based SuDS

8.2.2 Technical Manual references

- **Earth-retaining structures:** See [1.1 Foundations and substructure](#)
- **Trees and plants:** See [8.3 Soft landscape](#)
- **Surface water drainage systems:** See [5.2 Drainage](#) and [8.7 External drainage \(nature-based SuDS\)](#)

8.2.3 Legislation, standards and best practice

- **Statutory guidance:**
 - All areas of the outdoor environment to comply with [AD C](#), [AD K](#) and [AD M](#)
 - [The Statutory Biodiversity Metric: User Guide](#)
- **Standards:**
 - General landscape and maintenance: To BS 4428 and BS 7370
 - Biodiversity Net Gain (BNG): Design in accordance with BS 8683
 - Soil, generally: To BS 1377 series
 - Topsoil: To BS 3882
 - Subsoil: To BS 8601
- **Best practice:**
 - [Urban Greening Factor for England User Guide \(Natural England\)](#)
 - [Environmental Benefits from Nature User Guide \(Natural England\)](#)

- [Construction Code of Practice for the Sustainable Use of Soils on Construction Sites](#)
- [SAPCA Code of Practice for the Design, Construction and Improvement of Natural Sports Turf](#)
- [Natural Turf Sports Surfaces Design Guidance Note \(Sport England\)](#)
- [PAS 100: Specification for composted materials](#)
- [Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure](#)

8.2.4 Prohibited materials

- **Products containing peat, river/canal dredgings and plastic**

8.2.5 Quality of soil generally

- **Requirements:**
 - All soil imported to site or reused from the site shall be free from pests and disease, corrosive materials, fragments of aggressive weeds, sticks, straw, construction materials/debris, lumps of vegetation and rubbish or any other deleterious materials detrimental to human, animal or environmental health and would cause impediment to successful plant establishment
 - Topsoil imported to site or reused from the site shall have a stone content in accordance with BS

3882, with the exception of Special Schools/Special Colleges which shall not contain stones of 20mm nominal size, or greater

8.2.6 Existing topsoil

- **Standards:** To BS 7755, BS 1377 and BS EN 13650
- **Onsite provision:** Soil Survey shall define extent, quality and necessary improvements required for the reuse of onsite topsoil
- **Ameliorants:** Implement ameliorant requirements in accordance with BS 3882 – see [8.2.8 Ameliorants](#)

8.2.7 Imported soil

- **Onsite deficiency:** Where existing soil has deficiencies, use imported topsoil and subsoil only for all new soft landscape
- **Standards:**
 - Topsoil: To BS 3882
 - Subsoil: To BS 8601
- **Third party testing:** In accordance with BS 3882
- **Approvals:**
 - Soil certificates and interpretive report for offsite stockpile of topsoil and subsoil to be vetted prior to importing soil to site
 - Report shall demonstrate compatibility with compliant project landscape specification, and required soil ameliorants

8.2 Topsoil, subsoil and ameliorants

- **Delivery:** Soil to have defined granular or crumb structure

8.2.8 Ameliorants

- **Standards:** To BS ISO 19822 and BS EN 13650
- **Material:** PAS 100 compliant composted material
- **Requirements:** Incorporate ameliorants as per recommendations in Soil Resource Information and Soil Survey to meet BS 3882, BS 8601 and project landscape specification

Specific requirements

8.2.9 Preparation and grading of subsoil and topsoil

- **Stripping:** All topsoil shall be stripped prior to earthworks for gradients, cut and fill
- **Preparation:** Loosen soil to required depth when dry and in a non-plastic state. Contour/shape to meet project landscape requirements and as below
- **Grading:**
 - Topsoil gradient: Maximum 1 in 3
 - Stabilisation: Plants and/or turf to be planted along gradients of existing and/or created mounds with a gradient of 1 in 5 to 1 in 3
 - Additional provision: A three-dimensional cellular woven textile shall be incorporated for gradients steeper than 1 in 4

8.2.10 Topsoil generally

- **Extent:** To all:
 - Tree pits
 - Hedgerows
 - Nature-based SuDS (e.g., raingardens and swales or as agreed with the Employer and School/College)
 - Flower-rich perennial and herbaceous planting

- Amenity shrubs and groundcover
- Allotments and orchards
- Amenity grass and flowering lawn mix (or as agreed with the Employer and School/College)
- **Standard:** To BS 3882
- **Bed dimensions:** Variable, depth in accordance with BS 4428 and width/length as outlined in [8.3 Soft landscape](#) and [8.2.13 Soil for tree pits](#)
- **Drainage:** Free draining

8.2.11 Topsoil for allotments

- **Topsoil:** Multi-purpose topsoil with organic matter
- **Prohibited:** Topsoil containing hydrogel polymers is prohibited

8.2.12 Soil for wildflower turf planting

- **Extent:** Shall be used in small quantities/areas where required to achieve Biodiversity Net Gain (BNG)
- **Requirements:**
 - Soil certificate to demonstrate soil compliance with turf supplier's recommendations
 - Laid as wildflower turf
- **Bed dimensions:** Variable, depth to BS 4428

8.2.13 Soil for tree pits

- **Extent:** To all tree pits
- **Standard:** To BS 8545, BS 3882 and BS 8640
- **Tree pit dimensions:**
 - Trees in soft landscape: Width and length 150mm wider than the rootball (minimum) and approximately the same depth as the tree root system when fully spread
 - Trees in hard landscape: 1.8m square (minimum)
 - Depth: 1m (maximum), minimum as per BS 5837
 - Volume of topsoil/subsoil to meet supplier's recommendations

8.2.14 Structural soil for bioswale/structure tree pits

- **Extent:** In paved areas to provide paving support, adequate soil volume and/or water retention
- **Standard:** To CIRIA's Retrofitting to manage surface water (C713) guidance
- **Material:** Appropriate to structural and/or drainage requirements:
 - Interlocking tree crate cells infilled with topsoil/subsoil
 - Structural soil
- **Installation:** In accordance with manufacturer's recommendations

8.2.15 Topsoil/subsoil for container planting

- **Extent:** Only to be used on constrained sites (and where not a rain planter)
- **Bed dimensions:** Maximum width, length and depth required to provide adequate soil volume for plants specified
- **Requirements:**
 - Hydrogel polymers added to topsoil mix as per manufacturer's recommendations to minimise soil water loss
 - Topsoil to meet criteria for multi-purpose topsoil as BS 3882
- **Prohibited:** Trees in containers are prohibited

Topographical landform

8.2.16 Play slopes and mounds

- **Extent:** Playscape as part of play strategy
- **Standards:** To BS EN 1176, BS EN 1177, BS 8300-1, and Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure
- **Materials:**
 - Site won topsoil and subsoil to form slopes/mounds
 - Non-hazardous, recycled, crushed and permeable building materials as sub-base below subsoil
 - Rubber safety matting – see [8.1 Surfaces for play, sport, paths and roads](#)
- **Gradient and form:** Gentle rolling mounds between 1 in 12 and 1 in 5, no more than 1.2m tall
- **Coordination:** Required between play slopes and mounds and other play features (e.g., trim trails, stepping stones), and planted raingardens, swales and tree planting

8.2.17 Amphitheatre terraces

- **Extent:** Amphitheatres can be considered where site gradients are steep (e.g., 1 in 12). They shall be created in Playscape and Courtyard Garden
- **Standard:** To BS EN 1176, BS EN 1177, BS 8300-1, and Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure

- **Material:** Non-hazardous, recycled, crushed and permeable building materials as sub-base below subsoil
- **Seating wall construction (including height):**
 - Gabion walls with wall top seating – see [8.4 Boundary treatments, walls and fencing](#) and [8.6 External furniture](#)
 - Interlocking block walling system with wall top seating – see [8.4 Boundary treatments, walls and fencing](#)

8.2.18 Raingardens and swales

- **Extent:** As required to meet Employer's Requirements for surface water management with capacity to meet SuDS strategy – see [8.7 External drainage \(nature-based SuDS\)](#)
- **Standards:** To CIRIA's Guidance on the construction of SuDS (C768F) and The SuDS Manual (C753F)
- **Dimensions:** Maximum width, length and depth required to provide adequate soil volume for plants specified and storage capacity to meet Site Drainage Schematic
- **Soil composition:** In accordance with The SuDS Manual (C753F) for bioretention systems
- **Gradient and form:**

8.2 Topsoil, subsoil and ameliorants

- Raingardens: Stepped 150-180mm as outlined in [8.1.19 Edgings](#)
 - Swales: Gradual slopes to reduce depth of swale
 - **Material:** Sand to be added to topsoil mix to enhance drainage and prevent waterlogging
 - **Planting:** As outlined in [8.3.20 Plants for raingardens, rain planters and swales](#)
 - **Features:** Timber play bridges and/or stepping stones along pedestrian routes as agreed with the Employer and School/College
- Note:** Raingardens and swales are to be designed to not hold standing water in pupil realm areas

8.2.19 Attenuation ponds

- **Extent:** To Entrance Landscapes, Parkland and Playing Fields in partial shade to meet Employer's Requirements for surface water management, with capacity to meet SuDS strategy – see [8.7 External drainage \(nature-based SuDS\)](#)
- **Gradient and form:** Gradual slopes (no steeper than 1 in 5) to reduce depth of overall pond and with a range of depths appropriate for:
 - Deep water aquatics
 - Marginal plants
 - Semi-marginal plants
- **Accessories:**

- Inlet unit accessories as outlined in [8.7 External drainage \(nature-based SuDS\)](#)
- Decking for outdoor learning – see [8.1 Surfaces for play, sport, paths and roads](#)
- If, due to substantiated risk, a fixed pond cover may be installed just above the water level on all sides as outlined in [8.7 External drainage \(nature-based SuDS\)](#)

8.3

Soft landscape

This sub-section outlines the performance and functional requirements for the selection, installation and aftercare of new plants, grass and trees, and the planting composition for hedgerows, trees, woodlands, BioSolar and green roofs, and nature-based SuDS. For willow structures, see [8.8 Structures in the landscape](#)

General requirements

8.3.1 Summary

- **Purpose:** Soft landscape can benefit:
 - Outdoor learning by making natural processes visible and providing formal and informal learning opportunities
 - Wellbeing by providing access to, and connection with, nature; positively impacting behaviour, cognitive development and health
 - Ecosystems by contributing to biodiversity net gain, reducing flood risk, and improving air quality and passive cooling measures
- **Performance:**
 - Soft landscape solutions to conserve, enhance and respond to site specific ecological characteristics whilst integrated into the site-wide surface water management strategy
 - Enhance learning through a variety of soft landscape (e.g., trees, raingardens, flowering lawns), together with identification labels for all new trees and age-appropriate interpretive signage for nature habitats
 - Enhance and protect biodiversity by delivering 0.35 (minimum) Urban Greening Factor (UGF) within the

project's development boundary and delivering all Biodiversity Net Gain (BNG) statutory obligations onsite

Note: The delivery of BNG outside of the project boundary (i.e., offsite) will not be permitted unless the statutory obligation is provided at an alternative, local education setting and only when expressly agreed with the Employer

- Demonstrate enhancement over a 30-year period for the following Natural England targets¹⁹: Flood Regulation, Water Quality, Cooling and Shading, Air Quality Regulation, Carbon Storage, Interaction with Nature, Sense of Place, and Education
- Placement of new tree planting shall minimise impact on new and existing building structures and substructure

8.3.2 Technical Manual references

- **Earth-retaining structures:** See [1.1 Foundations and substructure](#)
- **BioSolar and green roofs:** See [2.3 Roofs](#)

¹⁹ Using the Environmental Benefits from Nature Tool.

8.3 Soft landscape

- **Surface water drainage systems:** See [5.2 Drainage](#) and [8.7 External drainage \(nature-based SuDS\)](#)
- **Category 5 water supplies and outdoor taps:** See [5.3 Water installations](#) and [8.6 External furniture](#)
- **Surfaces and edging:** [8.1 Surfaces for play, sport, paths and roads](#)
- **Subsoil and topsoil to soft landscape:** See [8.2 Topsoil, subsoil and ameliorants](#)
- **Boundary treatments, walls and fencing:** See [8.4 Boundary treatments, walls and fencing](#)
- **Canopies and willow structures:** See [8.8 Structures in the landscape](#)

8.3.3 Legislation, standards and best practice

- **Statutory guidance:**
 - All areas of the outdoor environment to comply with [AD C](#), [AD K](#) and [AD M](#)
 - [The Statutory Biodiversity Metric: User Guide](#)
- **Standards:**
 - Accessible design standards: To BS 8300-1
 - Biodiversity Net Gain (BNG): Design in accordance with BS 8683
 - Seeding and turf: To BS 4428, BS 3969 and BS 7370
 - Plants: To BS 4428, BS 3936 series and BS 5837
 - Trees, shrubs and hedges: To BS 5837, BS 3998, BS 8640, BS 8545 and BS 3936 series

- Temporary fencing: To BS 1722 series
- Selection and installation of soft landscape: To BS 4428, BS 5837, BS 7370, BS 3969, BS 3936 series and BS 3998
- General landscape and maintenance: To BS 4428, BS 7370 and BS 8683
- **Best practice:**
 - [Urban Greening Factor for England User Guide \(Natural England\)](#)
 - [Environmental Benefits from Nature User Guide \(Natural England\)](#)
 - National Plant Specification (NPS)
 - [Tree Species Selection for Green Infrastructure: A Guide for Specifiers](#)
 - [Trees in Hard Landscapes: A Guide for Delivery](#)
 - [Tree Species Soil Volume Guide](#)
 - [Traditional orchards: planting and establishing fruit trees \(Natural England\)](#)
 - [Tree Species Guide for UK Agroforestry Systems](#)
 - [SAPCA Code of Practice for the Design, Construction and Improvement of Natural Sports Turf](#)
 - [Natural Turf Sports Surfaces Design Guidance Note \(Sport England\)](#)

8.3.4 Prohibited materials/systems

- **Rising materials:** Placed or left below natural pitches

8.3 Soft landscape

- **Mesh within turf:** Of non-biodegradable type
- **Plastic components:** Above ground (e.g., tree guards) and below ground (e.g., underground guying)
- **Metal fixings for tree pits:** Below ground in soft landscape
- **New trees:** Planted in containers i.e., all new trees must be planted in the ground
- **Modular green walls:** For external walls/facades. See [8.3.15 Climbing plants](#) for acceptable options
- **Modular (cassette) systems:** For BioSolar and green roofs. A loose laid substrate/growing medium of varying depths is permitted
- **Lightweight sedum blankets:** For BioSolar and green roofs
- **Aggressive climbing plants:** Such as Hedera, Wisteria, Ipomoea, Solanum species and *Parthenocissus quinquefolia*
- **Wildflower meadow seed:** Only permitted on BioSolar roofs where required to meet GRO Code, UGF and/or BNG. Elsewhere, wildflower turf is permitted but only in limited areas
- **Pesticides**

8.3.5 Existing trees

- **Requirement:** All work, protection measures and felling of existing trees to be carried out by a qualified

professional as per Arboricultural Survey, Tree Removal, Protection and Retention Plan, and relevant method statements

- **Safety in pupil/student areas:** Trees to be risk assessed for all climb to fall hazards. If a substantiated risk is identified, the tree(s) shall either be:
 - Crown lifted, or
 - Protected with an environmental boundary/fence solution appropriate to the risk and installed beyond the tree root protection area(s) as outlined in [8.4 Boundary treatments, walls and fencing](#)

8.3.6 Suitability of use

- **Grass seed:** Shall be used for natural pitches and sporting runoff areas. Turf to only be used where there are planting programme constraints, as agreed with the Employer
- **Flowering lawn mix:** May be used in Playscape, Parkland and Playing Fields, and Entrance Landscape where natural pitches are not required and area managed as flowering lawn mix (preferred over wildflower turf below)
- **Wildflower turf:** Shall be used in small quantities/ areas where required to achieve Biodiversity Net Gain (BNG) (e.g., in orchards and/or planted swales), or as agreed with the Employer

8.3 Soft landscape

- **Imported soil:** Soil certificates and interpretive report for offsite stockpile of topsoil and subsoil to be vetted prior to importing soil to site

8.3.7 Planting season

- **Generally:** Plant in dormant period, or as agreed with the Employer. During winter months, the ground needs to be in a workable condition (i.e., not frozen and/or waterlogged)
- **Container plants:** Water, weed and mulch if planted during the growing season
- **Planting programme:**
 - September to November: Deciduous shrubs, herbaceous perennial plants, bulbs, wildflower and amenity turf
 - September to November and March to April: Evergreen trees and shrubs, and amenity seed
 - Late November to late March: Deciduous, bare root and rootballed trees and hedges
 - All year round: Deciduous container grown trees
 - Exception: Works to be completed out of sequence to meet planting programmes, only when expressly agreed with the Employer
- **Phased or temporary project requirements:**
 - Feasibility: Phased and temporary landscape works shall be coordinated with project programme, planting season and site conditions

- Installation: Relocation of plants shall take place during relevant dormant season

8.3.8 New trees, hedges, plants and grass

- **Sourcing:**
 - UK sourced plants with plant passports, applying best practice biosecurity principles sourced from local provenance where feasible
 - To compliment local nature recovery and green infrastructure strategies and networks
- **Selection:**
 - Suited to local context to provide seasonal interest during academic year
 - Able to thrive with well-balanced root system and, where appropriate, branch system
 - All plant stock shall conform to the standards set out in the National Plant Specification to be sturdy, healthy and vigorous, of good shape and without elongated shoots, grown in a suitable environment and hardened off, and free from pests, diseases, discoloration, weeds and physiological disorders
 - Select non-fruiting trees (unless as part of an edible planting/orchard) and trees/plants without nuts
 - Select non-invasive, non-harmful and non-irritant species
 - Establish a low-maintenance landscape that delivers environmental benefits

8.3 Soft landscape

- Planting to grow to, or be maintained at, 1.2m in height to ensure clear sight lines to facilitate passive/active supervision
- **Condition:** To BS 3936 series when delivered to site and planted
- **Soil bed preparation:** Water management, organic matter addition and soil bed preparation to BS 4428
- **Installation:**
 - Trees to retain labels with Latin and common names
 - Group into habitats (e.g., woodland), where possible, and install interpretive signage – see [8.6 External furniture](#)

8.3.9 Protection of new planting

- **Herbaceous perennial planting beds with or without trees:** Excluding amenity, flowering lawn and meadow turf, to be stepped up or down to reduce foot traffic by 150-180mm – see [8.1.19 Edgings](#) and [8.1.20 Concrete kerbs](#)
- **Raingardens:** To be stepped up or down by 150-180mm – see [8.1.19 Edgings](#) and [8.1.20 Concrete kerbs](#) to reduce foot traffic and be designed to receive surface water runoff from outbuildings and canopy structures in the landscape as a minimum

- **Biodegradable tree/hedge trunk guards:** Install where required to protect from strimming or animal damage
- **Chemicals:** To control weeds (herbicides) to be minimised to ensure environmental sustainability and protect non-targeted plant species
- **Temporary fencing:** Protect newly planted and/or seeded/turfed areas with temporary fencing for a minimum of 6 months and 12 months for herbaceous perennial plants from germination/planting

Specific requirements

Seeding and turf

8.3.10 Amenity grass

- **Extent:** Integrated with interlocking rubber mats, reinforced grass system (all other areas to use flowering lawn mix)
- **Type:** Amenity grass seed suitable for soil and activity
- **Establishment:** As per BS 4428
- **Exception:** Turf with biodegradable mesh may be used where there are planting programme constraints, as agreed with the Employer

8.3.11 Grass for natural pitches

- **Extent:** Where there is team sport provision on natural pitches (e.g., athletics track, football, rugby, cricket, rounders)
- **Type:** Grass seed comprising predominantly of hard-wearing and fine-leafed cultivars (varieties) of perennial ryegrass
- **Establishment:** Use in combination with a robust establishment and management plan to meet Sport England's [Natural Turf Sports Surfaces](#) guidance
- **Exception:** Turf with biodegradable mesh may be used where there are planting programme constraints, as agreed with and the Employer

8.3.12 Flowering lawn mix

- **Extent:** All non-playing pitch and runoff areas
- **Type:** To meet soil conditions and green infrastructure function
- **Preparation:** To be seeded as per manufacturer's recommendations

8.3.13 Wildflower meadow turf

- **Extent:** Orchards, planted swales and/or limited wildflower meadow areas, where required to meet BNG and UGF requirements
- **Types:**
 - Wet and drought-tolerant turf to be used in planted swales
 - In all other locations, wildflower turf to suit soil conditions
- **Installation and maintenance:** Wildflower turf to be laid and maintained as per manufacturer's recommendations

Plants

8.3.14 Herbaceous perennial plants, shrubs and bulbs

- **Extent:** Planting beds, raingardens and rain planters
- **Bed dimensions:**
 - Planting beds and rain gardens: Width 2.4m (minimum), length variable
 - Rain planters: Width 800mm (minimum), length 1.2m (minimum), height 500-1000mm
 - Depth: To BS 4428
- **Herbaceous perennial plants:**
 - Size: 2 to 3 litre pots
 - Plant groupings: 5, 7 or 9
- **Shrubs:**
 - Size: 3 to 10 litre pots
- **Bulbs:**
 - Grade: 1
 - Plant grouping: In drifts through planting beds and flowering lawns
 - Density: 30-50 per square metre

8.3.15 Climbing plants

- **Extent:** External walls/facades and fences identified for vertical greening
- **Bed dimensions:**

- Width 500mm (minimum), length 1.2m (minimum)
- Depth: To BS 4428
- **Size:** 3 to 5 litres pots
- **Installation:** To be planted in the ground (unless in a rain planter)
- **Types:**
 - Self-clinging, non-aerial root climbing plants
 - Non-self-clinging, supported with wire trellis, attached to a wall/fence to aid plant attachment
- **Trellis:**
 - 1.2m wide by 3-6m high steel wire system
 - Hung vertically (no horizontal footholds to prevent climbing)
 - Components to be designed and installed to prevent trapping and to meet BS EN 1176, BS 8613 and BS 5709

8.3.16 Allotment bed plants

- **Extent:** Learning Landscape
- **Bed dimensions:** Width 1.2m (maximum), length variable up to 3m, height 450mm (600mm if required for accessibility)
- **Edging:** Treated FSC sleepers

8.3 Soft landscape

- **Planting:** Planted with edible plants to meet principal crop rotation, ensure productive plants are established at handover

8.3.17 Hedgerows

- **Bed dimensions:**
 - Width: 1.2m (minimum), length variable
 - Depth: To BS 4428
- **Density options:**
 - Single hedgerow: Plant at 300mm centres (3 plants per linear metre)
 - Double staggered hedgerow: Plant at 500mm centres 300mm offset between rows (5 plants per linear metre)
 - Triple staggered hedgerow: Plant at 500mm centres (300mm offset) (8 plants per linear metre)
- **Native hedge planting mix:**
 - Girth/age: 1+1 to 1+2
 - Height range: 800-1000mm
 - Root options: Bare root (preferred), rootballed and/or container grown (where required due to planting programme constraints)
 - Form: As appropriate for selected species; either feathered, branched, transplant or leader with laterals (3 breaks)
- **Mixed hedge planting mix:**
 - Girth/age: 1+2

- Height range: 800-1000mm
- Root: Bare
- Form: Branched with 3 breaks

- **Installation:** Hedge planting pit designed to avoid ponding
- **Optional accessories:** Central post and wire mesh fence to be installed as outlined in [8.4 Boundary treatments, walls and fencing](#)

8.3.18 Aquatic plants for attenuation ponds

- **Design:** Ponds to form part of wider nature-based SuDS strategy and not depend on water from bib taps
- **Plant type:** A varying degree of drought and moisture tolerant plants to meet moisture level requirements
- **Varied zonal planting:** Include deep water aquatics, shallow water aquatics, marginal planting and bog plants
- **Density:**
 - Water's edge: Coir rolls to include a minimum 6no. plants per linear metre
 - Elsewhere: Plug plants at 8 plants per square metre

8.3.19 Plants for BioSolar and green roofs

- **Standards:** [The GRO Green Roof Code](#), [The GRO BioSolar Best Practice Design Guide](#), BS 3936, BS

8.3 Soft landscape

8616 and Natural England's Urban Greening Factor (UGF)

- **Locations:** On green roofs when required to meet BNG and UGF minimums and/or as part of a wider biodiversity strategy
- **Options to meet GRO Code:**
 - Extensive biodiverse green roof (including BioSolar)
 - Extensive green roof (for pitched or flat roofs)
- **Planting:** As required to meet GRO Code, UGF and/or BNG
- **Requirements for extensive biodiverse green roofs:**
 - Minimum growing media depth: 100mm, however, 50% of the roof area shall be a minimum of 150mm i.e., undulating growing substrate depths to create differing habitats for a greater range of invertebrate species
 - Minimum number of vegetative species (count) to meet UKHab's 'Biodiverse green roof' requirements
 - Where a BioSolar roof, extent of vegetation shall include the area beneath the photovoltaic panels

8.3.20 Plants for raingardens, rain planters and swales

- **Standards:** To CIRIA's Guidance on the construction of SuDS (C768F) and The SuDS Manual (C753F)
- **Guidance:**

- CIRIA's Retrofitting to manage surface water (C713)
- UDL's Designing Rain Gardens: A Practical Guide
- Rain Gardens Guide
- **Planting size and density options:**
 - Drought-tolerant, herbaceous perennial plants in 9cm pots at a density of 10-15 plants per square metre
 - SuDS-appropriate wildflower meadow turf (for swales only)
- **Drainage:** To BS 8582
- **Mulch to surround herbaceous perennial plants:** 75mm shredded hardwood (to prevent floating)
- **Inground raingardens:** Include tree planting where feasible

Trees

8.3.21 Proposed trees

- **Tree species:** Plant complementary species, a mix of fast- and slow-growing types, to create a sustainable planting strategy
- **Size options:**
 - Single stem: Heavy standard (12-14cm girth, 3-4m tall)
 - Single stem: Extra heavy standard (14-16cm girth, 4-4.5m tall)
 - Single stem (to be used in hard landscape areas and for trees as barriers, see [8.4 Boundary treatments, walls and fencing](#)): Extra heavy standard (18-20cm girth, 4-5m tall)
 - Multi-stem trees: 2.5-3m high with minimum 3no. main stems growing from a single rootball
 - Pleached trees: 1.2-1.5m frame canopy
- **Features:** 2m clear stem
- **Tree crowns:** Fastigate/columnar, pleached, round, vase-shaped, pyramidal and weeping
- **Tree pit dimensions:** See [8.2.13 Soil for tree pits](#) for soil and dimensions for tree pits
- **Density:**
 - Spacing: To allow for mature canopy growth and, if required, screening
 - Orchard trees set out: Minimum 100m² at 5m apart
- Orchards planted on constrained sites: To be espaliered
- **Layout:**
 - Trees to be drawn on plan and section at their mature size to ensure adequate space allowance for tree canopies
 - Locate fruiting varieties (where part of productive orchards/allotments) in areas where fruit does not cause management issues (e.g., above paving) or choose varieties that fruit during summer holidays
 - For trees in close proximity to buildings and services allow a buffer zone and install root barriers as agreed with the project structural engineer and/or statutory services provider
 - Pleached trees shall be planted away from fences/boundary walls
- **Tree root protection:** Structural soil or cellular structures: Install to either protect roots within vehicular areas or as required for SuDS – see [8.1 Surfaces for play, sport, paths and roads](#)
- **Irrigation:**
 - Watering bags: Install for trees in hard and soft landscape

8.3 Soft landscape

- Irrigation pipe and aeration pipe: Install for new trees in paving
- **Installation:**
 - Tree pit to be designed to avoid ponding
 - Trees in hard landscape: Provide underground biodegradable guying
 - Trees in soft landscape: Pressure-treated timber stakes with hessian ties
 - Trees underplanted with wildflower meadow turf or grass: Include a clear 1.5m diameter area around the base of the trunk laid with 75mm mulch
- **Trees in hard landscape:** Permeable, self-binding gravel (with appropriate pH level) to infill top of tree pit to BS 8545 and BS 8640 – see [8.2 Topsoil, subsoil and ameliorants](#) for topsoil and subsoil details. In areas with high footfall, install a flush perforated tree grille with permeable self-binding gravel

8.3.22 Woodland trees

- **Extent:** Outdoor learning structure to be provided as a willow structure or outdoor learning canopy – see [8.8.11 Willow structures](#) and [8.8 Structures in the landscape](#)
- **Tree species:** Include appropriate mix of tree species at suitable proportions to reflect local context
- **Features:** As standards, whips or feathers
- **Tree height:** 600-800mm (minimum)

- **Mix percentages:**
 - 20% standard, 2X, clear stem 150-175cm, 3 breaks, bare root
 - 10% 1+2, transplant, seed raised, branched, 4 breaks, bare root
 - 40% 1+1, transplant, seed raised, bare root
 - 10% feathered, 5 breaks, 2X, bare root
 - 10% 0/1, cutting, branched, 3 breaks, bare root
 - 10% 0/2, cutting, branched, 3 breaks, bare root

8.4

Boundary treatments, walls and fencing

This sub-section outlines the performance and functional requirements for boundary treatments, walls and fencing, including mesh, railing and picket fencing, dead hedges, low retaining walls, and fencing to MUGAs and artificial grass pitches. For external walls of buildings, see [2.5 External walls](#)

General requirements

8.4.1 Summary

- **Purpose:** Boundary treatments, walls and fencing, when well designed and maintained, provide:
 - A sanctuary for play, physical activity and learning (the pupil realm) particularly when the visibility of fencing is minimised or eliminated
 - A transitory space from the public to pupil realm whilst ensuring safety, security and safeguarding
 - A sense of place, creating a positive contribution to the local context, and fostering a sense of community and belonging
- **Performance:**
 - Structure: Capable of transferring design loads and surcharges acting on structures to support structures and competent ground in accordance with all relevant BS EN standards and for all permanent and temporary conditions.
 - Green infrastructure: Solutions shall be prioritised where feasible and particularly to demarcate pupil zones and/or where air quality is an issue
 - Security: Designs shall meet the requirements of the Project Brief, whilst ensuring a welcoming, safe and secure environment for children and young people
 - Perimeter boundary: The line demarcating the known boundary/extent of School/College Sites. The boundary may be a physical boundary (e.g., a hedge) or a conceptual boundary (e.g., a kerb detail). The type of perimeter boundary shall be appropriate to the local context, with fencing required only where a substantiated risk has been identified through the project specific Security Risk Assessment process
 - Secure line: See definition in [Annex A Glossary of defined terms](#). Consider the impact of the secure line on the wellbeing of children and young people to provide a balanced solution
 - Ecological conservation/enhancement: To be based on site specific survey findings, protection plans and methods
 - Materials: Durable and resilient and able to withstand the elements (e.g., corrosion resistant and UV stable) and the expected impact/wear from daily use within an education environment
 - Sustainable: Ethically sourced (e.g., FSC or PESCC) and supporting circular economy principles through re-use, re-manufacturing and recycling
 - Safety: See [8.4.7 Health and safety](#)

8.4.2 Technical Manual references

- **Earth-retaining structures:** See [1.1 Foundations and substructure](#)
- **External walls of buildings:** See [2.5 External walls](#)
- **Exterior lighting:** See [5.8 Daylighting and electrical lighting](#)
- **CCTV:** See [6.4 Building technologies](#)
- **Surfaces, and external guarding and handrails:** See [8.1 Surfaces for play, sport, paths and roads](#)
- **Trees and hedges:** See [8.3 Soft landscape](#)
- **Security:** See [5.10 Security and communication systems](#)

8.4.3 Legislation, standards and best practice

- **Statutory guidance:**
 - All areas of the outdoor environment to comply with [AD C](#), [AD K](#) and [AD M](#)
 - [The Statutory Biodiversity Metric: User Guide](#)
- **Standards:**
 - Accessible design standards: To BS 8300-1
 - General landscape: To BS 4428
 - Fencing and gates: To BS 1722 series, BS EN 1176 series, BS 8613 and BS 5709
 - Secure line fencing and non-automated gates: To meet LPS1175

- Earth-retaining walls: To BS 8002 and relevant BS EN standards, National Annexes and Non-Contradictory Complementary Information (NCCI)
- **Best practice:**
 - [Safer Parks, Improving Access for Women and Girls](#)
 - [Urban Greening Factor for England User Guide \(Natural England\)](#)
 - [Environmental Benefits from Nature User Guide \(Natural England\)](#)
 - [SAPCA Code of Practice for the Construction and Maintenance of Fencing Systems for Sports Facilities](#)
 - [Artificial Grass Pitch \(AGP\) - Acoustics \(Sport England\)](#)
 - The Royal Society for the Prevention of Accidents (RoSPA) advice and information: [Fencing for children's play areas](#) and [Gates and access to play and wheeled sports areas](#)
 - [Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure](#)
 - Gate Safety by Design Guidance and Powered Perimeter Gates guidance (HSE OPSTD 1-2011) [Help and Advice for Schools with Automated Gates](#)
 - [Requirements and testing procedures for the LPCB certification and listing of intruder resistant building](#)

8.4 Boundary treatments, walls and fencing

[components, strongpoints, security enclosures and free-standing barriers](#)

- [Secured by Design New Schools](#) guidance, if supported by a substantiated risk identified in the project specific Security Risk Assessment process

8.4.4 Minimum life expectancy

- **Steel fencing:** 25 years
- **Timber fencing:** 15 years
- **Timber and steel fencing:** 15 years
- **External walls:** 50 years

8.4.5 Prohibited materials

- **Deterrent fencing:** Using palisade fencing/fence panels or barbed wire or fencing/fence panels, walls, gates and/or posts with spiked tops, bottoms and/or sides
- **Boundary/zonal treatments:** Incorporating glazed panels, rendered walling or fair faced blockwork
- **Timber sleepers:** That have been creosoted

8.4.6 Material options

- **Steel:**
 - Standards: To BS EN 1090 series, BS EN 10025 series, BS EN 10219 and BS EN ISO 14341
 - Finish options:
 - Hot dip galvanised to BS EN ISO 1461

- Powder coated to BS EN 13438
- Plastic coated to BS EN 1176
- Colour(s): Jet black (RAL 9005), moss green (RAL 6005) or as agreed with the Employer and School/College

- **Timber:**

- Standards: To BS EN 1995-1, BS 8417, BS EN 14081 series, BS EN 335 and BS EN 330
- Finish: FSC treated timber, Use Class 4

Note: Timber fence panels shall not come into direct contact with the ground to prevent rotting; concrete gravel boards shall be used with timber fencing in this location

- **Concrete:**

- Standards: To BS EN 206, BS 8500-1 and -2
- Finish: Smooth, non-porous

8.4.7 Health and safety

- **Materials and components:**

- Including when combined, shall not have small openings that could trap fingers or sharp edges
- Where loose/recycled materials are used/reused on site to fill gabion baskets, these materials shall not contain contaminants, have sharp/cut edges or exposed wires, or feature loose rocks/stones/bricks that can be easily removed

8.4 Boundary treatments, walls and fencing

Note: Gabion baskets to have tamper proof hinged tops/lids

- All walls, fences and/or boundaries to have round or rolled top edges
- Fence or gate panels shall not be cut on site
- Fences, walls, rails and/or gates shall not enable a fall of 600mm or greater. Where a change in level greater than 600mm exists, edge protection to meet AD K shall be provided
- Any form of hinge, gate, fence and/or post shall not risk trapping, including at changes in levels and to slopes
- Fixed F&E shall not be positioned where it could aid unauthorised climbing, access or egress
- Part height walls topped with a fence placed centrally on a wall shall be avoided
- **Fixings:** All exposed bolts, screws, nuts and fixings shall be resistant to corrosion and have tamper proof protection covers
- **Setting out:**
 - All fencing and walls shall prevent the potential for damage due to vehicular impact/overrun
 - Gate release buttons shall be positioned to prevent access from outside the gated zone

8.4.8 General fence and boundary requirements

- **Secure line:** Material, design and height (1.8m minimum) to meet the requirements in the Project Brief based on the outcomes of the Security Risk Assessment
- **Secure line fencing and non-automated gates:** To LPS1175 rating and certified as A1 (SR1) (minimum) to meet the requirements in the Project Brief based on the outcomes of the Security Risk Assessment
- **Pupil zones:** 1.2m maximum height or as agreed with the Employer
- **Sports fencing:** Extent, design and height of sports fencing to meet the requirements in the Project Brief
- **Environmental:** Provide hedgehog access routes in fencing if contained within project ecological recommendations
- **Perimeter boundary:** Material, design and height to meet the requirements in the Project Brief based on the outcomes of the Security Risk Assessment
- **Natural surveillance:** All boundaries shall be visually permeable where feasible
- **Planting:** Proposed trees and planting along perimeter boundary and secure line shall be selected to reduce visual obstruction (e.g., 2m clear stem trees and 1.2m high plants/hedges). Existing trees with low branches to be crown lifted

8.4 Boundary treatments, walls and fencing

- **Screening:** Where screening is required between the pupil and public realm (e.g., to reduce air pollution), a pre-grown planted fence shall be utilised, unless another fence type is required due to a substantiated risk identified through the Security Risk Assessment process to meet the requirements in the Project Brief

8.4.9 Security fencing generally

- **Secure fence rating options:**
 - Medium risk: LPS 1175 A1 (SR1)
 - High risk: LPS 1175 B3 (SR2) minimum (and only where agreed the Employer)
- **Safety:**
 - Climb and scale resistant to prevent intruders and misuse from all approaches
 - Horizontal footholds prohibited, especially around ironmongery
 - 1.2m clear ground plane zone required between secure line and adjacent features/fixed F&E (e.g., benches)
- **Additional requirements:**
 - Roller barriers as a continuous fence/wall top to high-risk areas

8.4.10 Gates

- **Standards:** To BS EN 12453 and BS EN 12604, and LPS1175 rating and certified as A1 (SR1) (minimum)

- **Coordination:** Design, height and construction shall match corresponding fencing system and maintain the same level of security
- **Hinges:** Anti-lift, minimum of 3no. fitted per gate
- **Locks:** Suitable locking mechanisms to be agreed with the Employer to meet the requirements in the Project Brief based on the outcomes of the Security Risk Assessment
- **Safety:** All gate and post hinges in the pupil realm to be designed to BS 1722 and BS EN 1176 to avoid digit trapping
- **Requirements:**
 - Gate sensor and manual emergency stop button required to ensure collision or trapping does not occur during operation
 - Gate keep fencing required to be a minimum height of 1.8m with safe access to maintain gate equipment and machinery
 - To comply with Gate Safety by Design Guidance and corresponding guidance from the Royal Society for the Prevention of Accidents
 - Ensure vehicular gates are separate to pedestrian gates
 - If the gate forms part of an emergency escape route, the release mechanism shall be keyless and designed to prevent operation from outside of the gated zone

8.4 Boundary treatments, walls and fencing

- Automated gates to be UK Conformity Assessed or CE (Conformité Européenne) certified

Specific requirements

Green infrastructure boundary and zonal options

8.4.11 Ditch and berm landform

- **Extent:** To perimeter boundary
- **Standards:** To CIRIA's Guidance on the construction of SuDS (C768F), The SuDS Manual (C753F) and BS 8002
- **Gradient:** Maximum 1 in 5
- **Dimensions:** Maximum 500mm high mound combined with 500mm deep ditched swale
- **Planting options:** Flowering lawn mix or meadow turf
- **Safety:** See [8.7.6 Health and safety](#) for risk assessment

8.4.12 Hedge with central fence

- **Extent:** To pupil zones (e.g., Learning Landscape), perimeter boundary, storage areas (e.g., for green waste), secure line
- **Height:** Fence at 1.2m (minimum); hedge at 1.0m
- **Fence:** Post and wire mesh fencing
- **Installation:** To BS 4428
- **Options:**
 - Double-staggered hedge as [8.3.17 Hedgerows](#) with central post and wire mesh fence as [8.4.13](#)

- Single-row hedge on School side of fence – see [8.3.17 Hedgerows](#)

8.4.13 Post and wire mesh fencing

- **Extent:** To pupil zones (e.g., Learning Landscape), perimeter boundary, storage areas (e.g., for green waste), secure line
- **Standards:** To BS 1722-2 and BS 1722-3
- **Material options:**
 - Mesh: Steel
 - Posts: Treated FSC timber or concrete
- **Height:** Fence at 1.2m (minimum), hedge at 1.0m
- **Requirements:**
 - Double-staggered or single-row hedge; single-row hedge to be planted on School side of fence – see [8.3.17 Hedgerows](#)
 - Mesh fences shall be raised off the ground as per manufacturer's recommendations

8.4.14 Dead hedge

- **Extent:** To perimeter boundary in areas not accessed by pupils
- **Standard:** To Royal Society for the Protection of Birds (RSPB) guidance [Build a dead hedge for wildlife](#)

8.4 Boundary treatments, walls and fencing

- **Height:** 1.2m (maximum)
- **Timber stakes:** Rounded tops
- **Material:** Site-won material including cuttings, branches and leaf material

8.4.15 Trees as barriers

- **Extent:** To perimeter boundary
- **Height options:** See [8.3.21 Proposed trees](#)
 - Single-stem, extra heavy standard, 18-20cm girth (4-5m tall)
 - Single stem (to be used in hard landscape areas): Extra heavy standard 18-20cm girth (4-5m tall)
- **Options:**
 - Columnar, fastigate or pleached trees: Planted to create a vehicular deterrent
 - Non-columnar/pleached trees to be used where there is no impact to lighting and/or CCTV in double-staggered rows to create a vehicular deterrent. Ensure species selected form mature canopy growth
- **Maintenance:** Landscape and Ecological Maintenance and Management Plan written for School/College to ensure trees successfully establish as vehicular deterrent

8.4.16 Fedge screen

- **Extent:** To pupil zones (e.g., Learning Landscape) or storage areas (e.g., for green waste) not requiring a secure line
- **Height:** 1.2-1.8m (maximum)
- **Material:** Pre-grown living willow woven fedge screen with willow rods, uprights, binders and weavers

8.4.17 Pre-grown climbing plant fence

- **Extent:** To pupil zones (e.g., Learning Landscape), perimeter boundary to screen the pupil realm from the public and/or to improve air quality (subject to the outcomes of the project specific Air Quality Survey and/or Security Risk Assessment process)
- **Height:**
 - 1.2m (maximum) in pupil zones
 - 1.2–3m in areas requiring visual or air quality screen
- **Width:** 1.2m panels (minimum)
- **Materials:**
 - Non-harmful climbing or hedge plant pre-grown onto mesh (e.g., *Carpinus betulus*)
 - Mesh: Steel
 - Posts: Treated FSC timber
 - Accessories: Steel

8.4.18 Temporary plant protection fencing

- **Extent:** All new planted areas accessible by pupils/students or the public
- **Standard:** To BS 1722-7
- **Material options:**
 - Chestnut fencing to BS 1722-4, or
 - Timber hurdles, or
 - As agreed with the Employer and School/College
- **Height:** 300mm–1.2m

Physical boundary – Secure line options

8.4.19 Security fencing - mesh

- **Extent:** To secure line, perimeter boundary, storage areas (other than cycles and equipment storage areas)
- **Standard:** To BS 1722-10
- **Infill:**
 - Mesh panels: Heavy-duty weld mesh steel flat panels
 - Mesh opening options:
 - Low and medium risk: 200mm x 50mm vertical/horizontal
 - High risk: 12-15mm x 75-80mm vertical/horizontal
 - Wire gauge: 4-8mm
- **Height:**
 - Fence: 1.8m (minimum) to meet the requirements in the Project Brief based on the outcomes of the Security Risk Assessment
 - Planting: 1.2m high hedge on the School side of fence – see [8.3.17 Hedgerows](#) where fence is adjacent to public realm and/or roads
- **Requirement:** Mesh fences shall be raised off the ground as per manufacturer's recommendations

8.4.20 Security fencing - integrated steel and timber fencing

- **Extent:** To secure line, perimeter boundary, storage areas (other than cycles and equipment storage areas) where screening is required, and a pre-grown fence is not an option due to the outcomes of the Security Risk Assessment process
- **Infill:**
 - Mesh panels: Heavy-duty welded steel panels with integrated treated FSC timber slats for concealing
 - Mesh openings: 200mm x 50mm vertical/horizontal
 - Wire gauge: 4-8mm
- **Height:** 1.8m (minimum)

8.4.21 Security fencing - vertical bar railings

- **Extent:** To secure line, perimeter boundary, pupil zones
- **Type options:** Flat top, bow top or ball end
- **Material:** Cylindrical steel posts and railings
- **Height:**
 - Fence: 1.8m (minimum) to meet the requirements in the Project Brief based on the outcomes of the Security Risk Assessment

8.4 Boundary treatments, walls and fencing

- Planting: 1.2m high hedge on the School side of fence – see [8.3.17 Hedgerows](#) where fence is adjacent to public realm and/or roads

8.4.22 Acoustic fencing barrier

- **Extent:** To provide an acoustic barrier in consideration of external noise levels (from sources including, but not limited to, road, rail and air traffic, industrial and commercial premises) as identified in the Acoustic Survey Information
- **Standard:** To BS EN 14388
- **Acoustic rating:** Category 3
- **Material:** Planed, treated FSC timber. Panels, posts and boards to slot together to meet acoustic requirements
- **Height:** 2-3m to meet project specific acoustic requirements
- **Noise reduction:** Up to 28dB
- **Gravel boards:** Not required if they detrimentally impact acoustic performance
- **Installation:** Fencing to be raked (not stepped)

Physical boundary – Other fence/wall options

8.4.23 Timber panel, timber post and picket fencing

- **Extent:** To pupil zones (e.g., Learning Landscape), perimeter boundary where green infrastructure solutions are not feasible
- **Standards:** To BS 1722-5 and BS 1722-11
- **Material:** Treated FSC timber
- **Timber panel fencing:**
 - Close-boarded, flat top
 - Concrete posts to receive timber fence panels
 - Panel attachment: To meet the requirements in the Project Brief
 - Height: 1-1.8m (maximum height 1.2m in pupil zones)
 - Installation: To be raked (not stepped)
- **Timber post fencing:**
 - Treated FSC timber, play grade, sanded to create smooth and splinter-free surfaces with rounded and planed posts
 - Height: 1-1.2m staggered heights
 - Installed as a secure boundary with visual permeable gaps to meet BS EN 1176

- **Picket fencing:**
 - Treated FSC timber, play grade, sanded to create smooth and splinter-free surfaces with rounded and planed pales and posts
 - Height: 1-1.2m

8.4.24 Low walls

- **Extent:** To pupil zones, perimeter boundary, secure line
- **Standards:**
 - Retaining walls: To support the surrounding ground, surcharges and any applied loads including, but not limited to, fencing and balustrades while ensuring stability. Construction materials and protection shall be appropriate to the site and environmental conditions
- **Height:** 600mm maximum (450mm minimum for growing gardens)
- **Drainage:** Retaining walls to include filter fabric, weep holes, and perforated drain to adjacent nature-based SuDS

8.4 Boundary treatments, walls and fencing

- **Material options:**
 - Stone/bricks and mortar to BS EN 771 – see [2.5.14 Masonry walls](#)
 - Mortarless, interlocking block system retaining wall to ASTM C946-10
 - Steel gabion mesh basket to have wall-top seating to top of gabion walls in pupil realm areas – [8.6.9 Seating – wall top](#)
 - Slip resistant, fair-faced, reinforced concrete with anti-slip finish to BS EN 206, BS 8500-1 and -2
 - Rolled top steel to BS EN 10025 series
 - Treated FSC sleepers to BS EN 13249 and BS EN 13251 for growing gardens only (allotments/edible playgrounds) – see [8.3.16 Allotment bed plants](#)

8.4.25 MUGA and artificial grass pitch fencing

- **Extent:** Court and/or pitch fencing for Multi Use Games Areas (MUGAs) and/or artificial grass pitches
- **Standard:** To BS 1176 series, BS 1722 series, SAPCA Code of Practice for the Construction and Maintenance of Fencing Systems and Sport England's Artificial Grass Pitches (AGP) Acoustics Planning Implications Guide
- **Provision:** Inclusion and height of fencing to be assessed on a project specific basis through discussion with the School/College considering sports provision and age groups

- **Dimensions:**
 - Height determined by sport provision and age groups
 - Maximum height at ball ends to be 4.5m
 - Length determined by pitch/court size and standards
 - For Primary and Special Schools, fencing on non-goal ends to step down to 1.2m
- **Access:** Level access, maximum gradient 1 in 21
- **Lighting:** See [5.8.17 Exterior lighting for sport](#)
- **Gates:**
 - To open outwards
 - 1.2m wide (single gate) or 3m wide (double gates) with a removable lintel/panel above for ease of access for large equipment
 - Located to suit adjacent roads, paths and directions of travel
- **Security:** Manual combination locking mechanism to BS EN 1303

8.5

Play equipment and nature habitats

This sub-section outlines the performance and functional requirements for play equipment, including climbing and gym equipment, and nature habitats (also known as hibernacula), including insect hotels, and bird and bat boxes

General requirements

8.5.1 Summary

- **Purpose:** Play equipment and nature habitats can benefit:
 - Health and wellbeing by promoting physical and/or adventurous outdoor activities
 - The balance between restorative and active play in the pupil/student realm by focusing on low, moderate and high activity zones
 - Cognitive development by supporting play that caters to functional, cooperative, role and symbolic play theories
 - Inclusion through the creation of accessible places that provide a varied physical curriculum
 - The learning environment through thriving habitats which provide important opportunities to learn about ecosystems and nature conservation
- **Performance:**
 - Variety: Play equipment and features to be developed with the users to provide the following experiences: jumping, balancing, climbing, rocking, problem solving, swinging, and sensory exploration
 - Climate resilience: Maximise nature-based solutions in play and physical activity areas to create a resilient outdoor environment
 - Ecological conservation/enhancement: To be based on site specific survey findings, protection plans and methods
 - Sustainable: Ethically sourced (e.g., FSC or PESC) and supporting circular economy principles through re-use, re-manufacturing and recycling
 - Materials: Durable and resilient and able to withstand the elements (e.g., corrosion resistant and UV stable) and the expected impact/wear from daily use within an education environment
 - Safety: See [8.5.6 Health and safety](#). Play equipment to provide a safe and secure environment. Play equipment to be sourced from suppliers that test equipment in accordance with the latest safety standards including critical fall zones
 - Installation: All play equipment to be installed as per manufacturer's recommendations
 - Maintenance: Solutions to be low maintenance and comprise readily available parts/products that can be easily replaced

8.5.2 Technical Manual references

- **Paving:** See [8.1 Surfaces for play, sport, paths and roads](#)
- **Boundary treatments, walls and fencing:** See [8.4 Boundary treatments, walls and fencing](#)
- **External furniture:** See [8.6 External furniture](#)
- **External/ancillary structures:** See [8.8 Structures in the landscape](#)

8.5.3 Legislation, standards and best practice

- **Statutory guidance:**
 - All areas of the outdoor environment to comply with [AD C](#), [AD K](#) and [AD M](#)
 - [Statutory biodiversity metric: user guide](#)
- **Standards:**
 - Accessible design standards: To BS 8300-1
 - Anti-slip surfacing: To BS 7188
 - Play areas: To BS 8102, BS EN 1176 and BS EN 1177
 - Fixings: To BS 3692 and BS 4190
- **Best practice:**
 - [Urban Greening Factor for England User Guide \(Natural England\)](#)
 - [Environmental Benefits from Nature User Guide \(Natural England\)](#)

- [Managing Risk in Play Provision: Implementation guide \(Play England\)](#)
- [Children's Play and Leisure – Promoting a Balanced Approach \(HSE\)](#)
- [Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure](#)
- [Artificial Sports Surfaces for Outdoor Sport Guidance Note \(Sport England\)](#)
- [SAPCA Code of Practice for the Construction of Outdoor Multi Use Games Areas](#)
- [Accessible and inclusive sports facilities series \(Sport England\)](#)

8.5.4 Minimum life expectancy

- **Timber play equipment:** 10 years
- **Steel play equipment:** 15 years
- **Aluminium play equipment:** 10 years

8.5.5 Material options

- **Steel:**
 - Standards: To BS EN 1090 series, BS EN 10025 series, BS EN 10219 and BS EN ISO 14341
 - Finish options:
 - Hot dip galvanised to BS EN ISO 1461
 - Powder coated to BS EN 13438
 - Plastic coated to BS EN 1176

8.5 Play equipment and nature habitats

- Colour(s): Jet black (RAL 9005) or as agreed with the Employer and School/College
- **Timber:**
 - Standards: To BS EN 1995-1, BS 8417, BS EN 14081 series, BS EN 335 and BS EN 330
 - Finish: FSC treated timber, Use Class 4, play grade
- Note:** Timber products shall not come into direct contact with the ground to prevent rotting
- **Recycled aluminium alloy:**
 - Standards: To BS EN 1090 series, BS EN 755 series and BS EN 573 series
 - Finish:
 - Anodized to BS EN ISO 7599
 - Powder coated to BS EN 12206-1
- **Plastic:** Permitted to BS EN 1176 and shall be resistant to UV degradation, warping, cracking and splintering, but not be the primary material for play equipment

8.5.6 Health and safety

- **Risk:**
 - Approach: The Contractor shall establish with the Employer and School/College a risk-benefit assessment which manages the risk in play provision and helps to select the most appropriate equipment, layout and surface conditions

- The Contractor shall adhere to all safety criteria and critical fall height zones as BS EN 1176 and BS EN 1177
- **Materials and components:**
 - Including when combined, shall not have small openings that could trap fingers or sharp edges
 - All edges to play equipment to have a rounded or rolled top edge
 - All play equipment proposed to be installed with moving components shall be risk assessed
 - All potential trip and collision hazards e.g., with edging and accessories shall be designed out
 - Where recycled materials are reused on site to create play features and nature habitats, these materials shall not contain contaminants, have sharp edges or feature loose stones/bricks that can be easily removed
- **Fixings:** All exposed bolts, screws, nuts and fixings shall be resistant to corrosion and have tamper proof protection covers
- **Poles:** Exposed ends to be constructed to avoid splitting
- **Post tops:** Fitted with caps without metal inserts
- **Inspections and certification (ROSPA):**
 - Existing/legacy play equipment identified for reuse/relocation shall be first inspected by an approved Registered Play Instructor (ROSPA) to

8.5 Play equipment and nature habitats

provide confirmation and certification that the play equipment is suitable for reuse/relocation

- Interim storage arrangements for existing/legacy equipment shall not adversely affect the safety and performance of the equipment when reinstated
- All relocated existing/legacy and new play equipment shall be inspected and certified as safe for use by a Registered Play Inspector (ROSPA) when installed in its final location and prior to handover
- **Impact attenuating safety surface(s):**
 - Shall be used/installed in areas with critical fall height zones and/or are trafficked daily
 - To be installed in accordance with manufacturer's recommendations

Specific requirements

8.5.7 Traverse climbing walls

- **Extent:** Courtyard Garden and Playscape
- **Requirements:** Impact attenuating surface to manufacturer's recommendations
- **Materials:** Timber with steel footings and professional grade climbing grips made from sand-synthetic resin with anti-rotation system
- **Options:**
 - Standalone: Minimum of 2no. traverse wall panels angled at 60° or 90° angles from horizontal. Designed for pupil height and not to enable reaching heights 600mm above the ground
 - Handholds: To be located on proposed/existing standalone and/or building walls

8.5.8 Equipped play

- **Extent:** Playscape
- **In-ground trampoline:** Minimum 3no. individual trampolines
- **Trim trail equipment:** Minimum of 6no. of the following balance beams, stepping logs, wobbly bridges, climbing equipment, tunnels, log steps and strides, rope traverses, wobbly planks

- **Conical swing:** Minimum of 1no. pendulum conical social swing with a minimum of 4no. seats
- **Extent:** Playscape in Special Schools (in addition to the above list)
- **Single swing frame:** Minimum of 1no. with minimum of 2no. ergonomically shaped seats. Quantity of seats to be agreed with the Employer. Seat types to be confirmed with the School
- **Extent:** Learning Landscape, Courtyard Garden and Playscape
- **Primary/Special School STEM garden:** Minimum of 2no. of the following per STEM garden magnifying lens with table, water play, games panels, sun dial
- **Primary/Special School storytelling garden:** Minimum of 1no. high backed timber storytelling chair, seating circle (or amphitheatre seating) to accommodate full class (seat height/depth to suit age range), 5no. large timber play animals, 5no. large timber play transportation vehicles/vessels (e.g., tractors, boats etc)
- **Secondary School/AP STEM garden:** Minimum of 2no. of the following per STEM garden sun dial, parabolic reflectors, weather station, voice pipes

8.5 Play equipment and nature habitats

- **Extent:** Learning Landscape to 'Daily Mile' path and/or nature trail
- **Orienteering trail equipment:** Timber bollards with flat tops for control points markers
- **Primary School:** 5-10 control points over 200m
- **Secondary School:** 15-20 control points over 1km

8.5.9 Gym equipment

- **Extent:** Playscape, and Parkland and Playing Fields
- **Options:** Minimum of 6no. varied items including, but not limited to, stretching posts, sky/air walker, double sky/air walker, arm pedal and bike, self-weighted rower, twist and step

8.5.10 Sensory

- **Extent:** Learning Landscape, Courtyard Garden and Playscape
- **Sensory tactile:** Sand play within a minimum 3m² framed sand pit with tamper proof lid and/or mud kitchen with high pressure laminated plywood kitchen unit, removable stainless steel mixing bowls, pretend oven and hob and chalk board
- **Sensory audio/visual:** Xylophone, voice pipe, acrylic play mirrors
- **Sensory edible:** In ground and/or raised allotment bed – see [8.3.16 Allotment bed plants](#), 2no. insect hotels –

see [8.5.12 Nature habitats](#) and 1no. interpretive sign per nature habitat – see [8.6.19 Interpretive signage](#)

- **Nature:** 2no. nature habitats – see [8.5.12 Nature habitats](#), 5no. magnifying posts and 1no. interpretive sign per nature habitat – see [8.6.19 Interpretive signage](#)

8.5.11 Loose parts play

- **Extent:** Learning Landscape, Courtyard Garden and Playscape
- **Standard:** To Play Scotland's [Loose Parts Play: A Toolkit](#)
- **Size:** Of loose play area and storage facility to be based on agreed play strategy
- **Storage:** Fully weatherproof storage to accommodate loose parts play equipment

8.5.12 Nature habitats

- **Insect hotel:** Minimum of 1no. to [RSPB guidance](#), timber infilled with natural pinecones, straw, dead leaves, corrugated cardboard, and located within the pupil realm
- **Mini insect hotel:** Minimum 1no. timber, natural bamboo rods, straw, holes in wood, to BS 42021 and located in a warm position in rain planters only
- **Bird house:** Quantity and orientation as recommended in the project ecological recommendations, to BS

8.5 Play equipment and nature habitats

42020 and installed as per manufacturer's recommendations

- **Swift house:** Quantity and orientation as recommended in the project ecological recommendations, to BS 42020 and installed as per manufacturer's recommendations
- **Bat box:** Quantity and orientation as recommended in the project ecological recommendations, to BS 42021 and installed as per manufacturer's recommendations
- **Dead wood pole:** Quantity, material composition, installation and orientation as recommended in the project ecological recommendations, and located in supervised Learning Landscape
- **Log pile:** Variety of native tree material using site won logs with twigs and small branches to fill gaps stacked in a shady location, partially submerged in the ground and located in supervised Learning Landscape

8.6

External furniture

This sub-section covers the performance and functional requirements for external furniture, including seating, bicycle hoops and door guards, bins, outdoor taps and signage

General requirements

8.6.1 Summary

- **Purpose:**
 - External furniture provides connections by creating opportunities for social interaction and learning
 - External signage provides important information to support identity, wayfinding and knowledge
- **Performance:**
 - Sustainable: Ethically sourced (e.g., FSC or PESCO) and supporting circular economy principles through re-use, re-manufacturing and recycling
 - Materials: Durable and resilient and able to withstand the elements (e.g., corrosion resistant and UV stable) and the expected impact/wear from daily use within an education environment
 - Safety: See [8.6.7 Health and safety](#)
 - Installation: All fixed external furniture to be installed as per manufacturer's recommendations and located to allow clear passage between furniture and building(s) permitting full and uninterrupted access for maintenance
 - Maintenance: Solutions to be low maintenance and comprise readily available parts/products that can be easily replaced

8.6.2 Technical Manual references

- **Paving:** See [8.1 Surfaces for play, sport, paths and roads](#)
- **Boundary treatments, walls and fencing:** See [8.4 Boundary treatments, walls and fencing](#)
- **External/ancillary structures:** See [8.8 Structures in the landscape](#)
- **Lighting:** See [5.8 Daylighting and electrical lighting](#)

8.6.3 Legislation, standards and best practice

- **Statutory guidance:**
 - All areas of the outdoor environment to comply with [AD C](#), [AD K](#) and [AD M](#)
- **Standards:**
 - Accessible design standards: To BS 8300-1
 - Furniture: To BS EN 1729 series and BS EN 581 series
 - Equipment: To BS EN 1176 series, BS EN 1177 and BS 8613
- **Best practice:**
 - [Urban Greening Factor for England User Guide \(Natural England\)](#)
 - [Environmental Benefits from Nature User Guide \(Natural England\)](#)

- [Managing Risk in Play Provision: Implementation guide \(Play England\)](#)
- [Children's Play and Leisure – Promoting a Balanced Approach \(HSE\)](#)
- [Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure](#)

8.6.4 Minimum life expectancy

- **Door barriers, bicycle hoops and scooter stands:** 20 years
- **Outdoor bib taps/covers:** 10 years
- **Bins:** 12 years
- **Timber and steel seating:** 15 years
- **Recycled plastic seating:** 15 years
- **Signage and tree labels:** 15 years

8.6.5 Prohibited materials

- **Mass concrete:** Picnic benches and tables

8.6.6 Material options

- **Steel:**
 - Standards: To BS EN 1090 series, BS EN 10025 series, BS EN 10219 and BS EN ISO 14341
 - Finish options:
 - Hot dip galvanised to BS EN ISO 1461
 - Powder coated to BS EN 13438
 - Plastic coated to BS EN 1176

- Colour(s): Jet black (RAL 9005) or as agreed with the Employer and School/College
- **Timber:**
 - Standards: To BS EN 1995-1, BS 8417, BS EN 14081 series, BS EN 335 and BS EN 330
 - Finish: FSC treated timber, Use Class 4, play grade
Note: Timber products shall not come into direct contact with the ground to prevent rotting
- **Recycled aluminium alloy:**
 - Standards: To BS EN 1090 series, BS EN 755 series and BS EN 573 series
 - Finish:
 - Anodized to BS EN ISO 7599
 - Powder coated to BS EN 12206-1
- **Concrete:**
 - Standards: To BS EN 206, BS 8500-1 and -2
 - Finish: Smooth, non-porous
- **Plastic:** Permitted to BS EN 1176 and shall be resistant to UV degradation, warping, cracking and splintering, but not be the primary material for external furniture

8.6.7 Health and safety

- **Materials and components:**
 - Including when combined, shall not have small openings that could trap fingers or sharp edges

8.6 External furniture

- Where recycled materials are reused on site to create external furniture e.g., site won timber, these materials shall not contain contaminants, have sharp edges or feature loose stones/bricks that can be easily removed
- All timber shall be sanded to create smooth and splinter-free surfaces
- **Fixings:** All exposed bolts, screws, nuts and fixings shall be resistant to corrosion, UV degradation and thermal creep, and have tamper proof protection covers
- **Setting out:** Of all external furniture, lighting and/or CCTV columns and electric vehicle charging points shall prevent the potential for damage due to vehicular impact/overrun

8.6.8 Seating provision generally

- **Backrests:** Required for accessibility in Courtyard Garden and Playscape
- **Wheelchair space allocation:** A paved space shall be located alongside any seating provided
- **Seat heights:**
 - Age 3-6 years: 300-350mm
 - Age 7-11 years: 350-375mm
 - Age 11 years and above: 425-450mm

Specific requirements

Seating

8.6.9 Seating – wall top

- **Extent:** On top of gabion walls and interlocking block walling system in Courtyard Garden and/or Playscape
- **Type:** Open back seating platform using timber slats with UV protective finish, clamped to gabion external wire structure

8.6.10 Seating – loose

- **Extent:** Courtyard Garden
- **Standard:** To BS EN 581, BS 8417 and BS EN 1729
- **Proprietary seats comprising:**
 - Treated timber, or
 - Recycled plastic
- **Types:**
 - Picnic benches: Table with seats connected to accommodate 6 pupils/students
 - Social benches: Approximately 1.7m (length)

8.6.11 Seating – fixed

- **Extent:** Courtyard Garden
- **Material:** Proprietary products comprising:
 - Steel, or
 - Timber, or

- Concrete, or
- Recycled plastic
- **Types:**
 - Social benches approximately 1.7m (length)
 - Single seat 0.45m (length)
- **Requirement:** To be selected/orientated to encourage socialisation

8.6.12 Play boulders

- **Extent:** Playscape
- **Standard:** To BS EN 1176 series and BS EN 1177
- **Material:** Natural stone
- **Finish:** Smooth and without sharp edges

External furniture

8.6.13 Bicycle hoops

- **Extent:** In Entrance Landscape, Playscape and Courtyard Garden; quantities to suit local planning authority requirements
- **Type options:**
 - Single hoops: For visitors' bicycles in Entrance Landscape
 - Bicycle rack: Located inside the secure line
- **Material:** Galvanised steel to BS EN ISO 1461
- **Dimensions:**
 - Junior: 600mm high
 - Senior: 800mm high

8.6.14 Scooter stands

- **Extent:** In Playscape and Courtyard Garden; ratios as DfE's Pattern Book
- **Material:** Galvanised steel to BS EN ISO 1461
- **Options:** Single or double sided (depending on requirement)
- **Height:** 800mm

8.6.15 Bins

- **Extent:** For pupil/student use in Courtyard Garden
- **Material:** Powder coated, galvanised steel

- **Quantity:** To be agreed with the Employer and School/College
- **Type:** Fixed, flat top cover with 2no. galvanised or stainless steel removable recycling chambers/liners and pivot hinged door with hexagonal key operated, heavy-duty lock
- **Height:**
 - Primary: 0.8-1.0m
 - Secondary: 1.0-1.2m

8.6.16 Outdoor lockable bib taps and tap covers

- **Extent:** Wall mounted lockable cover over bib tap to be located:
 - On building elevations in Early Years outdoor areas
 - On building elevations close to trees, hedges and planting
 - On green roofs
 - In refuse areas/bin and compost stores
 - In area of mud kitchen, as applicable
 - Any further outlets specified in the Project Brief, noting requirements for Category 5 water supplies as [5.3 Water installations](#)
- **Standard:** Design to BS 8558
- **Tap material:** Brass, may be chromium plated

8.6 External furniture

- **Accessories:** Durable lockable cover with standard padlock
- **Setting out:** If located on hard surfacing, bib taps shall sit above ground level, trapped gully connected to below ground foul drainage system

8.6.17 External water bottle fillers

- **Extent:** 2no. in Courtyard Garden dining areas, and outdoor areas used for play and sport, unless otherwise specified in the Project Brief. See [5.1.18 Drinking fountains / bottle filling stations](#) for technical requirements

8.6.18 Door barriers

- **Extent:** Locate outside and adjacent to all outward opening external doors, except those used solely as fire escape exits and/or occasional-use rooms
- **Type:** Powder coated and/or galvanised steel hoop with 2no. flat plate crossbars (top and bottom) and integral rubber buffer
- **Dimensions:** Nominal 0.45m width x 1.2m height
- **Fixing:** Root-fixed

8.6.19 Interpretive signage

- **Extent:** 1no. for each nature habitat, raingarden and rain planter in the pupil realm
- **Standard:** To BS 559

- **Type:** Aluminium panel, backer, frame and steel legs
- **Finish:**
 - Polyester powder coated to BS 13438, or as agreed with the Employer and School/College
 - UV resistant
- **Colour of framing/legs:** Jet black (RAL 9005) or as agreed with the Employer and School/College
- **Fittings:** Anti-vandal and tamper proof
- **Information on panels:** To be accessible, age-appropriate and include text and images/graphics about flora and fauna relevant to the location of the interpretive sign

8.6.20 Information and wayfinding signage

- **Extent:**
 - Site boundary signage: Providing key School/College information, directions and wayfinding nodes
 - Entrance Landscape: Wayfinding guidance for visitors
 - Courtyard Garden: Wayfinding guidance for to access to community features, where required
- **Standard:** To BS 559, BS ISO 23601, BS 8300 series and BS 5499
- **Type:** Aluminium panel, backer, frame and steel legs

8.6 External furniture

- **Finish:**
 - Polyester powder coated to BS 13438 or as agreed with and the Employer and School/College
 - UV resistant
- **Colour of framing/legs:** To be agreed with the Employer and School/College
- **Fittings:** Anti-vandal and tamper proof
- **Information on panels:** Accessible written and graphic content, sized and positioned to ensure clear sight lines

8.7

External drainage (nature- based SuDS)

This sub-section outlines the performance and functional requirements for nature-based sustainable drainage systems (SuDS) for surface water management. For rainwater runoff from main buildings, see [2.3 Roofs](#). For surface and foul water drainage, both above and below ground, see [5.2 Drainage](#)

General requirements

8.7.1 Summary

- **Purpose:** External drainage (nature-based SuDS) benefits:
 - Resilience by reducing flood risk, managing rainfall sustainably, and reducing runoff into below ground drainage systems
 - Health and wellbeing by improving thermal comfort and air quality, and providing access to, and connection with, nature
 - The learning environment by creating opportunities for formal and informal learning about climate adaptative solutions, ecosystems and water scarcity
- **Performance:**
 - Nature-based SuDS shall be provided in accordance with [5.2 Drainage](#)
 - Permeable paving shall be incorporated where surface water runoff does not naturally convey to adjacent nature-based SuDS features, and where appropriate to support the functional and drainage requirements of Multi-Use Games Areas (MUGAs) and/or artificial grass pitches
 - Safety: See [8.7.7 Health and safety](#)
 - Maximise educational opportunities by making natural processes (rainwater management) visible for learning
 - Provide interpretive signage in key rainwater management habitats to provide information about flood resilience, and local flora and fauna
 - Ecological conservation/enhancement: To be based on site specific survey findings, protection plans and methods
 - Materials: Durable and resilient and able to withstand the elements (e.g., corrosion resistant and UV stable) and the expected impact/wear from daily use within an education environment
 - Design out hazards: SuDS should be designed to mitigate the risk of drowning through layout and feature
 - Sustainable: Ethically sourced (e.g., FSC or PESCC) and supporting circular economy principles through re-use, re-manufacturing and recycling

8.7.2 Technical Manual references

- **Piped above and below ground drainage:** See [5.2 Drainage](#)

8.7 External drainage (nature-based SuDS)

- **Permeable paving:** See [8.1 Surfaces for play, sport, paths and roads](#)
- **Subsoil and topsoil to SuDS:** See [8.2 Topsoil, subsoil and ameliorants](#)
- **Boundary treatments, walls and fencing:** See [8.4 Boundary treatments, walls and fencing](#)
- **External furniture:** See [8.6 External furniture](#)
- **External/ancillary structures:** See [8.8 Structures in the landscape](#)

8.7.3 Legislation, standards and best practice

- **Statutory guidance:**
 - All areas of the outdoor environment to comply with [AD C](#), [AD K](#) and [AD M](#)
 - [The Statutory Biodiversity Metric: User Guide](#)
- **Standards:**
 - General landscape and maintenance: To BS 4428 and BS 7370
 - Biodiversity Net Gain (BNG): Design in accordance with BS 8683
 - Accessible design standards: To BS 8300-1
 - Drainage: To BS 752
 - Gully tops and manhole tops in pedestrian and vehicular trafficked areas to BS EN 124-1
 - Surface water management: To BS 8582

- **Best practice:**
 - [Urban Greening Factor for England User Guide \(Natural England\)](#)
 - [Environmental Benefits from Nature User Guide \(Natural England\)](#)
 - [Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure](#)
 - CIRIA SuDS Manual (C753)
 - CIRIA Guidance on the construction of SuDS (C768)
 - CIRIA Retrofitting to manage surface water (C713F)
 - CIBSE Guide L: Sustainability
 - UDL's [Designing Rain Gardens: A Practical Guide](#)
 - [Rain Gardens Guide](#)
 - [Susdrain's](#) four pillars: quantity, quality, amenity and biodiversity
 - [National standards for sustainable drainage systems \(SuDS\)](#)

8.7.4 Minimum life expectancy

- **Rain planters:** 20 years
- **Inspection chamber covers, gullies and grates:** 30 years
- **Paving:** 40 years in general
- **Drainage accessories:** 30 years

8.7.5 Prohibited materials

- **SuDS features:** Which do not form part of the site-wide drainage strategy and require topping up with tap water
- **Planters:** Made from plastic, mass concrete or fibreglass
- **Grates, gullies or inspection chamber covers:** Made from plastic
- **Inspection chamber covers:** Infilled with concrete or mortar

8.7.6 Material options

- **Cast iron:**
 - Standards: To BS EN 124-2
 - Note:** Where required to withstand vehicular loading
- **Steel:**
 - Standards: To BS EN 1090 series, BS EN 10025 series, BS EN 10219 and BS EN ISO 14341
 - Finish options:
 - Hot dip galvanised to BS EN ISO 1461
 - Powder coated to BS EN 13438
 - Stainless steel to BS EN 10088 series
 - Colour(s): Where applicable, as agreed with the Employer and School/College
- **Concrete:**
 - Standards: To BS EN 206, BS 8500-1 and -2

- Finish: Smooth, non-porous
- **Timber (weirs):**
 - Standards: To BS EN 1995-1, BS 8417, BS EN 14081 series, BS EN 335 and BS EN 330
 - Finish: FSC treated timber, Use Class 4, play grade
 - Note:** Timber products shall not come into direct contact with the ground to prevent rotting

8.7.7 Health and safety

- **Risk:**
 - Approach: The Contractor shall establish with the Employer and School/College a site specific risk assessment in accordance with CIRIA SuDS Manual (C753) to ensure:
 - Nature-based SuDS features in the pupil realm shall be designed to not hold standing water
 - Low gradients are used to improve safety
 - Where there is a substantiated risk, green infrastructure boundary solutions, defensive planting or security fencing with climbing plants are prioritised – see [8.4 Boundary treatments, walls and fencing](#)
 - Drainage accessories: Follow a managed or proportionate approach to risk assessment in the design of drainage accessories in relation to avoiding slips, trips, falls and collisions

- **Materials and components:**
 - Including when combined, shall not have small openings that could trap fingers or sharp edges
 - Where loose/recycled materials are used/reused on site to fill gabion baskets, these materials shall not contain contaminants, have sharp/cut edges or exposed wires, or feature loose rocks/stones/bricks that can be easily removed

Note: Gabion baskets to have tamper proof hinged tops/lids

 - All timber shall be sanded to create smooth and splinter-free surfaces
 - All walls, fences and/or boundaries to have round or rolled top edges
 - All potential trip and collision hazards e.g., with edging and accessories shall be designed out
 - All inspection chamber covers, gullies, channels and grates to be installed flush with surrounding ground levels and not create a trip or trapping hazard
- **Fixings:** All exposed bolts, screws, nuts and fixings shall be resistant to corrosion and have tamper proof protection covers

Specific requirements

8.7.8 Raingardens

- **Extent:** In Courtyard Garden and Entrance Landscape
- **Standards:** To CIRIA's Guidance on the construction of SuDS (C768F) and The SuDS Manual (C753F)
- **Guidance:**
 - CIRIA's Retrofitting to manage surface water (C713)
 - UDL's Designing Rain Gardens: A Practical Guide
 - Rain Gardens Guide
- **Design:** Water shall be received via:
 - Adjacent paved surface, or
 - Rainwater downpipe from canopy or outbuilding, or
 - Drainage channels, or
 - Overhead rain chains
- **Edging:** Steel, concrete or paved – see [8.1 Surfaces for play, sport, paths and roads](#)
- **Levels:** Stepped to deter foot traffic – see [8.1 Surfaces for play, sport, paths and roads](#)
- **Requirements:**
 - Soil mix as [8.2 17 Raingardens and swales](#)
 - Drought-tolerant plant species as [8.3.20 Plants for raingardens, rain planters and swales](#)
 - Raingardens are to be designed to not hold standing water in pupil realm areas

- **Capacity, water levels and overflow details:** To agreed Site Drainage Schematic and Site Drainage Drawings
- **Ancillaries required:** Overflow outlet pipe with galvanised/stainless steel domed leaf guard
- **Ancillaries optional:** To be agreed with the Employer and School/College:
 - Erosion apron, where required to limit damage to soft landscape – see [8.7.13 Drainage accessories](#)
 - Timber play bridges and/or stepping stones to facilitate circulation
 - Weirs where required to slow water
 - Inlet unit when located in soft landscape

8.7.9 Rain planters

- **Extent:** In Courtyard Garden and Entrance Landscape
- **Standards:** To BS EN 1504, BS 8102, BS EN 771 series, BS 9101 and The SuDS Manual (C753F)
- **Guidance:** Rain Gardens Guide
- **Design:** Water shall be received via:
 - Rainwater downpipe from canopy or outbuilding, or
 - Overhead rain chains/cups

8.7 External drainage (nature-based SuDS)

- **Material options in order of preference:**
 - Proprietary rain planters (preferred)
 - Steel
 - Brick
 - Timber
- **Edges:** Rolled top, chamfered or rounded
- **Requirements:**
 - Waterproof lining as per guidance/manufacturer's recommendations
 - Soil composition in accordance with The SuDS Manual (C753F) for bioretention systems
 - Drought-tolerant plant species as [8.3.20 Plants for raingardens, rain planters and swales](#)
- **Capacity, water levels and overflow details:** To agreed Site Drainage Schematic and Site Drainage Drawings
- **Ancillaries required:**
 - Overflow to manufacturer's design
 - Erosion apron, where required to limit damage to soft landscape – see [8.7.13 Drainage accessories](#)
- **Ancillaries optional:**
 - Steel or timber weirs in planters
 - Second overflow
 - Spigot
 - Fascia plate

8.7.10 Planted swales

- **Extent:** In Entrance Landscape, Playscape and Parkland and Playing Fields
- **Standards:** To CIRIA's Guidance on the construction of SuDS (C768F) and The SuDS Manual (C753F)
- **Side slopes:** To be flat to enhance safety
- **Material:**
 - Soil mix as [8.2 17 Raingardens and swales](#)
 - Drought-tolerant plant species as [8.3.20 Plants for raingardens, rain planters and swales](#)
- **Requirement:** Swales are to be designed to not hold standing water in pupil realm areas
- **Ancillaries optional:** To be agreed with the Employer and School/College:
 - Weirs as required to slow water flow
 - Inlet unit when in the soft landscape

8.7.11 Attenuation ponds

- **Extent:** In Entrance Landscape, Parkland and Playing Fields in partial shade
- **Standards:** To CIRIA's Guidance on the construction of SuDS (C768F) and The SuDS Manual (C753F)
- **Material:**
 - Soil mix as [8.2 18 Attenuation ponds](#)
 - Planting as [8.3 18 Aquatic plants for attenuation ponds](#)

8.7 External drainage (nature-based SuDS)

- **Capacity, water levels and overflow details:** To agreed Site Drainage Schematic and Site Drainage Drawings
- **Requirement:** Provide a flat safety bench around the perimeter of the pond as a clear separator to the open water
- **Ancillaries optional:** To be agreed with the Employer and School/College:
 - Decking to facilitate Learning Landscape
 - Inlet unit when in the soft landscape

Surface water drainage ancillaries

8.7.12 Inspection chamber covers, gullies, channels and grates

- **Extent:** To all locations, with the exception of playing pitches, areas with play equipment and Multi Use Games Areas (MUGAs)
- **Standard:** To BS EN 124-1 and -3
- **Material:** Galvanised steel to BS EN ISO 1461
- **Detailing:**
 - Covers, gullies, grates and channels to be designed to take pedestrian and/or vehicular loading requirements
 - Lockable covers, slot and channel drains in pupil realm
 - Where in hard landscaped areas recessed inspection covers to be infilled with adjacent material
 - All inspection covers to be flush in soft landscape areas
 - All surface water drainage ancillaries shall be laid square to adjacent paving
- **Identification:** Clear labelling with utility company details, where applicable

8.7.13 Drainage channels

- **Extent:** In connection with nature-based SuDS

- **Standard:** To BS EN 1338, BS EN 1433 and recommendations in CIRIA C753 and C768
- **Material:** Paving setts
- **Width, depth, gradient and finish:**
 - To meet to meet Site Drainage Strategy/Schematic and landscape design
 - To avoid ponding or backfall

8.7.14 Drainage accessories

- **Extent:** To attenuation ponds, raingardens, rain planters and swales
- **Types:**
 - Rainwater chains/cups to connect downpipes to rain planters and/or raingardens
 - Gabion flow control to raingarden outlets
 - Spout, fascia plate and spigot to rain planters
 - Domed leaf guards to outlets
 - Slot weirs to rain planters and raingardens
 - Inlet unit to attenuation ponds, raingardens and swales
 - Erosion apron at base of downpipes, outfalls, spillways or drainage channels to slow water into swales, raingardens and rain planters and reduce soil erosion, using concrete diffuser stone, sunken

8.7 External drainage (nature-based SuDS)

gabion baskets with rounded river stones or paving setts

8.7.15 Fixed covers to ponds

- **Extent:** Where required to meet the needs of the pupils/students and the operational requirements in the Project Brief
- **Material:** Powder coated steel
- **Access:** Either via unclipped section(s) or hinged/lockable panel(s) with tamper proof fittings positioned to facilitate easy inspection and maintenance
- **Loading:** Strong enough to withstand the impact of an adult falling onto it

8.8

Structures in the landscape

This sub-section outlines the performance and functional requirements for structures in the landscape, including canopies and shelters, living (willow) structures, and storage facilities for outdoor equipment and waste. For primary building structures, see [2.1 Structural framing](#)

General requirements

8.8.1 Summary

- **Purpose:** Structures in the landscape take many forms, including:
 - Canopies to provide shelter and shade for waiting, circulation and movement, outdoor teaching, dining and learning, physical and social activity, and to connect indoor and outdoor environments
 - Canopies to signify a point of entrance and arrival
 - Structures as shading devices to help reduce heat island effects and regulate internal temperatures
 - Covered structures to provide partial protection to the elements for items such as bicycles, scooters and pushchairs/buggies
 - External storage for play and sports equipment, and waste and recycling facilities
 - Living structures e.g., willow tunnels, to provide shade and play features and connections with nature
- **Performance:**
 - Structure: To transfer design loads to support and substructures whilst ensuring structures remain stable and without causing unexpected damage. This includes wind loads and additional loads from extensive green roofs and rainwater during high levels of precipitation and saturation, as applicable
 - Fire: To resist fire and the surface spread of flame
 - Materials: Durable and resilient to withstand the elements e.g., corrosion resistant and UV stable, and daily use within an education environment
 - Sustainable: Ethically sourced (e.g., FSC or PESC) and supporting circular economy principles through re-use, re-manufacturing and recycling
 - Ventilation and daylighting: Designs to take into account the presence of adjacent canopies to ensure indoor environmental requirements are met
 - Drainage: Rainwater runoff from structures in the landscape shall be connected to nature-based SuDS – see [8.7 External drainage \(nature-based SuDS\)](#)
 - Lightning protection: Class of lightning protection to be determined by risk assessment in accordance with BS EN 62305 series – see [5.7 Electrical infrastructure](#)
 - Safety and security: Designed to prevent the climbing of the canopy/structure including downpipes by pupils/students. Also see [8.8.7 Health and safety](#)
 - Usable area: When calculating, discount canopy drip zone

8.8 Structures in the landscape

- Installation: To be installed as per manufacturer's recommendations
- Maintenance: Solutions to be low maintenance and comprise readily available parts/products that can be easily replaced. Methods of safe access for periodic cleaning and maintenance e.g., to gutters, outlets and roof mounted plant (as applicable), and adjacent buildings where in close proximity, shall be subject to an agreed Access, Cleaning and Maintenance Strategy and Planned Maintenance Plan

8.8.2 Technical Manual references

- **BioSolar and green roofs:** See [2.3 Roofs](#)
- **Lightning protection and small power:** See [5.7 Electrical infrastructure](#)
- **Exterior lighting:** See [5.8 Daylighting and electrical lighting](#)
- **Paving:** See [8.1 Surfaces for play, sport, paths and roads](#)
- **Trees and plants:** See [8.3 Soft landscape](#)
- **Boundary treatments, walls and fencing:** See [8.4 Boundary treatments, walls and fencing](#)
- **Outdoor taps and external furniture:** See [8.6 External furniture](#)
- **Nature-based SuDS:** [8.7 External drainage \(nature-based SuDS\)](#)

8.8.3 Legislation, standards and best practice

- **Statutory guidance:**
 - Structures in the landscape to comply with [AD A](#), [AD C](#), [AD K](#), [AD M](#) and [AD 7](#)
 - [The Statutory Biodiversity Metric: User Guide](#)
- **Standards:**
 - Structure: To BS EN 1990. Designs shall be in accordance with all appropriate Eurocodes
 - Wind loads: Calculated according to BS EN 1991-1-4
 - Timber structures: To BS 5268 and BS EN 1995-1-1
 - Fire: To BS 476-7
- **Best practice:**
 - [Urban Greening Factor for England User Guide \(Natural England\)](#)
 - [Environmental Benefits from Nature User Guide \(Natural England\)](#)

8.8.4 Minimum life expectancy

- **Canopy frame:** 30 years
- **Canopy roof covering:**
 - Extensive green roof: 30 years
 - Multiwall polycarbonate: 10 years
 - Glazed: 20 years
 - Micro-perforated tensile membrane: 10 years

- **Timber cladding:** 15 years

8.8.5 Fire performance

- **Resisting fire spread:** From one building to another, canopies to comply with AD B Volume 2, 13.13 and 13.14, as applicable
- **Fire suppression:** See [9 Fire safety](#) for technical requirements

8.8.6 Material options

- **Steel:**
 - Standards: To BS EN 1090 series, BS EN 10025 series, BS EN 10219 and BS EN ISO 14341
 - Finish options:
 - Hot dip galvanised to BS EN ISO 1461
 - Powder coated to BS EN 13438
 - Colour(s): Jet black (RAL 9005) or as agreed with the Employer and School/College
- **Timber:**
 - Standards: To BS EN 1995-1, BS 8417, BS EN 14081 series, BS EN 335 and BS EN 330
 - Finish: FSC treated timber, Use Class 4, play grade

Note: Timber products shall not come into direct contact with the ground to prevent rotting e.g., timber posts shall be raised off the ground via galvanised/stainless steel shoes or spacer connections

- **Concrete:**
 - Standards: To BS EN 206, BS 8500-1 and -2
 - Finish: Smooth, non-porous
- **Aluminium rainwater systems:**
 - Standard: To BS 9101
 - Finish: Powder coated to BS EN 12206-1
 - Colour(s): Jet black (RAL 9005) or as agreed with the Employer and School/College

8.8.7 Health and safety

- **Materials and components:**
 - Including when combined, shall not have small openings that could trap fingers or sharp edges
 - All timber shall be sanded to create smooth and splinter-free surfaces
 - All potential trip, trapping and collision hazards e.g., with edging and accessories shall be designed out
- **Fixings:** All exposed bolts, screws, nuts and fixings shall be resistant to corrosion, UV degradation and thermal creep, and have tamper proof protection covers
- **Setting out:** Of all structures in the landscape, shall prevent the potential for damage due to vehicular impact/overrun

8.8.8 Glazing

- **Selection:** The specification of glass for use in canopies shall be in accordance with the BS 6262 series. A specific assessment shall be carried out in accordance with Figure 1 of BS 6262-1 to determine the correct glass for the application and area
- **Performance generally:** (also see [8.8.9 Canopies](#) and [2.3.10 Glazing](#))
 - Glass shall remain in-situ if broken/damaged
 - Glazing shall be translucent and provide UV light protection
 - Glazing to canopy roofs shall be Class 2 to CWCT Technical Note 66
- **Standards:**
 - CIRIA Guidance on glazing at height (C632F)
 - CWCT Technical Note 65: Thermal fracture of glass
 - CWCT Technical Note 66: Safety and fragility of overhead glazing: guidance on specification
 - CWCT Technical Note 67: Safety and fragility of overhead glazing: testing and assessment
 - CWCT Technical Note 92: Simplified method for assessing glazing in Class 2 roofs
 - ACR [M] 001: Test for non-fragility of large element roofing assemblies

Specific requirements

8.8.9 Canopies

- **Extent:**
 - Outdoor learning canopy: Fixed to buildings or independent structure adjacent to buildings, and translucent in Early Years (EY), Special Schools/Special Colleges and AP; standalone in Primary Schools (not including EY) and Secondary Schools
 - External circulation canopy: Solid roof canopy for circulation between buildings and over arrival/waiting area in Entrance Landscape and/or Courtyard Garden
 - Dining canopy: Fixed to the building and translucent or standalone in Secondary Schools and Colleges. If standalone, a solid canopy roof can be used but shall be provided with electrical lighting in accordance with [5.8 Daylighting and electrical lighting](#)
- **Clear height:** Minimum 3m from ground level to underside of canopy at the lowest point, unless:
 - Across a designated route for fire appliances, in which case the minimum clear height advised by the local fire and rescue service shall apply
 - In the case of non-ambulant Special Schools, adequate height and clearance to avoid impact with high topped minibuses
- **Depth:**
 - 3.6m from building face (when fixed), length to suit use/design, unless otherwise agreed with the Employer
 - Variable when standalone
- **Locations:** Coordinated with internal spatial arrangements and external building elevations
- **Structure:**
 - Posts and beams: Timber (preferred) or steel
 - Where canopy structure is fixed to primary building structure, thermal breaks shall be provided between structural elements projecting into or out of a building as part of a fabric first approach to meet DfE's energy performance requirements
 - Posts in non-ambulant Special Schools to be designed out wherever possible. If unavoidable, protection measures for possible impact to be provided
- **Roof covering options:**
 - Multiwall polycarbonate roof sheets to BS EN 16153, capable of individual and independent

8.8 Structures in the landscape

- removal without compromising the integrity of the system
- Glazing as outlined in [8.8.8 Glazing](#), capable of individual and independent removal without compromising the integrity of the system
- Micro-perforated tensile membrane with fire classification to BS 13501-1. To Playscape only as a shade canopy and only where a willow structure is not appropriate; to be agreed with the Employer
- Extensive green roof to standalone canopies (i.e., not adjacent to buildings) – see [2.3.25 BioSolar roofs](#) and [8.3.19 Plants for BioSolar and green roofs](#) for technical requirements
- Solid roof canopy, fixed non-transparent covering that provides shelter and protection from the elements. Finished to meet the technical requirements in [2.3 Roofs](#) but does not need to be insulating
- **Roof covering performance:**
 - Roof coverings shall be resistant to UV degradation, thermal creep and sun bleaching, and provide UV light protection
 - Canopies adjacent to buildings to be flashed into external wall to prevent drip zone
 - All components of a sheet material or tensile design shall be easy to clean and maintain
- Falls: Designed fall taking into account deflection and construction tolerance: 1:40. Minimum finished fall: 1:80
- **Base:** Permeable paving to suit use and match adjacent surfaces, see [8.1 Surfaces for play, sport, paths and roads](#)
- **Rainwater goods:**
 - To suit canopy construction and of gravity type to BS EN 12056-3
 - Be safe and easy to flush and maintain (roddable)
 - Have a uniform finish with no signs of oxidation on external surfaces
 - Be robust enough to withstand both vandalism and accidental impact during use
 - To connect into adjacent nature-based SuDS, see [8.7 External drainage \(nature-based SuDS\)](#)
- **Services:**
 - Lighting: Canopies with opaque/non-translucent roof coverings greater than 10m² to have electrical lighting appropriate for the environment, see [5.8 Daylighting and electrical lighting](#) for technical requirements for exterior lighting
 - Power: 2no. IP65 lockable, double power outlets at adult height (not required for circulation canopies)
 - Wi-Fi coverage: Required (not required for circulation canopies)

8.8 Structures in the landscape

- Water: Via Category 5 water supply as [5.3.9 Category 5 water systems](#) to outdoor tap with lockable cover as [8.6.16 Outdoor lockable taps and tap covers](#) (not required for circulation canopies)

8.8.10 Equipment storage

- **Extent:**
 - In all character areas: Storage units to coordinate with character area requirements, as specified in the Project Brief
 - Bicycle and scooter storage: To be located inside the secure line to Entrance Landscape, Courtyard Garden (preferred) and/or Playscape
 - Play equipment storage: To be located in dedicated Early Years outdoor areas and to Playscape and/or Courtyard Garden in Primary Schools
 - Pushchair/buggy storage to Nursery provision: To be located to meet the needs of parents/pupils and the operational requirements in the Project Brief
 - Equipment storage: To be located in Parkland and Playing Fields and/or in Playscape
 - Sport equipment storage: To accommodate external sports/PE equipment in Secondary Schools only
- **Clear height:** Minimum 2m from ground level to underside of storage at the lowest point
- **Structure (options):**

- Semi-weatherproof: Open timber slats and steel framed construction
- Fully weatherproof: Close timber boarded steel framed construction with all sides forming a weatherproof barrier
- Roof covering options: As 8.8.9. Roofing felt permitted to Early Years play equipment storage and pushchair/buggy storage only
- **Gates to secure storage:** Lockable, hinged double gates to match timber cladding to open 180 degrees and be secured in place (along facade or into ground with shoot bolts)
- **Lighting:** Storage solutions with opaque/non-translucent roof coverings greater than 10m² to have electrical lighting appropriate for the environment, see [5.8 Daylighting and electrical lighting](#) for technical requirements for exterior lighting

8.8.11 Willow structures

- **Extent:** In Courtyard Gardens and Playscape
- **Design options:** Tunnels, domes, various shapes and outdoor classrooms
- **Measurements:**
 - Domes: Diameter 2.5m minimum
 - Tunnels: 1-1.5m wide maximum

- Outdoor classrooms: Minimum 1m wide entrance arch, 3m wide arbour and 6m diameter circle made with fedge screen – see [8.4.16 Fedge screen](#)

8.8.12 Storage area for general waste and recycling

- **Extent:**
 - In Entrance Landscape in a suitable location to ensure clear sightlines, paths and vehicular routes including on waste collection days (minimum of 13m²)
 - Area to be located at least 10m away from buildings, ventilation intakes, Courtyard Garden and Playscape areas to avoid odour and hygiene issues

Note: For property protection purposes, combustible materials shall not be stored within 10m of the outside of buildings
- **Type:** Lockable and visually impermeable fencing (preferred pre-grown climbing plant fence) as outlined in [8.4 Boundary treatments, walls and fencing](#)
- **Height:** To screen the contents inside the storage area
- **Base:** Impermeable surface as [8.1 Surfaces for play, sport, paths and roads](#), to freely drain to external floor drain/gully connected to foul water drainage system as [5.2 Drainage](#)

- **Installation:** To be organised with sufficient space for safe manoeuvring
- **Ancillaries:**
 - With Category 5 water supply as [5.3.9 Category 5 water systems](#) to outdoor tap with lockable cover as [8.6.16 Outdoor lockable taps and tap covers](#)
 - Waste and materials for recycling shall be stored in wheelie bins and comply with BS 5906

8.8.13 External plant space including sprinkler tanks

- **Extent:**
 - In Entrance Landscape in a suitable location to ensure clear sightlines, paths and vehicular routes
 - Structures and fencing shall be coordinated with the landscape and the design of the main building(s)
- **Type:**
 - Sprinkler tanks to be enclosed in lockable, visually impermeable, high-risk security fencing as outlined in [8.4 Boundary treatments, walls and fencing](#). This shall be a maximum of 3m in height
 - Other equipment shall be provided, as a minimum, with protection from inclement weather, including a roof with adequate clear height for maintenance personnel to stand. Some equipment, such as Air

8.8 Structures in the landscape

Source Heat Pumps, will require a permeable enclosure to allow for adequate air flow

- **Base:** Impermeable surface as [8.1 Surfaces for play, sport, paths and roads](#), to freely drain to external floor drain/gully connected to foul water drainage system as [5.2 Drainage](#)
- **Installation:** To be organised with sufficient space for maintenance and equipment replacement
- **Ancillaries:** With Category 5 water supply as [5.3.9 Category 5 water systems](#) to outdoor tap with lockable cover as [8.6.16 Outdoor lockable taps and tap covers](#)

8.8.14 Electrical substation

- **Extent:**
 - Electrical substations shall be provided in accordance with the requirements of the DNO/IDNO – see [5.7.7 Incoming electrical supplies](#)
 - Electrical substations shall be sited with consideration for clear sightlines, paths and vehicular routes
 - Structures and fencing shall be coordinated with the landscape design, providing green infrastructure solutions where possible

8.8.15 Storage area for green waste compost

- **Extent:**
 - In Playscape, and Parkland and Playing Fields

- To be located at least 10m away from buildings, ventilation intakes and Courtyard Garden and Playscape areas to avoid odour issues

Note: For property protection purposes, combustible materials shall not be stored within 10m of the outside of buildings

- **Type:** Freestanding with no post holes and aerating base
- **Frame:** Timber structure with slatted timber or close boarded cladding
- **Base:** Impermeable surface as [8.1 Surfaces for play, sport, paths and roads](#), with nearby external floor drain/gully connected to foul water drainage system as [5.2 Drainage](#)
- **Fencing:** To be surrounded by a double-staggered hedge with post and wire fence
- **Dimensions:** To meet the project Landscape and Ecological Maintenance and Management Plan
- **Installation:** To be organised with sufficient space for safe manoeuvring
- **Ancillaries:** With Category 5 water supply as [5.3.9 Category 5 water systems](#) to outdoor tap with lockable cover as [8.6.16 Outdoor lockable taps and tap covers](#)

9

Fire safety

9.1

Fire safety

This sub-section outlines the performance and functional requirements for fire safety in school and college buildings. Projects shall be designed and constructed in accordance with these requirements, except where there is an explicit requirement within this sub-section to follow particular parts of Approved Document B (AD B) Volume 2 or BS 9999

General requirements

9.1.1 Summary

- **Sub-section structure:** Unlike the other sub-sections within this Technical Manual, 9.1 Fire safety has been structured differently to mirror the structure of [Approved Document B \(AD B\) Volume 2](#). This is to ensure consistency and clarity in relation to DfE's fire safety requirements pertinent to schools and colleges and to improve navigation, application and compliance
- **Sub-section contents:** The requirements of this sub-section support Requirements B1 to B5 to Schedule 1 of the Building Regulations 2010 as well as Regulations 6(3), 7(1), 7(2), 7(3), 7(4) and 38
- **Overarching requirement:** All new and refurbished schools and colleges, including Partial School/College projects, shall be designed to meet the fire safety requirements in this sub-section, except where there is an explicit requirement within this sub-section to follow particular parts of Approved Document B (AD B) Volume 2 or BS 9999
- **Fire safety engineering:** These requirements have been written to cover common building types. The adoption of a fire safety engineered approach following BS 7974 may provide an alternative route to compliance with Part B of The Building Regulations 2010 for more complex building situations. Where this

approach is proposed and agreed with the Employer, all fire safety requirements outlined in this sub-section shall also be met

- **Purpose groups:** In most cases the appropriate purpose group for schools and colleges shall be 5 (Assembly and recreation), or 2a (Residential (institutional)) if residential accommodation is involved. General guidance on how residential accommodation in schools/colleges may comply with Part B of the Building Regulations is currently covered in AD B Volume 2 with specific requirements for residential accommodation also provided in this sub-section
- **Out of hours use:** Fire safety requirements shall also allow for community/out of hours use

9.1.2 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - [The Regulatory Reform \(Fire Safety\) Order 2005](#)
 - [The School Premises \(England\) Regulations 2012](#) applicable to maintained schools

- [The Education \(Independent School Standards\) Regulations 2014](#) applicable to academies, free schools and sixth form colleges
- **Statutory guidance:**
 - [Fire safety risk assessment educational premises](#)

9.1.3 Product and material testing

- Tests and assessments on the performance of materials, products and structures to demonstrate compliance shall be carried out by organisations with the necessary expertise e.g., organisations listed as 'approved bodies' in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020, or laboratories accredited by the United Kingdom Accreditation Service (UKAS)
- All test data relied upon to demonstrate compliance shall be made available to the Employer or Employer's Representative on request

9.1.4 Operation and maintenance

- A Planned Maintenance Plan for fire safety installations, aligned with Annex I of BS 9999, shall be provided as part of the handover information and include all periods/frequencies for tests and inspections

9.1.5 Building in use

- Routine inspection and maintenance of fire safety installations by the Responsible Body shall follow the procedures in Annex I of BS 9999

Requirement B1: Means of warning and escape

Section 1: Fire detection and alarm systems

- **Minimum level of coverage:**
 - Electrically operated fire warning system in accordance with BS 5839-1
 - For school/college buildings, including residential accommodation in schools/colleges, shall be L2/P2²⁰ (both categories are required)
 - Automatic fire detection system with manual call points
- **Manual call points:** Shall:
 - Comply with Type A of BS EN 54-11 and be installed in accordance with BS 5839-1
 - Be located so that the travel distance from any part of the building to the nearest call point is no more than 45m
 - Include a minimum of one call point per floor
 - Include call points in or near places of high hazard and in the main hall
 - Be mounted at a height of 1.4m above finished floor level

Note: Mounting height may be lowered to between

1-1.2m above finished floor level in accordance with AD M

- Wherever possible, and subject to the outcome of the project specific Security Risk Assessment process, be located where they are less prone to misuse or vandalism. This may be achieved by positioning them in open view of staff or having transparent, hinged covers

Note: Where the project specific Security Risk Assessment process has highlighted a significant risk of misuse e.g., in a SEMH school or AP, consideration may be given to the use of key operated manual call points as part of a stringent management regime but only where expressly agreed with the Employer

- **Fire alarm signals / tones:** Shall:
 - Be distinguishable from the sound signals used for class change, lockdown and intruder alarm. Where the fire alarm is used as a class change signal in buildings, the duration of class change signals shall not exceed 5 seconds

²⁰ A category L system is an automatic fire detection and alarm system intended for the protection of life. A category P system is for property protection must be permanently monitored so that any alarm is appropriately attended.

Note: The sound levels acceptable for a fire alarm may be too high for class change

- Be set at a comfortable noise level and be adjustable
- Be supplemented with flashing beacons provided in toilets and any other areas where deaf people or people with hearing loss may be on their own

Note: Where flashing beacons are not considered suitable for users, buddy systems or vibrating pagers linked to the fire alarm system may be considered

- **Voice alarm systems:** Shall:

- Where required by the project specific fire strategy, be provided via a combined Public Address and Voice Alarm (PAVA) system to give both an audible warning and verbal instruction if a fire occurs as part of a planned emergency strategy
- Comply with BS 5839-8
- Include an audible alarm signal distinct from other signals that may be in use

- **Special Schools / Special Colleges:**

- The sensory needs of users, particularly in Special Schools and Special Colleges, shall be assessed and understood to inform the design and operation of the fire detection and alarm system

- Voice alarms to BS 5839-8 may be an appropriate solution in these settings depending on the needs of users
- Alternatively, a larger number of quieter sounders may be provided to prevent noise levels becoming unacceptable
- Refer to HTM 05-03 Part B1 for examples in Health and Care settings

- **Remote monitoring:**

- Fire alarm systems shall be monitored by a manned alarm receiving centre (ARC) 24 hours a day unless the building is continuously occupied
- The ARC shall call the Fire and Rescue Service immediately, unless a filtering procedure has been agreed with the School/College in accordance with BS EN 50518

- **Detectors:**

- Shall be multi-sensor (smoke and heat) type in general
- Point smoke detectors may be provided in protected escape routes only e.g., escape stairs and protected lobbies
- Three-sensor detectors (optical-heat-carbon monoxide) shall be provided in areas where there is a high risk of false alarms e.g., kitchens and any other areas identified by the fire risk assessment

- **Design, installation, commissioning and maintenance of systems:**

- Alarm systems shall be standardised (not just compatible) across the School/College Site
- Where there is an existing site-wide fire alarm system, this system shall be extended to cover all new and/or refurbished buildings
- Where this is not possible, as evidenced in the project specific fire strategy, a standalone fire alarm system may be provided to the new and/or refurbished building(s), with a repeater panel provided adjacent to the existing main fire alarm panel
- New fire alarm systems shall be capable of being programmed to:
 - Switch between a day and night mode to allow a reduction in the sensitivity of detectors during the daytime
 - Use a timed delay during the daytime to allow staff to investigate the source of the detector activation before triggering the alarm
 - Immediately activate during the night and other times the building(s) is unoccupied and closed
- Panel location:
 - In the main entrance lobby in accordance with BS 5839-1

- If the proposal is to locate the main panel in another area, the location shall be justified and expressly agreed with the Employer
 - The fire alarm cabling shall be either a standard or enhanced type as required by BS 5839-1, and determined through a fire risk assessment
 - The wiring shall be fixed to or laid within metal cable containment. Fixing shall be by means of metallic clips
 - Soak testing shall be carried out as outlined in [5.11.12 Soak testing](#)
 - An installation and commissioning certificate of the fire alarm system(s) shall be submitted to the Employer prior to handover
 - Maintenance and inspection regimes for fire alarm systems shall comply with Annex I of BS 9999 and be clearly outlined in the Planned Maintenance Plan
- **Interface between fire detection and alarm systems and other systems:** Shall be in accordance with 1.17 in AD B Volume 2

Section 2: Design for horizontal escape

- **Criteria for means of escape generally:**

- Buildings shall be designed to ensure users (pupils/students, staff and visitors) in any part can reach a place of safety, efficiently, with dignity and without external assistance in an emergency
- Where practical, escape routes shall be the same as those used for normal circulation to aid familiarity and reduce anxiety and panic
- Means of escape shall be provided from any point on a floor to an exit from the floor
- The general principle is that any person confronted by a fire within a building can turn away from it and escape safely
- The means of escape strategy is likely to be simultaneous evacuation, where all occupants leave the building on the sounding of the fire alarm. These are the minimum requirements for means of escape purposes
- However, inclusive design for escape shall be an integral part of the design process, taking account of all users including those with sensory, cognitive, and/or mobility needs
- Escape for blind people or people with low vision shall be supported by:
 - Clear signage and tactile information
 - Continuous handrails on stairs and landings
 - Visual contrast along escape route(s)
 - Audible information or signals
 - Clear, simple routes around buildings which are free from obstacles
- Consideration shall be given to the needs of users, as some pupils/students in some settings may have additional support frames, larger wheelchairs or other mobility aids that may have an impact on the width of corridors, stairs, doors and/or lifts, above those required by AD M, and BS 8300-1 and -2
- An accessible means of escape for disabled people with complex needs shall be an integral part of the fire safety management process

- **Travel distances:**

- The number of escape routes and exits to be provided shall depend on the number of occupants in the room, tier or storey in question and the limits on travel distance to the nearest exit given in Table 28 overleaf
- It is only the distance to the nearest exit that needs to meet the recommendations. Other exits may be further away
- The dimensions in Table 28 are the maximum travel distances permissible depending on location.

If the internal layout of partitions, fittings etc is not known when plans are deposited, direct distances shall be used for assessment. The direct distance is taken as 2/3rds of the travel distance

- A single direction of escape (a dead end condition) shall be minimised/designed out wherever possible. Where unavoidable, it shall be subject to:
 - o The maximum travel distances in a single direction in Table 28, and
 - o Limiting the occupancy of the space off the dead end condition to 60 persons
 - **Access control measures:**
 - Measures to restrict access to the building (or parts of it) shall not adversely affect fire safety provisions
 - Where doors need to be secured against entry for security purposes, whether the building is occupied or not, emergency hardware shall be provided to ensure safe egress in an emergency
 - Electrically powered locks shall fail-safe open on activation of the fire alarm and/or loss of power and/or by activation of a manual release unit (Type A) to BS 7273-4 positioned to facilitate escape
- Note:** Where the project specific Security Risk Assessment process has highlighted a significant risk of misuse e.g., in a SEMH school or AP,

consideration may be given to the use of key operated manual release units as part of a stringent management regime and only where expressly agreed with the Employer

Location	Where travel is possible in one direction only (m)	Where travel is possible in more than one direction (m)
Places of special fire hazard ¹	9	18
Areas with seating in rows	15	32
Areas not listed above	18	45
Ground storey of small premises with a single exit	27	N/A

Table 28: Limitations on travel distance

¹ For the purposes of travel distance calculations, science laboratories and studios, and science preparation rooms (excluding chemical stores²¹) do not need to be treated as places of special fire hazard

²¹ Storage spaces for fuel or other highly flammable substances e.g., chemicals shall be treated as places of special fire hazard.

- **Number of occupants and exits:**

- The number of occupants to be used as the basis for the project specific fire strategy and building design shall be based on the 'maximum/design occupancy' figures against the individual space types in the Schedule of Spaces

Note: If these design occupancy rates change during occupation and use, it shall be the duty of the Responsible Person for the School/College to ensure that an appropriate fire safety risk assessment is carried out, including any associated changes to the building's fire safety measures

- When the number of occupants likely to use a room, tier or storey is not known, the capacity shall be calculated according to the floor space factors given in Table 29
- The minimum number of escape routes and exits from a room or storey according to the number of occupants shall comply with Table 2.2 in AD B Volume 2
- The number of exits shall be dependent on the limitations on travel distances outlined in Table 28

Room / area	Occupant capacity based on floor space factor (m ² /person) or design intent
Classroom, lecture room, study room	Maximum design capacity (e.g., no. of seats)
Dining room	0.9
Main hall, multi-purpose hall (also used for examinations)	0.45
Sports hall (not used for assembly or examinations)	5
Store room	30
Office	6
Staff social room	1

Table 29: Occupant capacity in rooms or areas

- **Alternative escape routes:** Shall be in accordance with 2.10 in AD B Volume 2
- **Inner rooms:**
 - An inner room is a 'normally' occupied room (e.g., classroom, staff workroom) from which the only escape is through another room
 - Spaces with transient occupancy (e.g., toilets and store rooms) do not need to be considered as inner rooms
 - Classrooms can be inner rooms when the corridor that they escape into is used as a teaching space or for other purposes, rather than just for circulation
 - Such an arrangement is acceptable providing that the following conditions are satisfied:
 - The occupant capacity of the inner room does not exceed 60 and the access room is not a place of special fire hazard
 - The escape route from the inner room does not pass through more than one access room
 - The travel distance from any point in the inner room to the exit(s) from the access room does not exceed the appropriate limit given in Table 28
 - One of the following arrangements is made:
 - i) the enclosures (walls or partitions) of the inner room are stopped at least 500mm below the ceiling; or
 - ii) a suitably sited vision panel not less than 0.1m² is located in the door or walls of the inner room, to enable occupants of the inner room to see if a fire has started in the access room; or
 - iii) the access room is fitted with a suitable automatic fire detection and alarm system to warn the occupants of the inner room of the outbreak of a fire in the access room
- In residential accommodation, inner rooms shall be avoided. Where unavoidable, due to existing building constraints, the occupancy of an inner room shall not exceed 30 persons (reference Purpose Group 2(a) residential (institutional) buildings in AD B Volume 2)
 - If a corridor is lined with lockers, any rooms off the corridor shall be regarded as inner rooms with the corridor treated as the access room
- **Open spatial planning:**
 - Where an open plan space connects more than one storey, rooms accessed from the open plan space shall be treated as inner rooms with the open plan space regarded as the access room, irrespective of whether the occupancy is transient or otherwise
 - In buildings not fitted with automatic fire suppression systems and where escape routes pass within 4.5m of open connections between

floors, alternative escape shall be available which does not pass within 4.5m of the void

- In buildings fitted with automatic fire suppression systems, rooms which are accessed by an open balcony less than 4.5m wide, and which do not have an alternative escape route away from the balcony, shall satisfy the following conditions:
 - o Escape from any point on the balcony shall be available in at least two directions
 - o The travel distance along the balcony shall not exceed 18m
- **Access to storey exits:** Shall be in accordance with 2.14 in AD B Volume 2
- **Separation of circulation routes from protected stairways:** Shall be in accordance with 2.15 in AD B Volume 2
- **Width of escape routes and exits:**
 - For escape purposes, the minimum corridor width of 1200mm recommended by AD M is sufficient if the corridor is not expected to serve as means of escape for more than 250 people. Corridor widths compliant with DfE's spatial standards (see Pattern Book) shall typically exceed this minimum
 - For more than 250 people, the minimum corridor width shall be calculated using the 5mm per person rule in accordance with AD B Volume 2

- Fixed seating for auditoria shall be in accordance with Annex D of BS 9999

- **Discounting exits:**

- Where a storey or room has more than one exit, it shall be assumed that one of them might not be available due to fire
- Therefore, when deciding on the total width of exits needed, the largest exit shall be discounted. Table 2.3 in AD B Volume 2 outlines the required exit width against a maximum number of persons escaping

Note: The required storey exit width can affect the required stair width because stairs need to be at least as wide as any storey exit leading onto them. Table 2 in AD M Volume 2 provides the minimum effective clear width of doors (also see Table 6 in section [2.8 Internal doors and glazed screens](#) for DfE's minimum effective clear width requirements for internal doors and [2.4.11 Internal stairs](#) for DfE's minimum clear width requirements for internal stairs)

- Where a ground floor storey exit shares a final exit with a stair via a ground floor lobby, the width of the final exit shall be sufficient to enable a maximum evacuation flow rate equal to or greater than that from the storey exit and stair combined (see Diagram 2.6 in AD B Volume 2)

- **Corridors:**
 - Protected corridors, enclosure of corridors that are not protected corridors, and the division of corridors shall all be in accordance with AD B Volume 2
 - Where a cavity exists above the ceiling over a corridor providing access to alternative escape routes, cavity barriers shall be fitted in accordance with Method 2 of 2.27 in AD B Volume 2
 - Any ventilation ducts shall ensure that their location does not create a risk of smoke bypassing the corridor separation
 - Doors that could provide a path for smoke to bypass compartmentation shall be self-closing but need not necessarily be fire resisting
- **Dead end corridors:** Where unavoidable:
 - Shall be enclosed in fire resisting construction up to the point that escape becomes available in two directions with the following exceptions:
 - Protected corridors do not need to be provided to short recesses of less than 2m
 - And over 4.5m in length, shall be separated from the main circulation corridor by self-closing fire-rated doorsets with smoke seals
- **External escape routes:** Shall be in accordance with 2.30 in AD B Volume 2
- **Escape over flat roofs:** Shall not be permitted unless for maintenance personnel only
- **Progressive horizontal evacuation (PHE) / phased evacuation:**
 - In some non-ambulant Special Schools and Special Colleges where occupants may require personal assistance, phased evacuation may be more appropriate
 - If PHE or phased evacuation is required to be implemented:
 - A single storey building solution is preferred
 - A building shall be divided into protected areas by compartment walls and compartment floors
 - Each storey shall contain at least three protected areas
 - For PHE every protected area shall have a minimum of two exits to adjoining protected areas
 - Maximum travel distances to the exit within a protected area shall be as shown in Table 28, and no more than 64m from any point to a storey exit or final exit
 - Escape routes shall not pass through ancillary accommodation (e.g., kitchens, staff changing rooms, locker rooms, plant rooms)
 - Direct access from classrooms to an external place of safety is considered an advantage for young children e.g., Early Years and KS1/Infant

- Specialist advice shall be sought on the sizing of escape stairs and exits. Also see 'Discounting of stairs' on page 486

Section 3: Design for vertical escape

- **Generally:**

- The siting and relationship of three elements - evacuation lift(s), stairs and refuges - shall be considered at the outset of a building's design as part of a holistic horizontal and vertical circulation strategy for pupils/students, staff and visitors on a daily basis whilst ensuring their safe, effective escape in an emergency
- In multi-storey buildings, more than one internal stair shall be provided for escape from every part of every storey. Single internal escape stairs are not acceptable
- Stairs need to be at least as wide as any storey exit leading onto them
- The width of escape stairs shall not reduce at any point on the way to a final exit
- External escape stairs are not acceptable in new buildings

- **Carry-down:**

- Individuals with mobility needs or requiring assistance shall be evacuated using evacuation lifts. Carry down is not the preferred option, as it is not suitable for all, may lack dignity and presents risk to those being carried or those carrying

- Carry down procedures will be necessary when evacuation lifts are not accessible e.g., where a fire prevents access or a lift is undergoing maintenance/repair
- Carry down can be undertaken in a variety of ways including using the person's own wheelchair, using a dedicated evacuation chair, or using powered stair climbers
- Where carry down is proposed in a stairway, stairs shall be a minimum width of:
 - 1600mm for three person carry down. DfE's requirement for 1650mm stair widths exceeds this minimum – see [2.4.11 Internal stairs](#)
 - 1700mm for four person carry down, but only where specified in the Project Brief**Note:** The purchasing and servicing of all carry down equipment and the training of staff shall be the responsibility of the School/College, in accordance with the fire safety risk assessment

- **Number and position of escape stairs:**

- The number of escape stairs shall be determined by satisfying travel distance requirements, whilst allowing for the possibility that a stair may have to be discounted for escape purposes because of fire or smoke

- **Provision of refuges:**

- Refuges shall:
 - Be provided on every storey (except those consisting only of plant rooms, and at final exit level) in each protected stairway providing an exit from that storey
 - Be provided on every storey to evacuation lifts except at final exit level
 - Be located to not inhibit easy access to evacuation lifts and stairs
 - Not reduce the width of the escape route or obstruct the flow of people escaping
 - Enable effective and accessible communication between those in the refuge and those who are organising the evacuation process e.g., from the main reception
 - Be protected from smoke and fire
 - Be a minimum of 900mm x 1400mm and have simple accessible signage to indicate the area is a refuge and providing simple instructions
 - Where specified in the Project Brief, include a fold-down seat to allow a resting place for someone who may have difficulty standing
- A single refuge may be occupied by more than one person during the evacuation procedure
- Examples of satisfactory refuge locations:

- An enclosure such as a compartment, protected lobby, protected corridor or protected stairway
- Other requirements for refuges are set out in Annex G of BS 9999

- **Emergency voice communication systems:**

- Each refuge shall be provided with an emergency voice communication system compliant with BS 5839-9
- This emergency voice communication system shall enable occupants within each refuge to alert others that they need assistance and to receive communications
- The main emergency voice communication system control panel shall be located where it can be safely monitored during the evacuation. The location of the control panel shall be agreed with the School/College and specified in the Project Brief

- **Width and capacity of escape stairs:**

- In general, most schools and colleges follow simultaneous evacuation procedures
- For simultaneous evacuation, each escape stair shall be a minimum width of 1100mm. DfE's requirement for 1650mm stair widths exceeds this minimum – see [2.4.11 Internal stairs](#)

- The capacity of escape stairs with widths from 1100mm to 1800mm is given in Table 3.2 in AD B Volume 2
- Where the maximum number of people needing to use the escape stairs is not known, occupant capacity shall be calculated based on the appropriate floor space factors in Table 29
- All residential accommodation, such as boarding schools, shall follow simultaneous evacuation procedures unless within a Special School/Special College (see below)
- Special Schools and Special Colleges:
 - o In some non-ambulant Special Schools and Special Colleges where occupants may require personal assistance, progressive horizontal evacuation (PHE) or phased evacuation may be more appropriate
 - o If PHE or phased evacuation is implemented, specialist advice should be sought on the sizing of escape stairs and exits
- **Discounting of stairs:**
 - Where two or more stairs are provided, it shall be assumed that one of them might not be available due to fire
 - Each stair shall be discounted in turn to ensure the capacity of the remaining stair(s) is adequate for the number of persons needing to escape
- This applies to a building with or without an automatic fire suppression system
- It is not necessary to discount each stair in turn when:
 - o They are protected by a smoke control system designed in accordance with BS EN 12101-6, or
 - o Each stair is approached on each storey through a protected lobby

Note: A protected lobby need not be provided on the top storey

 - o However, at least one storey exit shall still be discounted with these exceptions (see 2.21 in AD B Volume 2) and this shall be the largest storey exit
- **Enclosure of escape stairs:** Shall be in accordance with 3.23 in AD B Volume 2
- **Construction of escape stairs:**
 - Flights and landings of escape stairs shall achieve Class A2-s1, d0 or better for situations noted in 3.24 in AD B Volume 2
 - For riser and tread dimensions, see [2.4 Stairs, ramps and lifts](#)
- **Single steps:** Single steps on escape routes shall be avoided
- **Helical stairs and spiral stairs:** Are prohibited as part of an escape route

- **Fixed ladders:** Are prohibited as part of an escape route except where a fixed escape ladder located in a designated secure area is provided for emergency escape for maintenance personnel from roofs – see [2.4.14 Emergency escape for maintenance personnel from roofs](#)
- **External walls adjacent to protected stairways:** Shall be in accordance with 3.29 and 3.30 in ADB Volume 2
- **External escape stairs:**
 - External escape stairs are not acceptable in new buildings
 - Where external stairs are required as part of an escape route in refurbishment projects, due to limitations of the existing building, they shall meet the requirements of 3.31 to 3.33 in AD B Volume 2
 - Glazing in areas of fire resisting construction to external escape stairs in refurbishment projects shall also be fire resisting. Additional insulation performance shall be required where a risk assessment indicates that the potential fire hazard requires protection against heat in the post flashover phase. Flashover is defined in BS 9999 (3.54)
- **Exits from protected stairways:** Shall be in accordance with 3.36 in AD B Volume 2
- **Separation of adjoining protected stairways:** Shall be in accordance with 3.37 in AD B Volume 2
- **Use of space within protected stairways:** Only the following facilities are acceptable in protected stairways:
 - Sanitary accommodation or washrooms, providing the accommodation is not used as a cloakroom or forms an accessible toilet
 - A lift well if it is not a firefighting stair
 - A reception desk or enquiry office area of a maximum 10m² at ground or final exit level, if it is not in the only stair serving that part of the building
 - Cupboards (not storing chemicals) enclosed with fire resisting construction, kept locked and with cold-smoke seals, if they are not in the only stair serving that part of the building
- **Protected lobbies:**
 - A protected lobby shall be a fire resisting enclosure providing access to an escape stair and/or evacuation lift via two sets of fire doors and into which no room opens other than toilets
 - A protected lobby shall be provided to escape stairs where:
 - The building is designed for phased evacuation, or
 - An evacuation lift is situated within the protected enclosure of the escape stair, or

- The stair is a firefighting stair
- It is not necessary to discount each stair in turn when each stair is approached on each storey through a protected lobby (a protected lobby need not be provided on the top storey for this exception still to apply). See 'Discounting of stairs' on page 486 and 3.14 and 3.15 in AD B Volume 2
- A protected lobby shall also be provided between an escape stair and a place of special fire hazard (see 3.35 in AD B volume 2). In this situation, the lobby shall have no less than 0.4m² of permanent ventilation or be protected by a mechanical smoke control system
- A protected corridor shall not be proposed as an alternative to a protected lobby to an escape stair or evacuation lift due to the larger number of fire doors and service penetrations required that may lead to areas of increased fire risk
- Avoid placing furniture, noticeboards and any other non-essential items in protected lobbies
- **Evacuation lifts:**
 - In multi-storey buildings evacuation lifts shall be provided in place of standard passenger lifts
 - Evacuation lifts shall:
 - Afford safe evacuation from all storeys within reasonable time periods
 - Always be available for evacuation purposes
 - For general lift requirements, see [2.4.10 Lifts generally](#)
 - For numbers of evacuations lifts and lift car sizes, see [2.4.15 Evacuation lifts](#)
 - For applicable design standards: See [2.4.3 Legislation, standards and best practice](#)
 - Evacuation lift installations:
 - Fire protection of evacuation lift installations in general, shall be in accordance with AD B Volume 2
 - Evacuation lifts shall be situated within a protected enclosure of fire resisting construction (minimum REI 30) consisting of the lift well itself and a protected lobby at each storey served by the lift
 - Evacuation lifts shall be associated with a refuge. See 'Provisions of refuges' on page 485
 - Where multiple lifts are located within the same lobby, all lifts shall be evacuation lifts
 - The evacuation lift well and protected lobby area shall be sited either:
 - Within the enclosure of a protected stairway, or
 - Provided separately within a fire resisting enclosure in close proximity to a protected stairway
 - The evacuation lift enclosure and associated escape route shall:

- Remain free from the effects of fire, heat, and smoke during evacuation
 - Prevent the spread of heat and smoke vertically through the building
- Final exit:
 - A protected route of fire resisting construction shall be provided from the evacuation lift lobby at the final exit level to a final exit
 - The route from the protected lobby on the final exit level to a final exit shall lead to ultimate safety
- Alternative means of escape:
 - No part of an escape route shall be served only by a lift; a protected stair with refuge shall always be in close proximity to the evacuation lift
 - The building management plan shall include contingency arrangements for people who require level access for means of escape if an evacuation lift is out of service
- Power supplies, including an alternative power supply, shall be provided in accordance with BS 9999 clause G.2.2 (Annex G)

Section 4: Small premises – not used

Section 5: General provisions

- **Protection of escape routes:** Fire resistance of enclosures, of doors and of glazed elements shall all be in accordance with AD B Volume 2
- **Fire doors and doors on escape routes:** Shall be in accordance with AD B Volume 2 and the following requirements:
 - Fire doors shall be in accordance with Appendix C in AD B Volume 2 with the exception of vision panels. See 'Vision panels in doors' on page 491
 - Emergency door releases shall be mounted between 1000mm and 1200mm above finished floor level so that they are accessible to wheelchair users
 - Timber doorsets shall comply with BS 476-22 and BS 8214
 - A fire door shall have a certificate of performance, which shall be included in the fire safety information provided by the Contractor at handover
 - Maintenance and inspection requirements of fire doors shall comply with Annex I of BS 9999
 - Parts requiring replacement shall be like for like, and the correct, compatible components shall be listed on the installation instructions of the fire certificate data sheet
- The fire door label (to be located on top of the door leaf) shall include the manufacturer's contact details if confirmation is needed for the correct components
- **Door fastenings:**
 - Door closers shall only be provided where they are essential as they create access difficulties for people with limited upper body strength, particularly young children
 - Where closers are provided, they shall comply with the opening forces in AD M and BS 8300-2. Fire doors, security doors or any other particularly heavy doors may not meet these requirements; alternative methods of creating easily accessible routes shall be considered, including hold-open devices or automation. In an emergency these doors may need to be managed by staff, and this shall be highlighted in the evacuation plan
 - If a self-closing device interferes with the normal approved use of the building, self-closing fire doors may be held open by an automatic release mechanism to BS 7273-4, activated by an automatic fire detection and alarm system
 - Where specified in the Project Brief for access control (e.g., in an SEMH school or AP), self-

closing doors may be held locked shut by an automatic release mechanism activated (opened) by an automatic fire detection and alarm system

- If bedroom doors in residential accommodation are locked, automatic lock override functions are required in the event of fire alarm activation
- Final exit doors may be fitted with manual deadlocks that are used only when the building is empty providing the deadlock has an internal override e.g., thumbturn

Note: A stringent management regime needs to be in place to ensure the safe use of these door types

- Doors on escape routes (whether or not the doors are fire doors) from rooms with a capacity of more than 60 occupants shall either:
 - o Not be fitted with lock, latch or bolt fastenings, or
 - o Be fitted with panic fastenings in accordance with BS EN 1125
- All of the above mechanisms shall be regularly inspected and well maintained in accordance with Annex I of BS 9999
- **Direction of opening:** The door of any doorway or exit shall be hung in accordance with 5.11 in AD B Volume 2
- **Amount of opening and effect on associated escape routes:** Shall be in accordance with 5.12 and 5.13 in AD B Volume 2

- **Vision panels in doors:**

- See [2.8 Internal doors and glazed screens](#) for vision panel requirements
- Where non-insulating fire-resistant glazing is used, vision panels shall:
 - o Be less than 10% of the door area
 - o Not be less than 500mm above the floor
- Where insulating fire-resistant glazing is used, there shall be no limitation on its use or size, unless limitations are required for other reasons e.g., to limit damage from malicious abuse

- **Headroom in escape routes:** Shall not be less than 2.1m, with no projection below this height except for standard door frames

- **Flooring of escape routes:** The floor finishes of all escape routes (including the treads of stairs and surfaces of ramps and landings) shall be chosen to minimise their slipperiness when wet

- **Ramps and sloping floors:** The gradient of the incline or ramp shall not exceed 1 in 12

- **Final exits:** Shall be in accordance with AD B Volume 2 and the following requirements:

- Be sited to ensure rapid dispersal of persons from the vicinity of the building so that they are no longer in danger from fire and smoke
- Provide direct access to a street, passageway, walkway or open space

- Include adequate provision for the safe assembly of the school/college's occupants in areas (fire muster points) that will not be affected by smoke or the effects of fire damage
- Not lead onto enclosed courtyards
- Note:** Assembly (fire muster) points shall not hinder access for the Fire and Rescue Service
- **Lighting of escape routes:**
 - All escape routes shall have adequate electrical lighting, including emergency lighting, complying with BS 5266-1 and BS EN 1838 – also see [5.8 Daylighting and electrical lighting](#)
 - If the mains electricity power supply fails, escape lighting shall illuminate the routes listed in Table 5.1 in AD B Volume 2
 - Lighting to escape stairs in residential accommodation shall be on a separate circuit from that supplying any other part of the escape route
- **Signage and wayfinding:**
 - Fire safety signage shall be provided to comply with BS ISO 3864-1 and BS 5499-4
 - Signage shall:
 - Be clear and easily understood
 - Be well lit and carefully sited
 - Be located so that all users can see it, including people in wheelchairs
 - Have visual contrast to its background, avoiding bright or shiny surfaces
 - Signage shall be provided for refuges including directional signage and for equipment use
 - All stair and lift landings shall be clearly marked with the relevant floor number
 - All fire muster points shall be clearly marked
 - In residential accommodation signs shall be provided over the exit doors from dormitories and bedrooms showing where the nearest fire exit is
 - In Special Schools and Special Colleges there may be a need for additional or alternative signage as determined by the project specific fire strategy
 - For residential buildings with a floor level over 11m above ground level, firefighting wayfinding shall be provided in accordance with the recommendations in AD B Volume 2
- **Electrical services for life safety and fire protection systems:**
 - Electrical services, including electrical power supplies, for life safety and fire systems, shall be provided in accordance with BS 8519 and BS 9999
 - This includes, but is not limited to, emergency lighting, sprinkler systems, fire rescue service and evacuation lifts, fire detection and alarm systems, smoke ventilation systems and fire services communications systems

Requirement B2: Internal fire spread (linings)

Section 6: Wall and ceiling linings

- **Classification of linings:** The surface linings of walls and ceilings shall meet the classifications in Table 30 below, other than where variations and special provisions apply, see noticeboards and lockers below

Location	European Class ¹
Small rooms with area no greater than 30m ² or 4m ² in residential accommodation	D-s3, d2
Other rooms	C-s3, d2
Other circulation spaces	B-s3, d0

Table 30: Classification of linings

¹ The classes of reaction to fire performance of A2, B, C, D and E are accompanied by additional classifications related to the production of smoke (s1, s2, s3), with s1 indicating the lowest production, and/or flaming droplets/particles (d0, d1, d2), with d0 indicating the lowest production. When a classification includes 's3, d2', this means that there is no limit set for smoke production and/or flaming droplets/particles

- **Walls:**
 - Walls shall be defined in accordance with 6.2 and 6.3 (6.4 for residential) in AD B Volume 2
 - The performance of wall linings shall not include fitted furniture including noticeboards, display boards and lockers
 - Parts of walls in rooms may be of a lesser performance than that specified in Table 30 (but not poorer than Class D-s3, d2) provided the total area of those parts in any one room does not exceed 50% of the floor area of the room; and subject to a maximum of 60m²
- **Noticeboards/display boards:**
 - Irrespective of where they are to be installed, all noticeboards and display boards greater than 1m² in area shall be fire tested as a complete item to pass the 'smouldering ignition source 0 (cigarette test)' and 'flaming source 1 (match test)' in accordance with BS 5852, Clause 12
 - In teaching spaces shall:
 - Not extend more than 2.5m without having a break between them of at least 0.4m
 - Be located away from potential sources of ignition

- Not have a total area that exceeds 20% of the wall area or, if an automatic fire suppression system is installed, not exceed 50% of the wall area, to a maximum area of 60m² in either case
 - In corridors and circulation areas on escape routes shall:
 - Be covered by top hung glass or polycarbonate cover
 - Be no more than 3m long
 - Have a gap of at least 1m between noticeboards/display boards
- **Lockers:**
 - In corridors shall be made from materials rated Class A2-s3, d2 or better
 - Vents shall be excluded from lockers when positioned in escape corridors
 - Where cloakrooms are provided (or retained in refurbishment projects) lockers shall be made from materials rated Class A2-s3, d2 or better
- **Ceilings:**
 - Ceilings shall be defined in accordance with 6.5 and 6.6 in AD B Volume 2
 - Regarding the performance of ceiling linings, a ceiling shall include the underside of a mezzanine or gallery
- **Fire resisting ceilings:** Shall be in accordance with 6.7 in AD B Volume 2
- **Rooflights:**
 - The use of thermoplastic/polycarbonate rooflights is not acceptable
 - Non-plastic rooflights shall meet the performance given in Table 30
- **Thermoplastic materials:** Thermoplastic materials that cannot meet the performance given in Table 30 may be used in lighting diffusers, and flexible thermoplastic materials may be used in panels to suspended ceilings, if they comply with Diagrams 6.1, 6.2 and 6.3, and the provisions of Table 6.2 in AD B Volume 2. Note 6 to Table 6.2 in AD B Volume 2 does not apply to education buildings

Requirement B3: Internal fire spread (structure)

Section 7: Load bearing elements of structure

- **Generally:**
 - Compartment walls shall be treated as elements of structure whether load bearing or not
 - Load bearing elements may or may not have a fire-separating function
 - Fire-separating elements may or may not be load bearing
 - Premature failure of the structure shall be prevented by providing the necessary minimum standard of fire resistance to all load bearing elements
- **Fire resistance standard:**
 - All elements of structure shall have a minimum fire resistance of 60 minutes (REI 60). See Tables B1 and B2 in Appendix B in AD B Volume 2
- **Exclusions from the provisions for elements of structure:**
 - A structure that supports only a roof. Also see 'Escape over flat roofs' on page 482
 - Other exclusions shall be in accordance with 7.3 in AD B Volume 2

Section 8: Compartmentation / sprinklers

- **Generally:**
 - When a building is constructed to prevent the spread of fire from another part of the same building or an adjoining building, it is said to be compartmented
 - Compartments may consist of single or multiple rooms, spaces or storeys
 - Compartments shall be constructed so that their relevant boundaries are fire resisting
 - A fire shall be contained by compartmentation, thereby limiting its extent to the place of origin, to:
 - Prevent rapid fire spread
 - Limit the size of a fire
 - Provide protected zones linked by protected escape routes to a place of safety outside the building
 - The extent of sub-division shall depend on:
 - The use of and fire load (risk) in the building
 - Ease of evacuation
 - The height to the top storey in the building
 - The ability of the Fire and Rescue Service to intervene effectively
 - Whether an automatic fire suppression system is fitted

- **Construction of compartment walls and compartment floors:**
 - Shall provide fire resistance of a minimum REI 60
 - Shall be in accordance with AD B Volume 2
 - See Table 31 below for maximum compartment areas

Multi-storey schools	Single storey schools
No AFSS – 2000m ²	No AFSS – 4000m ²
With AFSS – 4000m ²	With AFSS – 8000m ²

Table 31: Maximum dimensions of building or compartment

Note: ‘AFSS’ means that the building is fitted throughout with an approved ‘automatic fire suppression system’

- **Special forms of compartmentation:**
 - Residential accommodation shall be in a separate fire compartment from the rest of the school/college, with dormitories and/or individual bedrooms separated by 30-minute fire resisting construction (REI 30)
 - Corridors which access dormitories and/or individual bedrooms shall also be fire protected
 - There are also special forms of compartmentation to which particular construction provisions apply. Fire resistance of these shall comply with Tables

B1 and B2 in Appendix B in AD B Volume 2. These are:

- Walls common to two or more buildings
 - Walls dividing buildings into separated parts
 - Construction enclosing places of special fire hazard – see ‘Places of special fire hazard in Schools and Colleges’ on page 498
- **Compartment floors:**
 - All floors shall be constructed as compartment floors as a property protection measure, except for buildings fitted with AFSS
 - Where openings in compartment floors are provided in buildings without AFSS, this may result in more than one storey being part of a single volume. As an alternative to fitting AFSS to these buildings, vertical compartmentation may be considered so long as:
 - Compartment walls allow occupants to escape past voids in accordance with the maximum travel distances shown in Table 28
 - Compartment walls shall follow the prescriptive recommendations of Diagram 2.5 AD B Volume 2 for escape past an open void, with alternative escapes
 - Fire doors within walls that form the compartment boundary shall comply with Table C1 in AD B Volume 2

- Where no alternative escape is provided, balcony escape through an atrium shall follow the requirements of BS 9999 section B.3.2. See 'Open spatial planning' on page 480
- **Junction of compartment wall or compartment floor with other walls:**
 - There shall be continuity at the junctions of fire resisting elements enclosing a compartment and any openings from one compartment
 - Excessive deflections shall be prevented to ensure compartment integrity
 - Compartment walls shall be able to accommodate deflection of the floor when exposed to fire
 - See LPC Design Guide for the fire protection of buildings and 8.24 in AD B Volume 2
- **Junctions with roofs:** Junctions of compartment walls with roofs shall be in accordance with 8.25 to 8.27 in AD B Volume 2
- **Openings in compartment walls and compartment floors:** Shall be limited to those for:
 - Atria designed in accordance with Annexes B and C of BS 9999
 - Doors which have the fire resistance stated in Appendix C in AD B Volume 2. Unless providing both integrity and insulation in accordance with Table B1 in AD B Volume 2, door openings shall be restricted to a maximum of 25% of the length of the compartment wall
- Protected shafts that meet the relevant provisions outlined in Section 8 in AD B Volume 2
- The passage of pipes, ventilation ducts, service cables, chimneys, appliance ventilation ducts or ducts encasing one or more flue pipes which meet the provisions set out in Section 8 in AD B Volume 2
- Where these services pass vertically through into circulation areas (corridors) they shall be located fully within the dedicated service spine and encased with appropriate fire resisting construction. See Section 10, Flues etc
- **Protected shafts and their construction, uninsulated glazed screens to protected shafts and openings into protected shafts:** Shall all be in accordance with AD B Volume 2
- **Glazing in compartment walls:**
 - Glazed apertures shall meet the fire resistance of the compartment wall
 - All fire resisting glass types only function as intended when installed as part of a whole fire resisting system, which includes matched components
 - The whole system shall be fire resisting and evidenced by third party fire test certification

- For limitations where uninsulated glazing elements meet integrity requirements only, refer to 5.4, 5.5 and 8.34 in AD B Volume 2
- **Places of special fire hazard in Schools and Colleges:** Require additional protection by being enclosed in a minimum 30-minute fire-resistant construction (minimum REI 30) or greater where noted below. The following shall be treated as places of special fire hazard:
 - Plant and boiler rooms
 - Storage space for fuel or other highly flammable substances e.g., chemical stores
 - Kitchens
 - Rooms housing a fixed internal combustion engine
 - Energy storage systems

Note: Walls for these spaces are not compartment walls, unless the place of special fire hazard abuts a compartment wall
- **Oil-filled transformer and switch gear rooms:** Shall:
 - Be enclosed in fire resisting construction (minimum REI 60)
 - Have fire resisting doors (minimum E 60) where forming part of the enclosure
 - Where fire doors open onto fire protected corridors they shall include smoke seals

Note: This is only likely to apply in the refurbishment of older buildings, as modern practice is to not use oil-filled electrical equipment within buildings
- **Places with additional fire safety requirements in Schools and Colleges:** Areas within Schools and Colleges where they either accommodate 'hot' activities, thus having the potential to be a high-risk area, or offer opportunities for arson need special consideration to other specific fire safety requirements to mitigate the risk. These areas include:
 - Internal storage areas:
 - Dedicated stores within a building shall be secure
 - If a building contains flammable sports mats, these shall be stored in locked cupboards or stores of appropriate fire resisting construction, vented to the external air and equipped with a smoke detection system
 - Science laboratories, preparation rooms, and D&T spaces:
 - Science laboratories and prep rooms have often been treated as places of special fire hazard, but with the changes in legislation concerning the control of dangerous and hazardous substances the risk of a significant fire has been reduced
 - Precautions for these spaces shall include practical measures, such as locking laboratory

- doors shut and turning off gas supplies when not in use
- Science laboratories, prep rooms, and D&T spaces fitted with gas supplies shall follow the advice given in the Institute of Gas Engineers' publication UP11, Gas installations for educational establishments
- Each science laboratory, prep room, and heat treatment area in D&T spaces shall be fitted with a lockable isolating valve to enable the gas supply to be shut off at the end of the day
- Fume cupboards shall have a powered extract system, with ductwork to be fire resisting once it passes through the enclosure of the teaching space. A flexible non fire-rated duct to a semi-mobile fume cupboard (for teacher demonstrations in a science laboratory) is permissible from the fume cupboard up to the enclosure of the teaching space
- Multi-sensor detectors (smoke and heat) shall be provided in these spaces to reduce the risk of false alarms
- Kitchens:
 - Consideration shall be given to providing a proprietary extinguishing system in compliance with BS EN 16282-7 in cooker hoods
 - Where legacy gas cookers are re-used in catering kitchens, and only where expressly agreed with the Employer, the room(s) shall be fitted with a lockable isolating valve. There shall also be a means of automatically shutting off the gas supply to cookers in the event of a fire
 - Consideration shall be given to providing three-sensor detectors (optical-heat-carbon monoxide) in problem areas due to the potential for smoke and rapid thermal changes from opening ovens
- Plant and boiler rooms: The following fire safety precautions are required for all new buildings and where an existing plant or boiler room is being refurbished:
 - Heat detection shall be provided in plant and/or boiler rooms linked to the fire alarm system to raise the alarm. Smoke detection only is not allowed
 - There shall be a means of automatically shutting off the fuel supply in the event of a fire e.g., an emergency shut-off push button at the entrance/exit to the room. The system shall shut off the electrical power to the plant
 - Alternatively, a system of alarm notification to remote key holders shall be used. See BS 6644, clause 6.8 Additional safety controls

- In the event of a genuine alarm, the system shall require manual resetting, but if it is purely a power failure and appropriate self-proving devices are in place, then automatic resetting shall activate
- For existing buildings with manual isolating valves on the fuel supply, the requirement to provide automatic isolation of the gas supply only applies where the plant/boiler room is being refurbished as part of the Works
- For plant/boiler rooms with difficult access or located inside or connected to a building, a foam inlet point and sometimes smoke vents are often required. With large installations (200kW and above) and especially with oil tanks within the building, foam spray heads shall be required with a pipe to outside for connection by the Fire and Rescue Service
- CO, CO₂ and flammable gas detectors are only required in educational buildings in high risk situations where there is a risk that gas leakage or combustion products can enter classrooms or corridors. These situations shall be designed out. For example, where a boiler is in an enclosure in a cupboard, classroom or corridor or where a flue passes through the building in an unvented chimney or duct. See IGEM UP11
- Where required, carbon monoxide, carbon dioxide and unburned gas detection systems shall raise an alarm and isolate the fuel supply
- For LPG-fired boilers, an unburned gas detection system shall be provided at low level in the plant/boiler room. See IGEM UP11
- Communications (server) rooms and rooms containing electrical power distribution apparatus:
 - Shall be enclosed in fire resisting construction (minimum REI 60) and have fire resisting doors (minimum E 60) where forming part of the enclosure
 - Where fire doors open onto fire protected corridors they shall include smoke seals
- Energy storage systems:
 - Where Energy Storage Systems (ESS) are provided, reference shall be made to NFPA 855: Standard for the Installation of Stationary Energy Storage Systems, National Fire Protection Association, and INDG 139: Using electric storage batteries safely (HSE)
 - These references shall also apply to Uninterruptable Power Supplies (UPS) in all locations including communications cabinets – see [6.2.15 Uninterruptable power supplies \(UPS\)](#)

- **Fire suppression systems:**

- Automatic fire suppression systems (AFSS) shall be fitted in new buildings, and in major refurbishment of existing buildings, in the following circumstances:
 - Buildings that are at least 4 storeys and/or over 11m high (measured from the ground level on the lowest side of the building to the top of the floor surface of the top storey)
 - Buildings with residential accommodation, such as boarding schools
 - All Special Schools, Special Colleges and AP
- Automatic fire suppression systems shall be provided throughout the buildings in these situations, with the following exceptions:
 - Enclosed stairs and enclosed vertical shafts (i.e. those areas that cannot contain combustible materials)
 - Selected concealed spaces and voids as agreed with the Employer
 - Rooms protected by other automatic extinguishing systems (designed, installed and maintained to recognised British/European standards)
 - Areas, rooms or spaces where water discharge might present a hazard (e.g., science chemical stores, communications (server and hub) rooms,

rooms with electrical switch gear/transformers)

Note: These areas may be located vertically below a sprinklered building or sprinklered section of a building

- Communicating buildings or storeys separated from the sprinklered building by walls of appropriate fire resistance
 - Outbuildings, such as sheds, separated from the sprinklered building by at least 10m
 - External canopies unless the loss of the canopy could compromise the continuity of education/residential facilities
 - Small, two storey teaching buildings with no more than 120 pupils/students on the first floor and where the existing buildings do not have AFSS installed, or
 - Temporary accommodation
- **General provisions for all AFSS systems:**
 - AFSS shall be designed and installed by a specialist contractor who is LPS 1014 certified and LPS 1084 Level 4 certified (Loss Prevention Certification Board)
 - Sprinkler systems shall have:
 - Quick response heads
 - Reliable water supplies, with the system having at least one superior single water supply to BS EN 12485

- Twin pump sets rather than one. Sprinkler pumps shall be configured as duty and standby with automatic changeover
- Sprinkler tank located externally to the building
- System status, pump monitoring and fault indication shall be at the local controller (and also remotely at the BMS) in accordance with BS EN 12845
- Sprinkler heads shall be coordinated with ceilings, acoustic rafts, light fittings and other high-level installations
- Sprinkler tanks, associated pumps and fittings shall be suitably protected against vandalism
- Sprinkler or water mist heads in any rooms with electrical distribution boards, switch gear, transformers or communications cabinets shall be fitted with impact proof cages with pipework and heads not positioned over the equipment
- **Sprinkler systems:**
 - Sprinkler systems shall be designed, installed and maintained in accordance with BS EN 12845 (BS 9251 for residential accommodation), with schools in general classified as Ordinary Hazard Group 1 (OH1)
 - Some higher risk rooms or areas may be classified as a higher hazard group than OH1, subject to a risk assessment by the designer
- **Enhanced availability sprinkler systems:**
 - A sprinkler system requiring additional measures for resilience is detailed in BS EN 12845 Annex F 'Additional measures to improve system reliability and availability'
 - These additional measures are known as providing an 'enhanced availability' system (once termed a 'life safety' system)
 - An enhanced availability sprinkler system shall be provided if it forms part of the project specific fire strategy for ensuring life safety
 - An 'enhanced availability' system shall be designed, installed and maintained in compliance with BS EN 12845 Annex F 'Additional measures to improve system reliability and availability'
 - The additional features of enhanced availability systems include:
 - A "wet" pipe system, except in areas at risk of freezing such as external facades or roof areas
 - Four valve sets rather than one
- **Water mist systems:**
 - Water mist systems may be used as part of a fire engineered solution with evidence provided to support its suitability for specific space protection as follows:
 - Water mist systems shall be appropriately designed and tested to BS 8489-1 and -7

- Shall be an enhanced availability type
- Shall be a “wet” pipe system, except in areas at risk of freezing such as external facades or roof areas

Section 9: Cavities

- **Provision of cavity barriers, pathways around fire-separating elements, extensive cavity requirements, and construction and fixings for cavity barriers:** Shall all be in accordance with AD B Volume 2

Section 10: Protection of openings and fire-stopping

- **Openings for pipes, and ventilation ducts and flues passing through fire-separating elements:** Shall be in accordance with Section 10 in AD B Volume 2 and the following requirements
- **Installation and specification of fire dampers:**
 - Fire dampers, fire and smoke dampers, and ductwork shall be provided in accordance with AD B Volume 2
 - To be installed and maintained in accordance with manufacturer’s instructions
 - To be fixed to solid construction, with the adjacent ductwork provided with an access panel to facilitate damper inspection and testing

- Shall not push through the structure due to expansion in a fire situation
- **Residential accommodation in schools:** In sleeping accommodation, fire dampers or fire and smoke dampers shall comply with 10.22 in AD B Volume 2
- **Flues etc:**
 - If a flue, or duct containing flues or appliance ventilation duct(s), passes through a compartment wall or compartment floor, or is built into a compartment wall, each wall of the flue/duct shall have a fire resistance of at least half that of the compartment wall/floor through which it is passing
 - Where ducts are used to provide air paths within buildings, louvres and openings do not require any protection from smoke or fire providing the following apply:
 - Ducts do not contain any services, and
 - Ducts do not breach any fire resisting construction (example of a breach would be if the ducts serve a room that is a place of special fire hazard or the air transfer grille path discharges into a protected escape route)
- **Fire-stopping:** Shall have a fire resistance the same as the compartment wall/floor in which it is installed in accordance with AD B Volume 2 and the following requirements

- Recommendations for fire-stopping 'accidental' gaps between various building materials are summarised in Table 32
- Table 32 defines the use of rigid intumescent sealants (RI), flexible non-intumescent (FN) sealants and flexible intumescent (FI) sealants
- The recommendations consider the response to fire of the materials bounding the gap (e.g., whether they erode, shrink, expand, bow) and the influence this will have on the seals
- The orientation of the gap will also affect how well the material stays in place and consideration will need to be given to whether the product selected will have high or low adhesion and whether the life of the seal can be influenced by the orientation
- Third party accredited systems and installers will ensure that the specified fire-stopping performs as required in an actual fire
- All fire-stopping, fire/smoke dampers and other fire protection shall be documented using photographic records and included in the Health & Safety File
- Guidance on testing, certification and approval of products and systems for fire-stopping within buildings is given in [Fire-stopping: Linear joint seals, penetration seals and cavity barriers](#) along with [Ensuring Best Practice for Passive Fire Protection in Buildings](#)

Construction type	Masonry	Concrete	Timber	Gypsum	Fire protected steel	Steel
Masonry	RI/FN ²	RI/FN ²	FI	RI	RI ²	N/A
Concrete	N/A	RI/FN ²	FI	RI	RI ²	N/A
Timber	N/A	N/A	RI	FI	FI ²	N/A
Gypsum	N/A	N/A	N/A	FI	FI ²	N/A
Fire Protected Steel ¹	N/A	N/A	N/A	N/A	RI ²	FI ²
Steel ³	*	*	*	*	*	FN

Table 32: Recommended product selection for fire-stopping gaps

¹ May be non-intumescent if protection does not degrade at all during heating

² Whilst an RI material or FN material can be used, FI would be beneficial

³ Restricted to 30-minute applications

* Treat as a functional linear gap seal

Section 11: Special provisions for car parks – not used

Requirement B4: External fire spread

Section 12: Resisting fire spread over external walls

- **Generally:**
 - The total amount of combustible material in the cladding system and extensive cavities of external walls may be limited in practice by the provisions for space separation in Section 13: Resisting fire spread from one building to another
- **Fire resistance standard:**
 - Where external walls are elements of structure, the relevant period of fire resistance depends on the use, height and size of the building concerned
 - With school/college buildings it is a minimum REI 60 (minimum REI 90 for school/college buildings with basements and school/college buildings 18-30m high)
 - For non-load bearing external walls 1000mm or more from the relevant boundary, a reduced standard of fire resistance is accepted in most cases and the wall only needs fire resistance from inside the building
 - For load bearing external walls 1000mm or more from the relevant boundary, the wall requires fire resistance from inside and outside of the building
- See Table B1 in AD B Volume 2 for permitted relaxations on fire resistance if the wall is 1000mm or more from the relevant boundary
- The insulation used in the external walls of new or refurbished buildings shall be non-combustible, Class A1, regardless of height and external wall build-up
- **Construction of external walls:**
 - The construction of external walls and the separation between buildings to prevent external fire spread are closely related. The chances of fire spreading across an open space between buildings and the consequences if it does, depends on:
 - The size and intensity of the fire in the building concerned
 - The distance between the buildings
 - The fire protection given by their facing sides
 - The risk presented to people in the other building(s)
 - The limits on the amount of unprotected area of wall depend on the distance of the wall from the relevant boundary; it is possible for some or all the

walls to have no fire resistance, except for any parts that are load bearing

- **External surfaces:** External walls shall not provide a medium for fire spread. Depending on the school/college typology and building height (measured from the ground level on the lowest side of the building to the top of the floor surface of the top storey), one or more of the following shall apply:
 - External surface materials on buildings less than 18m above ground level, including all elements of the sub-framing/substrate and fixings forming the external wall, shall achieve Class B-s1, d0 or better with the exception of the insulation which shall be Class A1
 - External surface materials on buildings 18m or higher above ground level, including all elements of the sub-framing/substrate and fixings forming the external wall, shall achieve Class A2-s1, d0 or better with the exception of the insulation which shall be Class A1
 - External surface materials on buildings prone to vandalism, where identified as a specific risk in the Project Brief, including all elements of the sub-framing/substrate and fixings forming the external wall, shall achieve Class A2-s1, d0 or better with the exception of the insulation which shall be Class A1

- External surface materials to residential areas of boarding schools, including all elements of the sub-framing/substrate and fixings forming the external wall, shall achieve Class A2-s1, d0 or better with the exception of the insulation which shall be Class A1
- External surface materials to ground floor accommodation within Special Schools and Special Colleges, including all elements of the sub-framing/substrate and fixings forming the external wall, shall achieve Class A2-s1, d0 or better with the exception of the insulation which shall be Class A1

Note: The above requirements shall not apply to those materials listed in Regulation 7(3) of the Building Regulations

- **Cavities and cavity barriers:** Shall be provided in accordance with AD B Volume 2
- **Regulation 7 – Materials and workmanship:**
 - Regulation 7(1)(a) sets general requirements for materials and how they are applied in building work and shall apply to all schools and colleges
 - Regulation 7(2) sets out requirements in respect of external walls and specified attachments such as balconies in relevant buildings, as defined in Regulation 7(4):

- All materials that become part of an external wall, or specified attachment shall achieve Class A2-s1, d0 or Class A1, with the exception of the insulation which shall only be Class A1
- Regulation 7(3) sets out the materials used in external wall construction in relevant buildings that are exempt from the requirements of Regulation 7(2):
 - Consideration shall be given to using alternative materials to plastic fittings such as airbricks, vent covers, ducts and waste pipes in external walls (see FPA's "[RISC Authority](#)" website for more details)
- Regulation 7, all parts shall apply to any school/college building at least 18m high (measured from the ground level on the lowest side of the building to the top of the floor surface of the top storey) and to any residential school/college building at least 11m high (using the same measurement method)
- **Solar shading devices:** Shall be in accordance with AD B Volume 2

Section 13: Resisting fire spread from one building to another

- **Boundaries:**
 - When the site boundary adjoins a space where further development is unlikely, such as a road, then part of the adjoining space may be included as falling within the relevant boundary
 - For educational premises it is only necessary to consider the potential for fire spread between buildings on the same site for property protection, or where they are under separate ownership
 - Where a wall is situated within 1000mm of any point on the relevant boundary, it shall comply with the requirements of 13.8 in AD B Volume 2 with the exception of the external surface materials facing the boundary which shall meet the minimum requirements as 'External surfaces' on page 507
- **Unprotected areas and fire resistance:** Shall be in accordance with AD B Volume 2
- **Method for calculating acceptable unprotected area:**
 - A simple method is outlined in Table 33 for calculating the acceptable amount of unprotected area in an external wall that is at least 1000mm from any point on the relevant boundary and the

building or compartment does not exceed 10m in height

- Other more precise methods are described in [External fire spread: Building separation and boundary distances \(BR187, BRE\)](#) and may be used instead of Table 33
- Each side of the building will meet the provisions for space separation if:
 - o The distance to the side of the building from the relevant boundary accords with Table 33 and the extent of unprotected area is within the appropriate limits outlined in Table 33
 - o Any part of the side of the building that has more than the maximum unprotected area is fire resisting
- **External storage areas:**
 - For property protection purposes, combustible materials shall not be stored within 10m of the outside of buildings
 - Waste and materials for recycling shall be stored in wheelie bins in external locked stores well away from the main buildings and shall comply with BS 5906
 - If they do not have a dedicated compound or storage enclosure, they shall be secured (e.g., to a wall) away from the main buildings by a padlock and chain

Minimum distance between side of building and relevant boundary (m)	Maximum total percentage of unprotected area (%)
1	8
2.5	20
5	40
7.5	60
10	80
12.5	100

Table 33: Permitted unprotected area in small buildings or compartments

¹ Intermediate values may be obtained by interpolation

² The total percentage of unprotected area is found by dividing the total unprotected area by the area of a rectangle that encloses all the unprotected areas and multiplying the result by 100

Section 14: Resisting fire spread over roof coverings

- **Roof coverings:**

- The term 'roof covering' describes one or more layers of material, but not the roof structure as a whole
- The following roof covering products and/or materials shall be considered to fulfil all of the requirements for performance characteristic 'external fire performance' without the need for testing, and can be used without restriction:
 - Slates (natural slates, stone slates)
 - Tiles (stone, concrete, clay, ceramic or steel)
 - Fibre reinforced cement (flat and profiled sheets, slates)
 - Profiled metal sheets $\geq 4\text{mm}$ thick (aluminium, aluminium alloy, copper, copper alloy, zinc, zinc alloy, uncoated steel, stainless steel, galvanised steel)
 - Flat metal sheets $\geq 4\text{mm}$ thick (aluminium, aluminium alloy, copper, copper alloy, zinc, zinc alloy, uncoated steel, stainless steel, galvanised steel)

- **Separation distances:**

- Table 14.1 in AD B Volume 2 sets out the minimum separation distances from the roof (or part of the

roof) to the relevant boundary, according to the type of roof covering

- There are no restrictions on the use of roof coverings tested to achieve B Roof(T4) to BS EN 13501-5. All proposed external surfaces of roof coverings to buildings shall be tested to achieve B Roof(T4)
- Roof materials shall take into account the potential environmental effects of using toxic materials, Class E or Class F materials and contaminated water runoff

Requirement B5: Access and facilities for the fire service

- **Generally:**
 - Guidance is given in AD B Volume 2 for the selection and design of facilities for protecting life by assisting the Fire and Rescue Service
 - To assist the Fire and Rescue Service some or all of the following facilities may be necessary:
 - Vehicle access for fire appliances
 - Access for firefighting personnel
 - The provision of fire mains within the building
 - The provision of adequate water supplies
 - If it is proposed to deviate from the general guidance in AD B Volume 2, early discussion shall take place with the local Fire and Rescue Service

Section 15: Vehicle access

- **Generally:**
 - The main factor determining the facilities needed to assist the Fire and Rescue Service is the size of the building
 - In most buildings, the combination of personnel access facilities offered by the normal means of escape, and the ability to work from ladders and appliances around the perimeter, will generally be adequate without special internal arrangements

- Where an alternative approach outside the scope of this section has been used to justify the means of escape it may be necessary to consider additional provisions for firefighting access
- Vehicle access will generally need to be to a percentage of the perimeter depending on the size of the building, but for small buildings it is usually only necessary to ensure that the building is sufficiently close to a point accessible to Fire and Rescue Service vehicles
- For larger buildings, it may be necessary to provide internal fire mains
- In buildings fitted with fire mains, pumping appliances need access to the perimeter at points near the mains, where firefighters can enter the building and where in the case of dry mains, a hose connection will be made from the appliance to pump water into the main
- Vehicle access to buildings fitted/not fitted with fire mains, including vehicle routes and hard standings, shall meet the criteria described in Section 15 in AD B Volume 2 where they are to be used by Fire and Rescue Service vehicles

- If these provisions cannot be met for pump appliance access to small buildings (those of up to 2,000m² with a top storey up to 11m above ground level), a fire main shall be provided in accordance with Section 16
- The maximum distance between access doors on elevations to which vehicle access is provided, or between a door and the end of the elevation, shall be 60m

Section 16: Fire mains and hydrants

- **Provision, design and construction of fire mains:** Shall be in accordance with AD B Volume 2
- **Provision of private hydrants:** Where a building with a compartment of 280m² or more in area is being erected more than 90m from an existing fire hydrant, additional hydrants shall be provided as follows:
 - Buildings provided with fire mains – hydrants shall be provided within 90m of dry fire main inlets
 - Buildings not provided with fire mains – hydrants shall be provided within 90m of an entry point to the building and not more than 90m apart
 - Each fire hydrant shall be clearly indicated by a plate affixed nearby in a conspicuous position, in accordance with BS 3251
 - Guidance on the provision of fire hydrants is given in BS 9990

- **Alternative supply of water:** Shall be in accordance with AD B Volume 2

Section 17: Access to buildings for firefighting personnel

- **Provision of firefighting shafts:**
 - For most school/college buildings, a firefighting lift installation is unlikely to be required, as the top storey is unlikely to be more than 18m above Fire and Rescue Service access level
 - Where a building is at this height, or higher, it shall have one or more firefighting shafts, each containing a firefighting lift. If such a building has a storey of 900m² or more in area, a minimum of two firefighting shafts shall be provided
 - Buildings with a storey of 900m² or more in area, where the floor is at a height of more than 7.5m above Fire and Rescue Service access level, shall be provided with at least two firefighting shafts (which do not need to include firefighting lifts)
 - Buildings with two or more basement storeys, each exceeding 900m² in area, shall be provided with a minimum of two firefighting shafts (which do not need to contain firefighting lifts). The building's height and size shall determine whether firefighting shafts also serve upper floors

- For residential accommodation in schools/colleges, the components of a residential firefighting shaft shall conform to BS 9991 requirements
- **Location of firefighting shafts:** Shall be in accordance with AD B Volume 2
- **Design and construction of firefighting shafts:** Shall be in accordance with 17.9, 17.10 and 17.11 in AD B Volume 2 and the following requirements:
 - The flammability of floor coverings is controlled in a firefighting shaft and, when tested to BS 4790, shall either:
 - Not ignite, or
 - Have effects of ignition on both the use-surface and under-surface not extending beyond a radius of 35mm centred on the central point of application of the nut
 - Floor coverings shall be secured to the floor with non-water-soluble adhesive and be interrupted at all doors on the threshold with a metal or non-combustible strip not less than 50mm wide
- **Roller shutters in compartment walls:** Shall be in accordance with AD B Volume 2

Section 18: Venting of heat and smoke from basements

- **Basement heat and smoke ventilation:** Basements shall be vented in accordance with AD B Volume 2 and the project specific fire strategy

9.2

Fire safety for MMC

This sub-section outlines the performance and functional requirements for fire safety where load bearing volumetric and panelised modern methods of construction (MMC) are being used in school and college buildings

General requirements

9.2.1 Summary

- **Sub-section contents:** The requirements of this sub-section specifically support Requirement B3 to Schedule 1 of the Building Regulations 2010. This is due to AD B Volume 2 stating that it may not provide appropriate guidance for non-standard conditions including *‘some buildings that incorporate modern construction methods’*
- **Overarching requirement:** This sub-section (9.2) shall be applicable to all new and refurbished schools and colleges, including Partial School/College projects, using load bearing volumetric and panelised MMC systems. It does not replace the fire performance and functional requirements set out in sub-section [9.1 Fire safety](#) or the requirements of the Building Regulations. It sets out what DfE considers to be the best practice approach to demonstrating fire safety compliance for load bearing volumetric and panelised MMC systems. Alternative approaches to demonstrate compliance for these construction types are permitted provided suitable evidence is presented
- **Definition:** Volumetric and panelised load bearing structural systems are defined in [Modern Methods of Construction: Introducing the MMC Definition Framework](#) under ‘Category 1 - Pre-manufacturing (3D primary structural systems)’ and ‘Category 2 - Pre-manufacturing (2D primary structural systems)’ respectively. Categories 3 to 7 of this framework are outside the scope of this sub-section
- **Duration:** This sub-section applies equally to MMC buildings that are both temporary (intended to remain in situ for more than 28 days and up to 3 years) and permanent (intended to remain in situ for more than 3 years)
- **Mass timber construction:** Mass timber construction methods such as Cross Laminated Timber (CLT), glulam, Laminated Veneer Lumber (LVL) or associated composite and hybrid structures, including any of the forms of construction listed above, are outside the scope of this sub-section
- **Sleeping (residential) accommodation:** General guidance on how residential accommodation in schools/colleges may comply with Part B of the Building Regulations is currently covered in AD B Volume 2 with specific requirements for residential accommodation also provided in [9.1 Fire safety](#)
Note: This sub-section (9.2) is not intended for sleeping accommodation which adopts a stay put evacuation strategy

9.2.2 Technical Manual references

- **Fire safety (in general):** See [9.1 Fire safety](#)
- **Minimum life expectancy:** See relevant sections of the Technical Manual for minimum life expectancy requirements for elements adjacent to passive fire protection features

9.2.3 Legislation, standards and best practice

- **Legal requirements:**
 - Relevant parts of the [Building Regulations](#) including [Regulation 7](#)
 - [The Regulatory Reform \(Fire Safety\) Order 2005](#)
 - [The School Premises \(England\) Regulations 2012](#) applicable to maintained schools
 - [The Education \(Independent School Standards\) Regulations 2014](#) applicable to academies, free schools and sixth form colleges
- **Statutory guidance:**
 - [Fire safety risk assessment educational premises](#)
- **Other relevant references:**
 - [Passive Fire Protection Forum \(PFPF\) Guide to Undertaking Technical Assessments of Fire Performance of Construction Products Based on Fire Test Evidence](#)

- The Steel Construction Institute (SCI) Design of Loadbearing Light Steel Walls Exposed to Fire on Two Sides (Guide P442)
- The Association for Specialist Fire Protection (ASFP) Fire Resistance Test of Open State Cavity Barriers (TGD 19)
- The Association for Specialist Fire Protection (ASFP) Red Book

9.2.4 Fire safety considerations

- Fire safety shall be achieved through the provision of a range of fire safety measures, as a single fire safety measure may not adequately mitigate all foreseeable hazards. Lapses and/or weaknesses in a single fire safety measure should not allow a disproportionate risk to the life safety of occupants. By providing a range of fire safety measures, the potential for a single point of failure resulting in a major incident is minimised
- The fire safety risk associated with volumetric and panelised MMC systems differs from traditional forms of construction because fire safety measures such as compartmentation, structural protection, and the limitation of unseen fire and smoke spread may be addressed collectively (i.e., a single element performing multiple functions). This high level of integration can create interdependencies, where the

failure of a single component may simultaneously undermine multiple layers of fire protection

- The key fire safety risk associated with MMC is the potential failure of multiple layers of safety (i.e., structural safety, compartmentation and unseen spread of fire and smoke through voids) in the event of fire spread into or originating within the voids formed behind the linings of modules/units. Where the MMC design includes the potential for this to occur, the risk shall be mitigated in a way that no single point of failure would lead to multiple layers of safety being compromised
- Table 34 provides example fire scenarios that shall be considered in the design and construction of volumetric and panelised modern methods of construction (MMC) as referenced throughout this sub-section (9.2)

9.2.5 Transportation/lifting

- Any fixtures that are required for transportation and/or to enable lifting that are in the assembled panel or the finished building shall not compromise the fire performance of any building element including, but not limited to, walls, ceilings, floors, fire-stopping and cavity barriers

9.2.6 Insulation

- The insulation used in all external walls, floors, structural zones of any roof deck, and in voids between modules/units, shall achieve a reaction to fire performance of Class A1
- Where insulation achieving a reaction to fire performance of B or lower is used as part of an inverted or warm roof build-up, this shall be fully encapsulated such that the risk of ignition from fire exposure from above is prevented

Specific requirements

9.2.7 Load bearing elements of structure

'Elements of structure' are defined in AD B Volume 2

- **Performance:**

- The fire performance of load bearing elements of structure shall be demonstrated by specific fire resistance testing - see [Demonstrating compliance](#) and Table 34 within this sub-section
- Compliance may also be demonstrated by other means as outlined in [9.2.12 Design compliance](#) and Table 34
- Fire protection not applied directly to the load bearing elements of structure (for example, where internal room linings are intended to provide a continuous fire resisting barrier) is a deviation from AD B Volume 2. Where this approach is used, the extent to which load bearing elements may be impacted by fire (e.g., as a result of ignition from electrical services running behind linings or a failure of the linings to prevent fire spread) shall be set out, with appropriate evidence to demonstrate how Requirement B3 has been met - see [Demonstrating compliance](#)

- **Walls:**

- For structures where the primary load bearing elements are formed by walls, sole reliance on fire resistance test evidence for non-load bearing walls or protection of hot rolled steel elements is not permitted
- Load bearing walls that do not act as a compartment shall meet the fire resistance performance stated in [9.1 Fire safety](#)
- In the absence of standard tests to demonstrate the fire resistance of a load bearing wall when subject to fire exposure on both sides simultaneously, compliance shall be demonstrated by other means - see [Demonstrating compliance](#) and Table 34

- **Floors:**

- Floors shall provide adequate fire protection to load bearing elements within the overall floor zone
- Specific consideration shall be given to exposure to fire from above as well as exposure to fire from below

- **Openings in external walls/facades:**
 - Openings in external walls/facades (e.g., for external windows and doors) shall be detailed to ensure they do not compromise the fire resistance of the load bearing elements of structure. In the absence of standard tests to demonstrate this, bespoke fire testing may be required. Compliance may also be demonstrated by other means - see [Demonstrating compliance](#) and Table 34
- **Fire Safety Strategy Report and Fire Safety Strategy Drawings:** Shall:
 - Detail the load bearing principles of the building, including indicating every element which functions as an element of structure
 - Detail how each element of structure achieves the required period of fire resistance as outlined in [9.1 Fire safety](#)
 - Identify where fire protection is not applied directly to elements of structure (for example, where internal linings form a continuous fire resisting barrier to protect load bearing elements located behind the linings), including any specific maintenance requirements to ensure that the protection is not compromised

9.2.8 Compartmentation

- **Generally:**
 - Compartmentation shall meet the requirements outlined in [9.1 Fire safety](#)
 - The risk of fire and smoke spread via any cavity formed between or within modules/units shall be mitigated. This shall include, but not be limited to, fires that originate internally or externally and break into a cavity, or fires that originate in the void spaces between modules/units (e.g., resulting from ignition of electrical services situated behind the outer face of the fire resisting linings) - see [9.2.9 Cavities](#)
 - Mitigation of the spread of both fire and smoke within voids formed between or within modules/units shall not solely rely on the fire performance of internal room linings for maintaining compartmentation
- **Performance:**
 - Materials subdividing voids which are relied upon to maintain the compartmentation of the building shall have an equal or greater fire resistance period than that required by the compartmentation
- **Service risers:**
 - Service risers passing between floors shall be detailed to ensure they do not present a route for

fire and smoke to spread into voids formed between or within modules/units. In the absence of standard tests to demonstrate this, bespoke fire testing may be required. Compliance may also be demonstrated by other means - see [Demonstrating compliance](#) and Table 34

- **Junctions of fire separating elements:**

- Junctions of fire separating elements (e.g., at the junction of a lightweight fire-resistant plasterboard wall and lightweight fire-resistant plasterboard ceiling or floor) shall be detailed to ensure they do not compromise the building's compartmentation strategy. In the absence of standard tests to demonstrate this, bespoke fire testing may be required. Compliance may also be demonstrated by other means - see [Demonstrating compliance](#) and Table 34

- **Openings in external walls/facades:**

- Openings in external walls/facades (e.g., for external windows and doors) shall be detailed to ensure they do not compromise the building's compartmentation strategy. In the absence of standard tests to demonstrate this, bespoke fire testing may be required. Compliance may also be demonstrated by other means - see [Demonstrating compliance](#) and Table 34

- **Minimum life expectancy:**

- Linear gap seals and/or other proprietary fire-resistant products used to limit the extent of voids formed between or within modules/units shall have a minimum life expectancy no less than the elements that they are fixed/adjacent to
- Manufacturer's evidence shall be provided to demonstrate minimum life expectancy requirements have been met
- Alternatively, where components used cannot achieve the required minimum life expectancy, appropriate access shall be provided to inspect, maintain and periodically replace linear gap seals throughout the building's life without requiring significant other works to take place (for example, the removal of internal partitions or linings to access components) or impacting the operation of the building. Consideration shall also be given to the likely long-term availability of these products
- The minimum life expectancy of all linear gap seals and/or other proprietary fire-resistant products shall be provided as part of the handover information

9.2.9 Cavities

- **Generally:**

- The risk of unseen fire or smoke spread via any cavity, including those formed between or within modules/units, shall be mitigated. This shall include, but not be limited to, fires that originate internally or externally and break into a cavity, or fires that originate in the void spaces between modules/units (e.g., resulting from ignition of electrical services situated behind the outer face of the fire resisting linings)
- This shall be achieved through appropriate detailing, sealing and fire-stopping measures to limit the spread of fire and smoke
- Fire-stopping shall be provided in accordance with the building's compartmentation strategy and shall be continued through any voids or structural zones formed by the module/unit's construction
- Mitigation of the spread of both fire and smoke shall not solely rely on the fire performance of internal room linings for maintaining compartmentation
- Any voids or cavities shall be sub-divided in accordance with AD B Volume 2. This includes any voids formed between modules/units and those

formed within the structural zone build-up of each module (e.g., floor cassettes)

- **Performance:**

- Cavity barriers shall achieve minimum integrity and insulation requirements in accordance with AD B Volume 2
- Cavity barriers shall not be considered part of the collective protection for maintaining compartmentation or protection to elements of structure
- The suitability of any cavity barrier test data shall be carefully evaluated to ensure it reflects the actual installation scenario (for example, whether tests demonstrating fire performance when fixed to, or compression-fitted between, concrete floors or walls are appropriate for the project)

- **Minimum life expectancy:**

- All cavity barriers shall have a minimum life expectancy no less than the elements that they are fixed/adjacent to
- Manufacturer's evidence shall be provided to demonstrate minimum life expectancy requirements have been met
- Alternatively, where components used cannot achieve the required minimum life expectancy, appropriate access shall be provided to inspect, maintain and periodically replace cavity barriers

throughout the building's life without requiring significant other works to take place (for example, the removal of internal partitions or linings to access components) or impacting the operation of the building. Consideration shall also be given to the likely long-term availability of these products

- The minimum life expectancy of all cavity barriers shall be provided as part of the handover information

9.2.10 Protection of openings and fire-stopping

- **Generally:**

- Service penetrations through fire resisting walls and ceilings shall be minimised
Note: This may be better managed via designated service zones to collate, organise and control service penetrations
- Services passing through fire resisting construction shall incorporate fire resisting 'letterbox' openings with fire-stopping products to limit the potential for fire spread, including to voids and cavities
- Where fire resisting 'letterboxes' cannot be provided, bespoke fire testing shall be provided to demonstrate that fire will not be able to spread into void spaces formed between modules/units due to service penetrations. Fire testing shall include

assessment of fire spread into any void between the exposed and unexposed side

- Detailed evidence shall be provided to confirm that all fire-stopping products proposed and used are appropriate for the specific material build-up of each element and the fire performance required
Note: Fire tests for fire-stopping products typically assess fire spread from the exposed side of an element to the unexposed side and do not consider the potential for fire spread to any void spaces formed between the exposed and unexposed side

- **Performance:**

- All penetrations through fire resisting elements, regardless of their diameter/size, shall be fire-stopped with a proprietary fire-stopping product
- Standard fire resistance tests to demonstrate the compliance of load bearing walls shall include a realistic representation of all fire-stopped service penetrations. These shall accurately reflect the actual building scenario taking into account the time for heat to enter cavities surrounding load bearing elements
- Performance of partial penetrations shall be demonstrated by test evidence based on the fire exposure conditions of EN 1363-1 and/or load bearing or non-load bearing requirements of walls or floors according to EN 1365-2

- **Minimum life expectancy:**
 - All fire-stopping products shall have a minimum life expectancy no less than the elements that they are fixed/adjacent to
 - Manufacturer's evidence shall be provided to demonstrate minimum life expectancy requirements have been met
 - Alternatively, where components used cannot achieve the required minimum life expectancy, appropriate access shall be provided to inspect, maintain and periodically replace fire-stopping products throughout the building's life without requiring significant other works to take place (for example, the removal of internal partitions or linings to access components) or impacting the operation of the building. Consideration shall also be given to the likely long-term availability of these products
 - The minimum life expectancy of all fire-stopping products shall be provided as part of the handover information

Demonstrating compliance

9.2.11 Evidence

Evidence of fire safety compliance shall be provided for the following:

- Design compliance
- Product/material specification compliance
- Installation compliance
- Operation and maintenance compliance

9.2.12 Design compliance

To demonstrate compliance for building protection, life safety, and the control of internal and external fire spread, a specific design review shall be carried out to establish a range of reasonably foreseeable fire scenarios that could occur. The design review shall include appropriate mitigation measures to address each scenario and the evidence to support each mitigation measure. It shall be included in the Fire Safety Strategy Report

- **Fire scenarios:**
 - As a minimum, for buildings that fall within the scope of this sub-section (9.2), the fire scenarios listed in Table 34 shall be included in the design review together with details outlining how compliance shall be achieved in each fire scenario

- Additional fire scenarios shall be added where relevant to the specific MMC system proposed
- A fire scenario will only be considered not applicable to a specific MMC system when it is deemed that the inherent design of the system eliminates all risk of that fire hazard occurring
- **Compliance:** The following types of evidence are considered suitable demonstrations of compliance:
 - Inherent design of the system eliminating all risk of the specific fire hazard occurring
 - Standard fire test/classification report
 - Direct field of application or extended field of application report prepared by a UKAS accredited laboratory in accordance with the relevant extended field of application standard referenced in the overarching classification standard BS EN 13501-1 for a given element of construction
 - Designed using recognised design standards for elements of traditional construction (e.g., Eurocodes)
 - Engineering assessment report prepared by a party with the relevant competency defined in the PFPF Guide and following the requirements of the same
 - see [9.2.3 Legislation, standards and best practice](#)

- Fire engineering calculations from first principles undertaken by a suitably qualified individual chartered through the Engineering Council with a relevant organisation such as the Institute of Fire Engineers
- Bespoke fire test evidence (e.g., full-scale burn tests)
- **Mitigation and test standards:**
 - Each fire scenario as listed in Table 34, alongside any additional fire scenarios where relevant to the specific MMC system proposed, shall have an appropriate mitigation measure to prevent the potential consequences occurring
 - Each mitigation shall have the relevant test standards to demonstrate compliance or appropriate evidence as listed above
 - Any residual risks shall be recorded in the Designer's Risk Assessment (e.g., the required control of combustible materials introduced into cavities, products with minimum life expectancy shorter than the elements they are fixed/adjacent to, ongoing maintenance requirements to mitigate future risk)

9.2.13 Product/material specification compliance

To demonstrate compliance for building protection, life safety, and the control of internal and external fire spread, every

product or system specified for use that is required to achieve a defined level of fire performance shall be supported by appropriate documented evidence

- **Documentation:** Shall:
 - Clearly state the tested fire performance of the proposed product and in what arrangement
 - Indicate the specific relevant product proposed where documentation refers to a range of products
 - Be cross referenced against the performance requirements outlined in the Fire Safety Strategy Report to demonstrate compliance
 - Clearly state any limitations on how the product or material shall be installed to achieve the required fire performance
- **Manufacturers' information:** Manufacturers' data sheets and/or marketing brochures shall be suitable demonstrations of compliance only if they:
 - Clearly state the product meets the required fire performance when installed in a scenario reflective of the specific arrangement
 - Clearly and unambiguously state any limitations on how the product or material shall be installed to achieve the required fire performance

9.2.14 Installation compliance

To demonstrate compliance of the installation, evidence via Fire-stopping Record Photographs and a Fire-stopping Protection Schedule shall be provided

- **Fire-stopping Record Photographs:** Shall:
 - Clearly show the installation of all active and passive fire safety measures
 - Where any part of fire-stopping or a cavity barrier is concealed on completion, each stage of the installation shall be documented with photographic evidence
 - All record photographs shall be provided as part of the handover information
- **Fire-stopping Protection Schedule:** Shall:
 - Be coordinated with the project Fire Safety Strategy Report, Fire Safety Strategy Drawings and Fire-stopping Record Photographs
 - Reference the document evidencing that the specified product or material will achieve the required fire performance in its specific arrangement
 - Reference any relevant documents detailing manufacturers' installation requirements
 - Include manufacturers' standard detail(s) for each service penetration with fire-stopping

9.2.15 Operation and maintenance compliance

A Planned Maintenance Plan for all fire safety installations, aligned with Annex I of BS 9999, shall be provided as part of the handover information for the Fire Safety Management Plan (Draft) and shall include all periods/frequencies for tests and inspections

- **Planned Maintenance Plan:** Shall:
 - Include a list of fire safety and maintenance procedures for all passive and active systems
 - Include a schedule outlining the minimum life expectancy of all fire protection products installed
 - Include the inspection schedule of fire resisting partitions/structural walls and all penetrations and linings within the building, not just those on escape routes, in accordance with [9.2.3 Legislation, standards and best practice](#)
 - Where the minimum life expectancy of the fire protection products used is lower than that of the elements they are fixed/adjacent to, a replacement schedule for these products shall be included in the Planned Maintenance Plan

A Fire Safety Manual, aligned with Annex H of BS 9999, shall also be provided as part of the handover information for the Fire Safety Management Plan (Draft)

- **Fire Safety Manual:** Shall:
 - Include a schedule outlining the minimum life expectancy of all fire protection products installed
 - Include a requirement to immediately repair damage to plasterboard linings which protect structural elements or compartmentation. This shall include a draft method statement for the repair of such walls in situ based on manufacturers' instructions
 - Include a requirement to replace damaged cavity barriers and fire-stops as whole units
 - Include a requirement to immediately repair damage to the fire-stopping of service penetrations. This shall set out the methods of patching the fire-stopping permitted by the manufacturer's installation details
 - State that where damage has been caused to any reactive products such as intumescent or ablative materials that these shall be replaced in their entirety

Note: The mixing of fire-stopping products and materials shall be avoided unless relevant test evidence is available to demonstrate that the original design fire resistance can be achieved using such a combination

9.2.16 Future adaption or retrofit

- Any minor works such as the replacement or maintenance of systems which interact with passive fire protection products shall not reduce the fire performance of the product
- During major building or refurbishment works, the fire protection product selection and evaluation process shall follow the same principles as a new build, such that the components chosen shall demonstrate that they appropriately limit internal and external fire spread as set out in relevant clauses of this sub-section (9.2)
- Where existing fire protection products are altered as part of major building works, the entire affected fire protection system shall be replaced as new
- Where the building layout is changed or a new facade system is introduced, these shall follow the principles set out in the project specific fire strategy as well as those in relevant fire safety guidance documents
- Where the building layout is changed or a new facade system is introduced, all cavity barrier and fire-stops shall be replaced as new
- When the replacement of building services affects fire protection measures, all existing and associated fire protection products shall also be replaced as new
- Disruption to any fire protection that occurs during the retrofit or adaptation of a building shall be remediated,

9.2 Fire safety for MMC

ideally in consultation with the original MMC supplier
(as applicable)

9.2 Fire safety for MMC

Fire scenario	Fire origin	Fire spread route	Potential consequence of fire spread - see consequence definitions below table	Requirements to be addressed
1	Fire in a room	Fire spread through fire resistant walls from one side to the other	1, 2	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation
2	Fire in a room	Fire spread through initial layers of lightweight partition into the cavity behind, then spreading onwards	1, 3, 4	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities 9.2.10 Protection of openings and fire-stopping
3	Fire in a room	Fire spread through service penetration(s) in internal fire resistant partition walls - fire spread through one side of the wall to the other	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.10 Protection of openings and fire-stopping
4	Fire in a room	Fire spread through service penetration(s) in internal fire resistant partition walls - partial penetration e.g., light switches, electrical sockets	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.10 Protection of openings and fire-stopping

9.2 Fire safety for MMC

Fire scenario	Fire origin	Fire spread route	Potential consequence of fire spread - see consequence definitions below table	Requirements to be addressed
5	Fire in a room	Fire spread upwards through fire resistant ceiling from one side to the other	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation
6	Fire in a room	Fire and smoke spread upwards through the fire resistant ceilings and onwards via service penetrations	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities 9.2.10 Protection of openings and fire-stopping
7	Fire in a room	Fire and smoke spread upwards through the fire resistant ceilings and onwards via service penetrations - partial penetrations e.g., light fittings	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.10 Protection of openings and fire-stopping
8	Fire in a room	Fire spread downwards through fire resistant floor, undercutting compartment walls, then spreading via the void	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities

9.2 Fire safety for MMC

Fire scenario	Fire origin	Fire spread route	Potential consequence of fire spread - see consequence definitions below table	Requirements to be addressed
9	Fire in a room	Fire spread through the junctions of fire resistant walls and ceilings	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.10 Protection of openings and fire-stopping
10	Fire in a room	Fire exposure to both sides simultaneously of a non-compartment load bearing wall	1	9.2.7 Load bearing elements of structure
11	Fire in a service riser	Fire spread through service risers	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation
12	Fire in a room adjacent to external wall	Fire spread through external fire resistant wall - exposure from inside	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation
13	Fire outside building adjacent to external wall	Fire spread through external fire resistant wall - external fire exposure directly adjacent to the wall (e.g., bin fire or car fire)	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities

9.2 Fire safety for MMC

Fire scenario	Fire origin	Fire spread route	Potential consequence of fire spread - see consequence definitions below table	Requirements to be addressed
14	Fire outside building adjacent to external wall	Fire spread through external fire resistant wall - a fire inside the building breaking out through openings (e.g., windows) resulting in external flaming		9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities
15	Fire in a room adjacent to external wall	Fire spread through service penetrations, window or door openings into cavity of external wall	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities 9.2.10 Protection of openings and fire-stopping
16	Fire in floor/wall void between modules/units	Fire and smoke spread through floor/wall voids formed between modules/units	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities
17	Fire in wall cavity	Fire spread through external or internal wall cavity caused by ignition source in the external wall cavity	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities 9.2.10 Protection of openings and fire-stopping

Fire scenario	Fire origin	Fire spread route	Potential consequence of fire spread - see consequence definitions below table	Requirements to be addressed
18	Fire in roof void	Fire and smoke spread in roof void (structural zone of any roof decks) that exposes modules to fire from above	1, 3	9.2.7 Load bearing elements of structure 9.2.8 Compartmentation 9.2.9 Cavities

Table 34: Fire scenarios in volumetric and panelised modern methods of construction (MMC) systems

¹ The consequences of fire spread will depend on the specific details of the MMC system proposed. The list above may not be exhaustive. The Contractor shall provide a comprehensive list of all fire scenarios that is appropriate for their system

² The definitions of the consequences are as follows:

- Consequence 1: Risk to building stability because of elements of structure being exposed to a fire (applies to building elements containing elements of structure)
- Consequence 2: Breach of fire resistance requirements (e.g., compartmentation or enclosure of places of specific fire hazard)
- Consequence 3: Breach of fire resistance requirements (e.g., compartmentation or enclosure of places of specific fire hazard) allowing fire and smoke to spread across multiple compartments
- Consequence 4: Unseen fire and smoke spread in cavities

Annexes

Annex A

Glossary of defined terms

Glossary of defined terms

Terms and acronyms used throughout the Technical Manual and accompanying Pattern Book are defined below.

Access Statement - A description of how inclusive design principles have been incorporated into a development and produced in conjunction with a planning application.

Activity Layer - A spatial organisation of the outdoor environment into three levels of physical activity: low, moderate and high.

Activity Space Type - A type of space based on the activities to be accommodated, and the associated attributes required, as listed in the DfE data library.

Additional Learning Support (ALS) - Colleges have specific statutory duties when it comes to supporting students with additional needs and special educational needs and disabilities (SEND). Many colleges provide an ALS service in dedicated spaces and have dedicated teams who are able to offer advice, support and guidance to ensure student wellbeing. An ALS Team may consist of support staff such as mentors, counselling service and a college nurse to provide confidential support if needed. ALS may provide students with access to one-to-one out of class support or small group support. Students may also have access to a range of

assistive technologies and specialist equipment. Students on SEND-specific programmes may attend some or all classes in an ALS department.

Alternative Provision (typically referred to as 'AP' in this resource and including Pupil Referral Units (PRU)) -

Education arranged by local authorities for pupils/students who, because of exclusion, illness or other reasons, would not otherwise receive suitable education; education arranged by schools for pupils/students on a fixed period of exclusion; and pupils/students being directed by schools to an off-site provision to improve their behaviour (in the Technical Manual the word 'School' includes AP, unless otherwise stated). Colleges may cater for AP where a school is responsible for a pupil/student's education, or where pupils/students of compulsory school age, not registered at a school, are educated at colleges and for whom the local authority is financially responsible, and for asylum seekers of compulsory school age attending colleges. APs can be used to provide short-term placements for those who are at risk of exclusion.

Ambulant Toilet - A room containing a toilet for one person only for use by an ambulant disabled person or any person who can walk but has restricted mobility, or a person who would benefit from a larger toilet space with grab rails.

Approved Document (AD) - Documents which set out what, in ordinary circumstances, may be accepted as one way to comply with The Building Regulations 2010. However, following the approved documents alone does not guarantee compliance. Where specific references are made to Approved Documents, they are noted as “AD A”, “AD B” etc.

Area Data Sheets (ADS) - Spreadsheets within the Further Education Schedule of Accommodation (FE SoA) identifying the requirements for each space including area, services and environmental performance, and FF&E.

Basic Teaching Area - The area comprising all the teaching spaces (except halls and PE spaces) needed for the full range of curriculum subjects.

BIM Protocol - As defined in the Scheme Contract.

Block - Standalone structure made from a Suite(s) of any number of floors, for example, a Suite(s) forming accommodation set as a standalone element.

Building or **Buildings** - As defined in the Scheme Contract.

Building Elements - Different parts of any building including roof and floor structure and coverings, stairs, ceilings, walls, finishes and doors.

Building Readiness and Maintenance Programme - Part of the Master Programme capturing all activities in the run up to Practical Completion including, but not limited to, testing (including soak test), commissioning and witnessing, decant, contractor's clean and training, and all post Practical Completion activities into the first year of occupancy and operation for which the Contractor is responsible.

Building Services - Means electric, gas and water services, heating, ventilation, air conditioning, controls, access, security and alarm systems, electrical plant and installations including pipework, ductwork, data and power cabling, and renewable technologies including, but not limited to, photovoltaic panels, ground source heat pumps and air source heat pumps.

Character Area - A distinct landscape area of the school ground that has a recognisable pattern and grouping of places, natural (e.g., green infrastructure, topography), functional (e.g., use) and perceptual (e.g., sensory), making it different from surrounding areas.

College - As defined in the Scheme Contract.

College Hours - College hours refer to the hours of the day the college is in use for education purposes.

College-specific SoA and ADS - The College-specific Schedule of Accommodation (SoA) and Area Data Sheets

(ADS) list every space in the Works, to form a project SoA. The area data requirements for each space are provided on summary worksheets and are recorded on College-specific ADSs for each space.

Community Use - Community Use applies to use of the School/College or areas of the School/College outside Core Hours.

Completion Date - As defined in the Scheme Contract.

Consequential Works - Works required outside the site boundary (e.g., offsite highway works required as part of a planning condition).

Core Hours - Core hours refer to the hours of a day the School/College is in use by the majority of pupils/students.

Cluster - An indivisible group of rooms with direct dependence that fit on the grid, for example, a classroom with store and group room, or music practice spaces with access corridor.

Cubicle - A ventilated compartment, not self-contained, usually formed by the assembly of partition panels and located within a room.

Daily Mile - A 15-minute outdoor activity where pupils/students roll, walk, jog or run along an accessible loop

through the Courtyard Garden, Playscape and/or Parkland and Playing Fields. The route does not need to be exactly one mile as the distance can be achieved through multiple laps.

Damp Proof Course (DPC) - A horizontal barrier installed within walls and openings of a building that is designed to prevent moisture from rising through the structure. Modern DPCs are typically made from materials like bitumen and flexible polymeric sheet.

Decant Protocol - As defined in the Scheme Contract.

Deliverables or Information Deliverables - Information or action required from the Contractor at key stages in the Scheme to provide the evidence of satisfactory progress or compliance with the Employer's Requirements.

Department - A department or faculty within a Secondary School based on a subject (e.g., English) or a group of subjects (e.g., humanities) or within a college based on vocational and technical studies.

Design and Technology (D&T) - An overarching term for several subjects requiring light and heavy practical spaces with specialist equipment.

Durability - The ability of building components to maintain their intended functionality, structural integrity, and aesthetic appearance over a specified period under expected conditions

of use and exposure. A durable building and site will minimise the need for frequent maintenance, repair or replacement.

Early Years - Refers to children aged 0 to 5 years. In schools this is typically children in nursery and reception aged 3 to 5 years.

Education and Health Care (EHC) Plan - A plan that identifies the educational, health and social needs of children and young people and sets out the additional support needed.

Embodied Carbon - Calculation of emissions equivalent to carbon for up-front construction and includes material replacement over the lifetime of the project.

Employer - Means the party named as the Employer in the Scheme Contract.

Employer's Requirements (ERs) - As defined in the Scheme Contract.

Energy Use Intensity (EUI) - The Energy Use Intensity (EUI) is the annual measure of the total energy consumed in a building.

Exchange Information Requirements (EIR) - As defined in the BIM Protocol.

Existing Buildings - The Buildings at the School/College prior to the relevant Completion Date but excluding any new facilities comprising the Works.

External Furniture and Equipment - Means the furniture and equipment (including play equipment and storage) required for the Outdoor Environment to be operational including for socialisation, play and physical activity. Furniture and equipment (F&E) may be fixed or loose. "**Fixed F&E**" is secured to the ground to ensure stability. "**Loose F&E**" (where located externally) is not fixed to the ground but has spatial implications and shall be shown on final layouts.

Fabric First - A design term referring to maximising the performance of the external envelope of a building. Fabric First designs concentrate on the building's passive capability such as optimising insulation, eliminating thermal bridging, maximising airtightness, solar gain and natural ventilation, rather than relying on technologies such as photovoltaics to improve a building's energy efficiency and sustainability credentials.

Fedge - A fence made from living plants (willow plants), a cross between a fence and a hedge. It provides a level of privacy and security whilst maintaining a natural aesthetic.

FF&E Groups - A method of identifying the level of Contractor responsibility for different types of FF&E. "**Group 1**" requires

the installation and provision of new items, “**Group 2**” requires the installation of either new or legacy items, “**Group 3**” requires the provision of either new items or the decant and placing of legacy items, “**Group 4**” requires decant only of small legacy items. See [4.1.5 Definition groups and responsibilities](#) of this resource.

Fittings, Furniture and Equipment (FF&E) - FF&E is a blanket term which includes fittings. Fittings are furniture items that form an integral part of the building to be operational and require wall/floor treatments after installation. Furniture and Equipment (F&E) may be fitted, fixed or loose. “**Fitted F&E**” is fitted to the fabric of the building but does not rely on the building to be operational. Fixed equipment requires installation and is hard wired to the fabric of the building. Fixed furniture is also attached to the fabric of the building but only to ensure stability. “**Loose F&E**” (where located internally) is neither fitted nor fixed to the building but has spatial implications and shall be shown on final layouts.

Furnished Space Types - A type of internal space within a standard Activity Space Type, identified by the FF&E required and to suit variables such as age range and group size.

Further Education Schedule of Accommodation (FE SoA) - A schedule of all spaces required in the College, including their required size, occupancy and type.

General Teaching - Secondary School/College teaching that typically does not involve practical activities or specialist equipment, for example, English, maths or humanities.

Glazing Line - The lowest edge of the glass within a window or door frame.

Good Industry Practice or **Good Industry Standard** - The implementation of products and solutions, and the exercise of that degree of skill, care, prudence and foresight which would ordinarily be expected from time to time from a skilled and experienced building contractor under the same or similar circumstances.

Green Infrastructure - A network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity (Natural England).

Grid (External) - An organising structure that connects the Building(s) with the Outdoor Environment.

Grid (Internal) - A spatial grid that structures indoor layouts using six grid types (general, small hall, medium hall, large space, corridor and services spine) which are fixed or extendable.

Gross Area or Gross Internal Area (GIA) or Gross Internal Floor Area (GIFA) - The overall area of a building measured to the internal face of the perimeter/external walls at each floor level including areas occupied by internal walls, partitions and service accommodation - see definition for “Gross Internal Floor Area” by the Royal Institution of Chartered Surveyors (RICS).

Note: As defined in Building Bulletin 103 (BB 103), the minimum Gross Area required includes plant rooms and a communications (server) room, as well as hub rooms and vertical ducts. External ventilation plant and equipment, chimneys and automatic fire suppression system tanks are outside of the final gross area of the designed building.

Heavy Duty - Materials or treatments designed to withstand significant wear, impact and environmental stresses whilst maintaining their aesthetic and functional qualities.

Key Stage (KS) - The specific part of a child’s education relating to their age and year group.

Learning Landscape - A thoughtfully designed Place that integrates natural elements and educational features to create an engaging and interactive learning environment. These landscapes are designed to support various types of learning, from passive learning to social and emotional development: e.g., sensory gardens, nature trails and growing gardens.

Legacy - Items which have been used at the existing Site or recently purchased by the School/College (where applicable) which are considered suitable for use within the new or refurbished Site.

Light Reflectance Value (LRV) - A measure of visible and usable light that is reflected from a surface when illuminated by a light source.

Linking Corridors - Perpendicular connections to the main corridor within the general, small hall and medium hall grids, utilising the extending grid system.

Local Exhaust Ventilation (LEV) - Local ventilation, as near to the source of pollutants as possible, of a practical activity such as a fume cupboard, a wood dust extract system or a heat bay fume extract system.

Loose Parts Play - Involves children interacting with a variety of movable, open-ended materials (natural or human-made) that can be combined, redesigned, taken apart, and put back together in countless ways ([Loose Parts Play - Play Scotland](#)).

Mainstream Academy - An academy that isn’t a special or alternative provision academy.

Mainstream School - A school that isn’t a special or alternative provision school.

Mezzanine - An intermediate floor or level located between main floors/levels of a building where there is sufficient height. It is typically a partial floor, not extending over the whole floorspace of a building.

Minimum Life Expectancy - The period of time for which an element, item or product can be expected to satisfy minimum performance requirements associated with that element, item or product, when subject to typical conditions, wear and usage (vandalism is not deemed 'typical' for the purpose of this definition).

Mobility Equipment - A wheelchair, motorised wheelchair, horizontal learning station, walking stick or standing frame or any other mobility aid required to be used within the School/College.

National Curriculum - A set of subjects and standards used by Primary Schools and Secondary Schools so children learn the same things. It covers what subjects are taught and the standards children should reach in each subject. All local-authority-maintained schools in England must teach these programmes of study. Other types of school like academies and private schools do not have to follow the national curriculum. Academies must teach a broad and balanced curriculum including English, maths and science. They must also teach relationships and sex education, and religious education.

Nature-based Solutions (NbS) - Actions to protect, sustainably manage and restore natural or modified ecosystems which address societal challenges (e.g., climate change, food and water security or natural disasters) effectively and adaptively, whilst simultaneously providing human wellbeing and biodiversity benefits. For example, nature-based SuDS (e.g., raingardens), planted trees to reduce heat island effect and planting to improve air quality.

Net Area - The usable area within the Gross Area of the Building(s), comprising Basic Teaching Area; larger spaces e.g., catering and sports spaces; halls, dining and PE spaces; libraries (LRC); staff and administration; and storage. It includes everything except Non-net Areas.

Net Site Area - The usable Site area available to pupils, this is also known as the 'playing field area' when considering land disposals (Section 77 of the School Standards and Framework Act 1998).

New Buildings - As defined in the Scheme Contract.

New Model Designs – Replacement to the DfE Baseline Designs (2014) showing the design intent of the DfE Pattern Book.

No Work - Work to individual elements designated “**No Work**” in the project specific Refurbishment Scope of Works (RSoW) means no work required; shall be left as existing.

Non-net Area - Part of the Gross Area of the Building(s) not included in the Net Area, comprising circulation; toilets and personal care; plant, including communications (server) rooms and plant rooms; kitchens; and the area occupied by internal walls.

Non-net Site Area - Part of the Gross Site Area which supports the functioning of the Site and includes the footprint of buildings and access areas such as paths, roads and parking.

Occupied Space - A space in a school/college that is occupied by pupils/students and/or staff such as classrooms, group rooms and offices. Spaces such as toilets, hygiene rooms and changing rooms, circulation spaces and spaces used solely for building services (e.g., for plant) or storage are not considered occupied spaces.

Off-grid - Non-grid defined space used for connecting Block(s) together (existing and new).

Operational Carbon (kgCO₂e) - The carbon dioxide and equivalent global warming potential (GWP) of other gases

associated with the in-use operation of a building. This includes both regulated and unregulated energy loads.

Outbuildings and Enclosures - Structures providing a simple, secure enclosure with protection from weather and wildlife, for air handling plant, external tanks or external storage (such as shed or garages).

Outdoor Environment - The natural and human-made places located outside of school and college buildings, but within the school/college ownership boundary. This includes hard and soft landscaped places, entrance forecourts, car and cycle parking, playing fields, multi-use games, play and habitat areas.

Outdoor Environment Readiness and Maintenance

Programme - Part of the Master Programme capturing all activities in the run up to Practical Completion including, but not limited to, all hard and soft landscape activities and the training of identified personnel, and all post Practical Completion activities into the first year of occupancy and operation for which the Contractor is responsible.

Outdoor Learning - A covered external space allocated for the delivery of the curriculum. In schools, they are located directly outside Nursery playrooms, Reception classrooms and Special School classrooms or in the landscape as part of

a learning landscape area (e.g., training area) for outdoor learning and play.

Overheating Risk Assessment (ORA) - The DfE methodology for carrying out modelling to mitigate the risk of overheating.

Partial School/College Project - A project in which the Works are carried out on some Buildings or parts of the Outdoor Environment of a School/College, typically less than 75% of the overall building area.

Pattern Book - The document which outlines the Employer's spatial requirements for the design of School and College Buildings and Outdoor Environments.

Performance in Use (PiU) Targets - A set of easily measurable criteria related to indoor environmental conditions and building performance used to assess the performance in use of the relevant Building.

Perimeter Boundary - The line demarcating the known boundary/extent of School/College Sites. The boundary may be a physical boundary (e.g., a fence, hedge, row of trees) or a conceptual boundary (e.g., a change in surface finish, kerb detail, row of studs). The boundary should respond to the local character, and an understanding of risk, whilst enhancing the sense of place and permitting surveillance.

Period Dignity - Where women and girls have access to period products, as and when they are required, to use in a private space (with toilet, hand washing facilities and hygienic waste disposal) that is safe and dignified.

Place - A place is a single defined landscape area determined by use, which is combined to form a Character Area.

Practical Completion - As defined in the Scheme Contract.

Practical Teaching - Teaching that involves pupils/students doing (or observing) practical activities and often requiring access to services and specialist equipment, for example science.

Practical Spaces - Teaching Spaces listed as light practical spaces or heavy practical spaces in the DfE data library.

Primary School - A Mainstream School for pupils aged 4 to 11 covering 3 educational stages: foundation (up to 5 years), key stage 1 (KS1 - 5 to 7 years) and key stage 2 (KS2 - 7 to 11 years). For the purposes of this Technical Manual, a Primary School includes middle-deemed Primary Schools that provide for pupils aged 8 to 12.

Profound and Multiple Learning Difficulties (PMLD) - Pupils/students with PMLD are likely to have more than one disability, a profound learning disability, great difficulty communicating, requires high levels of support, and may have

additional sensory or physical disabilities, complex health needs or mental health difficulties and challenging behaviours.

Note: For other terms and abbreviations used to describe specific special educational needs and disabilities refer to the 'Glossary and references' section (page 82) of [Building Bulletin 104](#).

Project Brief - Document suite which provides key data for a specific Scheme and sets out requirements which are additional to the Pattern Book and Technical Manual.

Project-specific Schedule of Places or Project-specific Schedule of Spaces - The Project-specific Schedules of Places or Spaces lists every external place or internal space in the Works, based on DfE-provided standardised schedules.

Protected Lobby - A fire resisting enclosure providing access to an escape stairway and/or evacuation lift via two sets of fire doors and into which no room opens other than toilets. See [9 Fire safety](#) of this resource.

Public Realm - Refers to all parts of the built environment, between buildings and within buildings, where the public has free access (e.g., streets, squares and parks).

Pupil Realm - Refers to all outdoor places accessible to pupils/students daily within the School grounds. This includes

pavements, pathways, courtyards, gardens, playscapes, playing fields and learning landscapes.

Pupil Referral Unit (PRU) - Pupil Referral Units (PRUs) are alternative provision schools maintained by the local authority. In the Technical Manual the term 'AP' includes PRUs, and the word 'School' includes AP and PRUs, unless otherwise stated

Pupil Zones - Areas within school/college grounds that require segregation for different users, uses and/or activities.

Rectification Period - As defined in the Scheme Contract.

Refurbished Buildings - Where relevant to a Scheme, and as defined in the Scheme Contract.

Refurbishment Scope of Works (RSoW) - An annex of the Project Brief, where relevant to a Scheme, which sets out the scope of works required for Refurbished Buildings. Work required to each element shall be designated as "**Renew**", "**Replace**", "**Repair**", "**Retain**" or "**No Work**".

Regulated Energy - Energy consumed by a Building, associated with fixed installations for heating, hot water, cooling, ventilation, and lighting systems. These form the basis of a compliance calculation for AD L.

Remodelled Area - The total area of any internal spaces in which some internal walls are to be removed and/or rebuilt,

and most elements within the space, including the fenestration, are designated as “**Renew**” or “**Replace**”.

Renew - Work to individual elements designated “**Renew**” in the project specific RSoW requires all new elements or finishes designed to satisfy the relevant requirements in the Employer’s Requirements, including this Technical Manual.

Repair - Work to individual elements designated “**Repair**” in the project specific RSoW requires isolated repairs to elements or finishes to satisfy the requirements in any project specific specification or drawing issued as part of the Employer’s Requirements.

Replace - Work to individual elements designated “**Replace**” in the project specific RSoW requires partially new and/or major repairs to existing elements or finishes designed to satisfy the relevant requirements in the Employer’s Requirements, including this Technical Manual, where possible.

Resourced Provision - Resourced provisions are places that are reserved at a mainstream school for pupils with a specific type of SEN and who are taught for at least half of their time within mainstream classes but require specialist facilities around the school. Resourced provisions are referred to as ‘specially resourced provision’ in BB 103.

Restorative Garden - A thoughtfully designed courtyard space with biophilic features that promote mindfulness, connection to nature and support wellbeing and learning.

Retain - Work to individual elements designated “**Retain**” in the project specific RSoW requires existing elements or finishes left as existing, with no work required unless needed in order to complete other works which form part of the Scheme; overall performance shall be no worse than the existing performance and condition.

Sanitary Ancillaries - Additional fixtures or devices that support the use, maintenance or function of Sanitaryware (e.g., toilet paper/soap dispensers).

Sanitaryware - Devices or fixtures that are connected to a plumbing or drainage system.

Schedules of Places - DfE-provided standardised Schedules of (external) Places based on standard forms of entry and used as the basis for the project specific briefing process for schools. Formerly known as the External Facilities Tool (or EFT) for schools.

Schedules of Spaces - DfE-provided standardised Schedules of (internal) Spaces based on standard forms of entry and used as the basis for the project specific briefing

process for schools. Formerly known as the Schedule of Accommodation (or SoA) for schools.

Scheme - The design and construction or construction (as the case may be) of Works associated with School/College Buildings and/or Outdoor Environment.

Scheme Contract - An agreed contract (including where applicable, a pre-construction services agreement) for a Scheme.

School - As defined in the Scheme Contract.

School Hours - School hours refer to the hours of the day the school is in use for education purposes.

Secondary School - A Mainstream School for pupils aged 11 to 16 (or 18 if there is a sixth form) covering 2 or 3 educational stages: key stage 3 (KS3 - 11 to 14 years), key stage 4 (KS4 - 14 to 16 years) and in some cases a sixth form (KS5 - 16 to 18 years). For the purposes of this Technical Manual, a Secondary School includes middle-deemed Secondary Schools that provide for pupils aged 8 to 13.

Secure Line - The agreed demarcation around or within a School or College Site which, due to substantiated risk, is secured with a fence and/or building(s) for the purposes of safeguarding and security.

SEN (D) - Special educational needs (and disabilities).

SEN Unit - Special educational needs (SEN) units are special provisions within a mainstream school where the pupils with SEN are taught within separate classes for at least half of their time. They are designated by the local authority specifically for making SEN provision, and sometimes accommodate pupils registered at other schools on a part-time basis. SEN units are referred to as 'designated units' in BB 103.

Sites - As defined in the Scheme Contract.

Social, Emotional and Mental Health (SEMH) -

Pupils/students with a wide range of social and emotional difficulties which manifest themselves in many ways. These may include becoming withdrawn or isolated, as well as displaying challenging, disruptive or disturbing behaviour. These behaviours may reflect underlying mental health difficulties such as anxiety or depression, self-harming, substance misuse, eating disorders or physical symptoms that are medically unexplained. Other children and young people may have disorders such as attention deficit disorder, attention deficit hyperactive disorder or attachment disorder.

Soft Landings - The DfE process pursuant to Government Soft Landings (GSL) to ensure easy transition across the briefing, design, construction and occupation stages of a

Scheme with the overriding aim of realising optimal operational performance.

Soft Landings Checklist - A project management checklist of the activities required throughout the project lifecycle as part of DfE's approach to Government Soft Landings.

Space - A space is a single room or defined area that fits to the grid or is accommodated in a cluster.

Special College - A Post-16 institution that is specially organised to make special educational provision for students with special educational needs and disabilities. Also referred as a specialist further education college or Special Post-16 Institution (SPI).

Special Conditions - Any additional Scheme specific conditions as may be applicable and as set out as an annex of the Project Brief.

Special School - A school where all pupils/students have Education, Health and Care (EHC) Plans. Special Schools cater for various age ranges including primary, secondary and all-age, and various types of SEND. Pupils/students are taught in small classes, and support staff and health professionals work alongside teaching staff. For simplicity, this Technical Manual refers to Special Schools that cater predominantly for ambulant pupils/students as 'ambulant'

Special Schools and those that are specifically set up to accommodate pupils/students with PD and PMLD (as well as other needs) as 'non-ambulant' Special Schools (in the Technical Manual, the word School includes Special Schools, unless otherwise stated).

Specially Resourced Provision (SRP) - Additional specialist facilities in a Mainstream School/College Site for a small number of pupils/students, typically less than 30, who usually have EHC Plans. Pupils/students spend most of their time in mainstream classes, attending the SRP facilities for individual support, to learn a specific skill, to receive medical or therapeutic support or to access specialist equipment. The facilities can be in a Department/Suite or dispersed throughout the school/college.

Statutory Body - A statutory body is a body set up by law (statute) that is authorised to implement certain legislation. This includes, but is not limited to, acting as a pre-application consultee, being the statutory party to an examination, and occasionally licensing or supervising. Examples of statutory bodies include the Health and Safety Executive, Historic England, Natural England, and the Environment Agency.

Statutory Requirements - As defined in the Scheme Contract.

Suite(s) - Collection(s) of Spaces and Clusters that need proximity or close relationship to function, for example, administration spaces, dining and kitchens, Primary classrooms and activity rooms.

Supplementary Area - Net Area and Non-net Area which is used for non-school/college or support functions such as Specially Resourced Provision, a community health centre, or residential accommodation. Additionally, other spaces may include ancillary areas not defined within the GIFA such as outbuildings and glasshouses.

Sustainable Drainage Systems (SuDS) - A collection of water management practices that aim to align modern drainage systems with natural water processes. Sustainable Drainage Systems (SuDS) differ from traditional drainage systems as they typically manage rain close to where it falls.

Tamper proof - Any object, device, or system designed to remain secure and intact, protecting it from being opened, manipulated, or damaged without leaving evidence of such attempts.

Teaching Spaces - Any spaces within the basic teaching area and any large or indoor PE space, except dining/catering and social areas, as listed in the Schedules of Spaces.

Teaching Resources - Material that supports teaching and learning including printed material and equipment.

Technical Manual - This document, which outlines the Employer's technical requirements (relating to specific materials, components and systems) for the design and construction of School and College Buildings and Outdoor Environments.

Technology - As defined in the Pattern Book and Section 6 of this Technical Manual, with specific requirements set out for School/College Sites in the Project Brief.

Unregulated Energy - Energy consumed by a Building which is outside of the scope of the Building Regulations. This includes energy associated with equipment such as plug in devices, Technology and FF&E.

Untouched - An area or building defined in the RSoW as not requiring any work.

Use - Activities in the outdoor environment are categorised into six types of use: social, access, restorative garden, physical activity, learning landscape, and movement.

Utilities - A service or commodity provided by a public or private utility company including public sanitary and storm sewers, natural gas, electricity, telephone, broadband, public water facilities and all other utility facilities and services

necessary for the operation and occupancy of the School/College.

WC - 'Water Closet' referring to a room or compartment that includes a toilet.

Whole Life Carbon - Calculation of emissions equivalent to carbon for the lifetime of the project (nominally 60 years), including up-front construction, in-use energy and material replacement, deconstruction, demolition and re-use.

Whole School/College Project - A project in which the Works are carried out on most Buildings or most of the Outdoor Environment of a School/College, typically more than 75% of the overall building area, and the Contractor has responsibility for providing the required facilities for the whole School/College Sites.

Works - All of the works (including design and works necessary for obtaining access to the Sites) to be undertaken as defined in the Scheme Contract.

Zones - Areas within School/College Sites that require segregation for different users, uses and/or activities.

Note: The word 'zone' is also used in [Building Bulletin 103](#) and [Building Bulletin 104](#) in relation to the minimum to maximum recommended area range for a given category of internal space.

Annex B

Standards referred to

Standards referred to

BS (British Standard)

BS 476-7:1997 Fire tests on building materials and structures
- Method of test to determine the classification of the surface
spread of flame of products

BS 476-22:1987 Fire tests on building materials and
structures - Methods for determination of the fire resistance of
non-loadbearing elements of construction

BS 559-1:2023 Interior and exterior signs - Design,
manufacture and installation of signs. Specification

BS 1125:1987 Specification for WC flushing cisterns
(including dual flush cisterns and flush pipes)

BS 1206:1974 Specification for fireclay sinks: dimensions and
workmanship

BS 1254:1981 Specification for WC seats (plastics)

BS 1363 series. 13 A plugs, socket-outlets, adaptors and
connection units

BS 1377 series. Methods of test for soils for civil engineering
purposes

BS 1710:2014 Specification for identification of pipelines and
services

BS 1722 series. Fences

BS 1876:1990 Specification for automatic flushing cisterns for
urinals

BS 2882:1980 Method for determination of water and
sediment in crude petroleum and fuel oils (centrifuge method)

BS 3251:1976 Specification. Indicator plates for fire hydrants
and emergency water supplies

BS 3402:1969 Specification for quality of vitreous china
sanitary appliances

BS 3692:2014 ISO metric precision hexagon bolts, screws
and nuts. Specification

BS 3882:2015 Specification for topsoil

BS 3936 series. Nursery stock

BS 3958-4:1982 Thermal insulating materials - Bonded
preformed man-made mineral fibre pipe sections

BS 3969:1998+A1:2013 Recommendations for Turf for general purposes

BS 3998:2010 Tree work. Recommendations

BS 4163:2021+A1:2022 Health and safety for design and technology in educational and similar establishments. Code of practice

BS 4190:2014 ISO metric black hexagon bolts, screws and nuts. Specification

BS 4211:2005+A1:2008 Specification for permanently fixed ladders

BS 4428:1989 Code of practice for general landscape operations (excluding hard surfaces)

BS 4680:1996 Specification for clothes lockers

BS 4790:1987 Method for determination of the effects of a small source of ignition on textile floor coverings (hot metal nut method)

BS 5234-1:1992 Partitions (including matching linings) - Code of practice for design and installation

BS 5234-2:1992 Partitions (including matching linings) - Specification for performance requirements for strength and robustness including methods of test

BS 5250:2021 Management of moisture in buildings. Code of practice

BS 5266-1:2016 Emergency lighting - Code of practice for the emergency lighting of premises

BS 5268 series. Structural use of timber

BS 5306-8:2023 Fire extinguishing installations and equipment on premises - Selection and positioning of portable fire extinguishers. Code of practice

BS 5385 series. Wall and floor tiling. Code of practice

BS 5422:2023 Thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40°C to $+700^{\circ}\text{C}$. Method for specifying

BS 5427:2016+A1:2017 Code of practice for the use of profiled sheet for roof and wall cladding on buildings

BS 5489-1:2020 Design of road lighting

BS 5499-10:2014+A1:2023 Guidance for the selection and use of safety signs and fire safety notices

Annex B Standards referred to

BS 5499-4:2013 Safety signs - Code of practice for escape route signing

BS 5534:2014+A2:2018 Slating and tiling for pitched roofs and vertical cladding. Code of practice

BS 5709:2018 Gaps, gates and stiles. Specification

BS 5756:2007+A2:2017 Visual strength grading of temperate hardwood. Specification

BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations

BS 5839-1:2017 Fire detection and fire alarm systems for buildings - Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises

BS 5839-8:2023 Fire detection and fire alarm systems for buildings - Design, installation, commissioning and maintenance of voice alarm systems. Code of practice

BS 5839-9:2021 Fire detection and fire alarm systems for buildings - Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems

BS 5852:2006 Methods of test for assessment of the ignitability of upholstered seating by smouldering and flaming ignition sources

BS 5867-2:2008 Fabrics for curtains, drapes and window blinds - Flammability requirements. Specification

BS 5906:2005 Waste management in buildings. Code of practice

BS 5930:2015+A1:2020 Code of practice for ground investigations

BS 6150:2019 Painting of buildings. Code of practice

BS 6173: 2020 Installation and maintenance of gas fired catering appliances for use in all types of catering establishments (2nd and 3rd family gases). Specification

BS 6180:2011 Barriers in and about buildings. Code of practice

BS 6187:2011 Code of practice for full and partial demolition

BS 6206:1981 Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings

Annex B Standards referred to

BS 6222-3:2017 Domestic kitchen equipment - Performance requirements for durability of surface finish and adhesion of surfacing and edging materials. Specification

BS 6229:2018 Flat roofs with continuously supported flexible waterproof coverings. Code of practice

BS 6262 series. Glazing for buildings

BS 6262-1:2017 Glazing for buildings. General methodology for the selection of glazing

BS 6262-4:2018 Glazing for buildings. Code of practice for safety related to human impact (Incorporating corrigendum No. 1)

BS 6266:2011 Fire protection for electronic equipment installations. Code of practice

BS 6297:2007+A1:2008 Code of practice for the design and installation of drainage fields for use in wastewater treatment

BS 6396:2022 Electrical systems in furniture. Specification

BS 6465-3:2020 Sanitary installations - Code of practice for the selection, installation and maintenance of sanitary and associated appliances

BS 6644:2011 Specification for the installation and maintenance of gas-fired hot water boilers of rated inputs between 70 kW (net) and 1.8 MW (net) (2nd and 3rd family gases)

BS 6701:2016+A1:2017 Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance - Specification for installation, operation and maintenance

BS 6724: 2016 Electric cables - Thermosetting insulated, armoured cables of rated voltages of 600/1 000 V and 1 900/3 300 V for fixed installations, having low emission of smoke and corrosive gases when affected by fire. Specification

BS 7176:2007+A1:2011 Specification for resistance to ignition of upholstered furniture for non-domestic seating by testing composites

BS 7177:2008+A1:2011 Specification for resistance to ignition of mattresses, mattress pads, divans and bed bases

BS 7188:1998+A2:2009 Impact absorbing playground surfacing. Performance requirements and test methods

BS 7211:2012+A1:2020 Electric cables. Thermosetting insulated and thermoplastic sheathed cables for voltages up to and including 450/750 V for electric power and lighting and

Annex B Standards referred to

having low emission of smoke and corrosive gases when affected by fire

BS 7273-4:2015+A2:2023 Code of practice for the operation of fire protection measures - Actuation of release mechanisms for doors

BS 7370 series. Grounds maintenance

BS 7430: 2011 + A1: 2015 Code of practice for protective earthing of electrical installations

BS 7533 series. Pavements constructed with clay, concrete or natural stone paving units

BS 7543:2015 Guide to durability of buildings and building elements, products and components

BS 7671:2018 + A3:2024 Requirements for Electrical Installations. IET Wiring Regulations

BS 7719:1994 Specification for water-borne emulsion paints for interior use

BS 7755 series. Soil quality

BS 7786:2006 Specification for unsintered PTFE tapes for general use

BS 7874:1998 Method of test for microbiological deterioration of elastomeric seals for joints in pipework and pipelines

BS 7932:2003 Determination of the unpolished and polished pendulum test value of surfacing units

BS 7953:1999 Entrance flooring systems. Selection, installation and maintenance

BS 7976 series. Pendulum testers

BS 8002:2015 Code of practice for earth retaining structures

BS 8102:2022 Protection of below ground structures against water ingress. Code of practice

BS 8201:2011 Code of practice for installation of flooring of wood and wood-based panels

BS 8203:2017 Code of practice for installation of resilient floor coverings

BS 8204-6:2008+A1:2010 Screeds, bases and in situ floorings - Synthetic resin floorings. Code of practice

BS 8214:2016 Timber-based fire door assemblies. Code of practice

BS 8217:2005 Reinforced bitumen membranes for roofing. Code of practice

BS 8218:1998 Code of practice for mastic asphalt roofing

BS 8220-3:2004 Guide for security of buildings against crime.
Storage, industrial and distribution premises

BS 8243:2021 Design, installation and configuration of
intruder and hold-up alarm systems designed to generate
confirmed alarm conditions. Code of practice

BS 8300-1:2018 Design of an accessible and inclusive built
environment - External environment. Code of practice

BS 8300-2:2018 Design of an accessible and inclusive built
environment - Buildings. Code of practice

BS 8417:2024 Preservation of wood. Code of practice

BS 8424:2004 Building hardware. Pull handles. Requirements
and test methods

BS 8473:2018 Intruder and hold-up alarm systems.
Management of false alarms. Code of practice

BS 8481:2006 Design, preparation and application of internal
gypsum, cement, cement and lime plastering systems.
Specification

BS 8485:2015+A1:2019 Code of practice for the design of
protective measures for methane and carbon dioxide ground
gases for new buildings

BS 8489-1:2016 Fixed fire protection systems. Industrial and
commercial watermist systems - Code of practice for design
and installation

BS 8489-7:2016 Fixed fire protection systems. Industrial and
commercial watermist systems - Tests and requirements for
watermist systems for the protection of low hazard
occupancies

BS 8490:2025 Siphonic roof drainage systems. Guide

BS 8492:2016+A1:2017 Telecommunications equipment and
telecommunications cabling. Code of practice for fire
performance and protection - Code of practice for fire
performance and protection

BS 8500-1:2023 Concrete. Complementary British Standard
to BS EN 206 - Method of specifying and guidance for the
specifier

BS 8500-2:2023 Concrete. Complementary British Standard
to BS EN 206 - Specification for constituent materials and
concrete

BS 5519:2020 Selection and installation of fire-resistant power and control cable systems for life safety, fire-fighting and other critical applications. Code of practice

BS 5545:2014 Trees: from nursery to independence in the landscape. Recommendations

BS 5558:2015 Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. Complementary guidance to BS EN 806

BS 5560:2012+A1:2018 Code of practice for the design of buildings incorporating safe work at height

BS 5579:2020 Guide to the design of balconies and terraces

BS 5580-1: 2019 Water quality risk assessments for legionella control. Code of Practice

BS 5580-2:2022 Water quality. Risk assessments for *Pseudomonas aeruginosa* and other waterborne pathogens. Code of practice

BS 5582:2013 Code of practice for surface water management for development sites

BS 5601:2013 Specification for subsoil and requirements for use

BS 5613:2017 Finger protection devices for pedestrian doors. Specification - Safety requirements and test methods

BS 5616:2019 Specification for performance parameters and test methods for green roof substrates

BS 5640 (draft). Structural and supported soils for trees in hard landscapes. Guide

BS 5683:2021 Process for designing and implementing Biodiversity Net Gain. Specification

BS 5747:2007 Reinforced bitumen membranes (RBMs) for roofing. Guide to selection and specification

BS 5910:2017 Steel and aluminium rainwater systems. Specification

BS 5963:2016 Intruder and hold-up alarm systems. Commissioning, maintenance and remote support. Code of practice

BS 5918:2021 Processing of alarm signals by an alarm receiving centre. Code of practice

BS 5990:2015 Non automatic fire-fighting systems in buildings. Code of practice

Annex B Standards referred to

BS 9991:2024 Fire safety in the design, management and use of residential buildings. Code of practice

BS 9999:2017 Fire safety in the design, management and use of buildings. Code of practice

BS 42020:2013 Biodiversity. Code of practice for planning and development

BS 42021:2022 Integral nest boxes. Selection and installation for new developments. Specification

BS 594987:2024 Asphalt for roads and other trafficked areas. Transport, laying, compaction and product type testing protocols. Specification

BS EN (British Standard European Norm)

BS EN 2:1992 Classification of fires

BS EN 40 series. Lighting columns

BS EN 54-11:2001 Fire detection and fire alarm systems - Manual call points

BS EN 54-29:2015 Fire detection and fire alarm systems - Multi-sensor fire detectors. Point detectors using a combination of smoke and heat sensors

BS EN 54-31:2014+A1:2016 Fire detection and fire alarm system - Multi-sensor fire detectors. Point detectors using a combination of smoke, carbon monoxide and optionally heat sensors

BS EN 81-20:2020 Safety rules for the construction and installation of lifts. Lifts for the transport of persons and goods - Passenger and goods passenger lifts

BS EN 81-28:2022 Safety rules for the construction and installation of lifts. Lifts for the transport of persons and goods - Remote alarm on passenger and goods passenger lifts

BS EN 81-41:2024 Safety rules for the construction and installation of lifts. Special lifts for the transport of persons and goods - Vertical lifting platforms intended for use by persons with impaired mobility

BS EN 81-70:2021+A1:2022 Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lift - Accessibility to lifts for persons including persons with disability

BS EN 81-72:2020 Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts - Firefighters lifts

BS EN 124-1:2015 Gully tops and manhole tops for vehicular and pedestrian areas - Definitions, classification, general

principles of design, performance requirements and test methods

BS EN 124-3:2015 Gully tops and manhole tops for vehicular and pedestrian areas - Gully tops and manhole tops made of steel or aluminium alloys

BS EN 206:2013+A2:2021 Concrete. Specification, performance, production and conformity

BS EN 295 series. Vitrified clay pipe systems for drains and sewers

BS EN 330:2014 Wood preservatives. Determination of the relative protective effectiveness of a wood preservative for use under a coating and exposed out-of-ground contact. Field test: L-joint method

BS EN 335:2013 Durability of wood and wood-based products. Use classes: definitions, application to solid wood and wood-based products

BS EN 338:2016 Structural timber. Strength classes

BS EN 356:2000 Glass in building. Security glazing. Testing and classification of resistance against manual attack

BS EN 378 Refrigerating systems and heat pumps - Safety and environmental requirements

BS EN 438-3:2016 High-pressure decorative laminates (HPL). Sheets based on thermosetting resins (usually called laminates) - Classification and specifications for laminates less than 2 mm thick intended for bonding to supporting substrates

BS EN 438-6:2016 High-pressure decorative laminates (HPL). Sheets based on thermosetting resins (usually called laminates) - Classification and specifications for Exterior-grade compact laminates of thickness 2 mm and greater

BS EN 490:2011+A1:2017 Concrete roofing tiles and fittings for roof covering and wall cladding. Product specifications

BS EN 491:2011 Concrete roofing tiles and fittings for roof covering and wall cladding. Test methods

BS EN 492:2012+A2:2018 Fibre-cement slates and fittings. Product specification and test methods

BS EN 508-2:2019 Roofing and cladding products from metal sheet. Specification for self-supporting products of steel, aluminium or stainless steel sheet - Aluminium

BS EN 508-3:2021+A1:2023 Roofing and cladding products from metal sheet. Specification for self-supporting products of steel, aluminium or stainless steel sheet - Stainless steel

Annex B Standards referred to

BS EN 520:2004+A1:2009 Gypsum plasterboards. Definitions, requirements and test methods

BS EN 573 series. Aluminium and aluminium alloys. Chemical composition and form of wrought products

BS EN 581 series. Outdoor furniture. Seating and tables for camping, domestic and contract use

BS EN 594:2011 Timber structures. Test methods. Racking strength and stiffness of timber frame wall panels

BS EN 597-1:2015 Furniture. Assessment of the ignitability of mattresses and upholstered bed bases - Ignition source smouldering cigarette

BS EN 631-1:1993 Materials and articles in contact with foodstuffs. Catering containers - Specification for dimensions of containers

BS EN 661:1995 Resilient floor coverings. Determination of the spreading of water

BS EN 662:1995 Resilient floor coverings. Determination of curling on exposure to moisture

BS EN 681 series. Elastomeric seals. Material requirements for pipe joint seals used in water and drainage applications

BS EN 682:2002 Elastomeric seals. Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids

BS EN 752:2017 Drain and sewer systems outside buildings. Sewer system management

BS EN 755 series. Aluminium and aluminium alloys. Extruded rod/bar, tube and profiles

BS EN 771 series. Specification for masonry units

BS EN 771-1:2011+A1:2015 Specification for masonry units - Clay masonry units

BS EN 771-3:2011+A1:2015 Specification for masonry units - Aggregate concrete masonry units (Dense and lightweight aggregates)

BS EN 771-4:2011+A1:2015 Specification for masonry units - Autoclaved aerated concrete masonry units

BS EN 806 series. Specifications for installations inside buildings conveying water for human consumption

BS EN 806-4:2010 Specifications for installations inside buildings conveying water for human consumption - Installation

Annex B Standards referred to

BS EN 816:2017 Sanitary tapware. Automatic shut-off valves
PN 10

BS EN 817:2024 Sanitary tapware. Mechanical mixing valves
(PN 10). General technical specifications

BS EN 877:2021 Cast iron pipe systems and their
components for the evacuation of water from works.
characteristics and test methods

BS EN 988:1997 Zinc and zinc alloys. Specification for rolled
flat products for building

BS EN 997:2018 WC pans and WC suites with integral trap

BS EN 998-2:2016 Specification for mortar for masonry -
Masonry mortar

BS EN 1026:2016 Windows and doors. Air permeability. Test
method

BS EN 1057:2006+A1:2010 Copper and copper alloys.
Seamless, round copper tubes for water and gas in sanitary
and heating applications

BS EN 1090 series. Execution of steel structures and
aluminium structures

BS EN 1092-3:2003 Flanges and their joints. Circular flanges
for pipes, valves, fittings and accessories, PN designated -
Copper alloy flanges

BS EN 1111:2017 Sanitary tapware. Thermostatic mixing
valves (PN 10). General technical specification

BS EN 1125:2008 Building hardware. Panic exit devices
operated by a horizontal bar, for use on escape routes.
Requirements and test methods

BS EN 1154:1997 Building hardware. Controlled door closing
devices. Requirements and test methods

BS EN 1155:1997 Building hardware. Electrically powered
hold-open devices for swing doors. Requirements and test
methods

BS EN 1172:2011 Copper and copper alloys. Sheet and strip
for building purposes

BS EN 1176 series. Playground equipment and surfacing

BS EN 1177:2018+A1:2023 Impact attenuating playground
surfacing. Methods of test for determination of impact
attenuation

BS EN 1191:2012 Windows and doors. Resistance to
repeated opening and closing. Test method

Annex B Standards referred to

BS EN 1192:2000 Doors. Classification of strength requirements

BS EN 1253 series. Gullies for buildings

BS EN 1254 series. Copper and copper alloys. Plumbing fittings

BS EN 1287:2017 Sanitary tapware. Low pressure thermostatic mixing valves. General technical specification

BS EN 1303:2015 Building hardware. Cylinders for locks. Requirements and test methods

BS EN 1304:2013 Clay roofing tiles and fittings. Product definitions and specifications

BS EN 1307:2014+A3:2018 Textile floor coverings. Classification

BS EN 1338:2003 Concrete paving blocks. Requirements and test methods

BS EN 1340:2003 Concrete kerb units. Requirements and test methods

BS EN 1342:2012 Setts of natural stone for external paving. Requirements and test methods

BS EN 1343:2012 Kerbs of natural stone for external paving. Requirements and test methods

BS EN 1401-1:2019+A1:2023 Plastics piping systems for non-pressure underground drainage and sewerage. Unplasticized poly(vinyl chloride) (PVC-U) - Specifications for pipes, fittings and the system

BS EN 1433:2002 Drainage channels for vehicular and pedestrian areas. Classification, design and testing requirements, marking and evaluation of conformity

BS EN 1436:2018 Road marking materials. Road marking performance for road users and test methods

BS EN 1504 series. Products and systems for the protection and repair of concrete structures

BS EN 1504-2:2004 Products and systems for the protection and repair of concrete structures. Definitions, requirements, quality control and evaluation of conformity - Surface protection systems for concrete

BS EN 1610:2015 Construction and testing of drains and sewers

BS EN 1634-1:2014+A1:2018 Fire resistance and smoke control tests for door and shutter assemblies, openable

Annex B Standards referred to

windows and elements of building hardware - Fire resistance test for door and shutter assemblies and openable windows

BS EN 1729 series. Furniture. Chairs and tables for educational institutions - Safety requirements and test methods

BS EN 1729-1:2015 Furniture. Chairs and tables for educational institutions - Functional dimensions

BS EN 1729-2:2023 Furniture. Chairs and tables for educational institutions - Safety requirements and test methods

BS EN 1751:2024 Ventilation for buildings. Air terminal devices. Aerodynamic testing of damper and valves

BS EN 1838:2024 Lighting applications. Emergency lighting for buildings

BS EN 1871:2020 Road marking materials. Paint, thermoplastic and cold plastic materials. Physical properties

BS EN 1886:2007 Ventilation for buildings. Air handling units. Mechanical performance

BS EN 1906:2012 Building hardware. Lever handles and knob furniture. Requirements and test methods

BS EN 1935:2002 Building hardware. Single-axis hinges. Requirements and test methods

BS EN 1990:2023 Eurocode. Basis of structural and geotechnical design

BS EN 1991-1-1:2025 Eurocode 1. Actions on structures - Specific weight of materials, self-weight of construction works and imposed loads for buildings

BS EN 1991-1-3:2025 Eurocode 1. Actions on structures - Snow loads

BS EN 1991-1-4:2005+A1:2010 Eurocode 1. Actions on structures - General actions - Wind actions

BS EN 1991-1-7:2006+A1:2014 Eurocode 1. Actions on structures - General actions - Accidental actions

BS EN 1992-1-1:2023 Eurocode 2. Design of concrete structures - General rules and rules for buildings, bridges and civil engineering structures

BS EN 1993-1-1:2022 Eurocode 3. Design of steel structures - General rules and rules for buildings

BS EN 1995 series. Eurocode 5. Design of timber structures

Annex B Standards referred to

BS EN 1995-1-1:2004+A2:2014 Eurocode 5: Design of timber structures - General. Common rules and rules for buildings

BS EN 1996 series. Eurocode 6. Design of masonry structures

BS EN 1997 series. Eurocode 7. Geotechnical design

BS EN 10025 series. Hot rolled products of structural steels

BS EN 10088 series. Stainless steels

BS EN 10219 series. Cold formed welded steel structural hollow sections

BS EN 10226 series. Pipe threads where pressure tight joints are made on the threads

BS EN 10255:2004 Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions

BS EN 10346:2015 Continuously hot-dip coated steel flat products for cold forming. Technical delivery conditions

BS EN 12056-1:2000 Gravity drainage systems inside buildings - General and performance requirements

BS EN 12056-3:2000 Gravity drainage systems inside buildings - Roof drainage, layout and calculation

BS EN 12056-5:2000 Gravity drainage systems inside buildings - Installation and testing, instructions for operation, maintenance and use

BS EN 12101-6:2022 Smoke and heat control systems - Specification for pressure differential systems. Kits

BS EN 12150 series. Glass in building. Thermally toughened soda lime silicate safety glass

BS EN 12193:2018 Light and lighting. Sports lighting

BS EN 12199:2020 Resilient floor coverings. Specifications for homogeneous and heterogeneous relief rubber floor coverings

BS EN 12206-1:2021 Paints and varnishes. Coating of aluminium and aluminium alloys for architectural purposes - Coatings prepared from thermosetting coating powder

BS EN 12219:2000 Doors. Climatic influences. Requirements and classification

BS EN 12224:2000 Geotextiles and geotextile-related products. Determination of the resistance to weathering

BS EN 12326 series. Slate and stone for discontinuous roofing and external cladding

Annex B Standards referred to

BS EN 12369-3:2022 Wood-based panels. Characteristic values for structural design - Solid wood panels

BS EN 12400:2002 Windows and pedestrian doors. Mechanical durability. Requirements and classification

BS EN 12453:2017+A1:2021 Industrial, commercial and garage doors and gates. Safety in use of power operated doors. Requirements and test methods

BS EN 12464-1:2021 Light and lighting. Lighting of work places - Indoor work places

BS EN 12464-2:2024 Light and lighting. Lighting of work places - Outdoor work places

BS EN 12485:2017 Chemicals used for treatment of water intended for human consumption. Calcium carbonate, high-calcium lime, half-burnt dolomite, magnesium oxide, calcium magnesium carbonate and dolomitic lime. Test methods

BS EN 12604:2017+A1:2020 Industrial, commercial and garage doors and gates. Mechanical aspects. Requirements and test methods

BS EN 12727:2016 Furniture. Ranked seating. Requirements for safety, strength and durability

BS EN 12845:2015+A1:2019 Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance

BS EN 13030:2001 Ventilation for buildings. Terminals. Performance testing of louvres subjected to simulated rain

BS EN 13043:2002 Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas

BS EN 13108-1:2016 Bituminous mixtures. Material specifications - Asphalt Concrete

BS EN 13120:2009+A1:2014 Internal blinds. Performance requirements including safety

BS EN 13141 series. Ventilation for buildings. Performance testing of components/products for residential ventilation

BS EN 13150:2020 Workbenches for laboratories in educational institutions. Dimensions, safety and durability requirements and test methods

BS EN 13162:2012+A1:2015 Thermal insulation products for buildings. Factory made mineral wool (MW) products. Specification

Annex B Standards referred to

BS EN 13163:2012+A2:2016 Thermal insulation products for buildings. Factory made expanded polystyrene (EPS) products. Specification

BS EN 13164:2012+A1:2015 Thermal insulation products for buildings. Factory made extruded polystyrene foam (XPS) products. Specification

BS EN 13165:2012+A2:2016 Thermal insulation products for buildings. Factory made rigid polyurethane foam (PU) products. Specification

BS EN 13200-1:2019 Spectator facilities - General characteristics for spectator viewing area

BS EN 13200-2 Spectator facilities - Layout criteria of service area. - Part 2: Characteristics

BS EN 13200-3:2018 Spectator facilities - Separating elements. Requirements

BS EN 13200-4:2023 Spectator facilities - Seats. Product characteristics

BS EN 13200-5:2006 Spectator facilities - Telescopic stands

BS EN 13241:2003+A2:2016 Industrial, commercial, garage doors and gates. Product standard, performance characteristics

BS EN 13249:2016 Geotextiles and geotextile-related products. Characteristics required for use in the construction of roads and other trafficked areas (excluding railways and asphalt inclusion)

BS EN 13251:2016 Geotextiles and geotextile-related products. Characteristics required for use in earthworks, foundations and retaining structures

BS EN 13252:2016 Geotextiles and geotextile-related products. Characteristics required for use in drainage systems

BS EN 13279-1:2008 Gypsum binders and gypsum plasters - Definitions and requirements

BS EN 13300:2022 Paints and varnishes. Paints and varnishes for interior walls and ceilings. Classification

BS EN 13310:2015+A1:2018 Kitchen sinks. Functional requirements and test methods

BS EN 13438:2013 Paints and varnishes. Powder organic coatings for hot dip galvanised or sherardised steel products for construction purposes

BS EN 13501-1:2018 Fire classification of construction products and building elements - Classification using data from reaction to fire tests

Annex B Standards referred to

BS EN 13501-2:2023 Fire classification of construction products and building elements - Classification using data from fire resistance and/or smoke control tests, excluding ventilation services

BS EN 13501-5:2016 Fire classification of construction products and building elements - Classification using data from external fire exposure to roofs tests

BS EN 13553:2017 Resilient floor coverings. Polyvinyl chloride floor coverings for use in special wet areas. Specification

BS EN 13598-1:2020 Plastics piping systems for non-pressure underground drainage and sewerage. Unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Specifications for ancillary fittings and shallow chambers

BS EN 13598-2:2020 Plastics piping systems for non-pressure underground drainage and sewerage. Unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Specifications for manholes and inspection chambers

BS EN 13650:2001 Soil improvers and growing media. Extraction of aqua regia soluble elements

BS EN 13707:2004+A2:2009 Flexible sheets for waterproofing. Reinforced bitumen sheets for roof waterproofing. Definitions and characteristics

BS EN 13830:2015+A1:2020 Curtain walling. Product standard

BS EN 13845:2017 Resilient floor coverings. Polyvinyl chloride floor coverings with particle based enhanced slip resistance. Specification

BS EN 13893:2002 Resilient, laminate and textile floor coverings. Measurement of dynamic coefficient of friction on dry floor surfaces

BS EN 13956:2012 Flexible sheets for waterproofing. Plastic and rubber sheets for roof waterproofing. Definitions and characteristics

BS EN 13964:2014 Suspended ceilings. Requirements and test methods

BS EN 13970:2004 Flexible sheets for waterproofing. Bitumen water vapour control layers. Definitions and characteristics

BS EN 14019:2016 Curtain Walling. Impact resistance. Performance requirements

Annex B Standards referred to

BS EN 14041:2018 Resilient, textile, laminate and modular multilayer floor coverings. Essential characteristics

BS EN 14055:2018 WC and urinal flushing cisterns

BS EN 14056:2003 Laboratory furniture. Recommendations for design and installation

BS EN 14081 series. Timber structures. Strength graded structural timber with rectangular cross section

BS EN 14175-2:2003 Fume cupboards - Safety and performance requirements

BS EN 14243-3:2019 Materials obtained from end of life tyres - Shreds, cuts and chips. Methods for determining their dimension(s) including protruding filaments dimensions

BS EN 14296:2015+A1:2018 Sanitary appliances. Communal washing troughs

BS EN 14351-1:2006+A2:2016 Windows and doors. Product standard, performance characteristics - Windows and external pedestrian doorsets

BS EN 14351-2:2018 Windows and doors. Product standard, performance characteristics - Internal pedestrian doorsets

BS EN 14388:2015 Road traffic noise reducing devices. Specifications

BS EN 14411:2016 Ceramic tiles. Definition, classification, characteristics, assessment and verification of constancy of performance and marking

BS EN 14434:2023 Writing boards for educational institutions. Ergonomic, technical and safety requirements and their test methods

BS EN 14449:2005 Glass in building. Laminated glass and laminated safety glass. Evaluation of conformity/product standard

BS EN 14688:2015+A1:2018 Sanitary appliances. Wash basins. Functional requirements and test methods

BS EN 14749:2016+A1:2022 Furniture. Domestic and kitchen storage units and kitchen-worktops. Safety requirements and test methods

BS EN 14843:2007 Precast concrete products. Stairs

BS EN 14904:2006 Surfaces for sports areas. Indoor surfaces for multi-sports use. Specification

BS EN 15026:2023 Hygrothermal performance of building components and building elements. Assessment of moisture transfer by numerical simulation

BS EN 15091:2024 Sanitary tapware. Electronic opening and closing sanitary tapware

BS EN 15534 series. Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC))

BS EN 15978 Sustainability of construction works

BS EN 16034:2014 Pedestrian doorsets, industrial, commercial, garage doors and openable windows. Product standard, performance characteristics. Fire resisting and/or smoke control characteristics

BS EN 16121:2023 Non-domestic storage furniture. Requirements for safety, strength, durability and stability

BS EN 16139:2013 Furniture. Strength, durability and safety. Requirements for non-domestic seating

BS EN 16153:2013+A1:2015 Light transmitting flat multiwall polycarbonate (PC) sheets for internal and external use in roofs, walls and ceilings. Requirements and test methods

BS EN 16165:2021 Determination of slip resistance of pedestrian surfaces. Methods of evaluation

BS EN 16282 series. Equipment for commercial kitchens. Components for ventilation in commercial kitchens

BS EN 16282-7:2017+A1:2021 Equipment for commercial kitchens. Components for ventilation in commercial kitchens - Installation and use of fixed fire suppression systems

BS EN 16798-1:2019 Energy performance of buildings. Ventilation for buildings - Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics. Module M1-6

BS EN 17037:2018+A1:2021 Daylight in buildings

BS EN 50131 series. Alarm systems. Intrusion and hold-up systems

BS EN 50171:2021 Central safety power supply systems

BS EN 50172:2024 Emergency escape lighting systems

BS EN 50173 series. Information technology. Generic cabling systems

Annex B Standards referred to

BS EN 50174 series. Installation technology. Cabling installation

BS EN 50310:2016+A1:2020 Telecommunications bonding networks for buildings and other structures

BS EN 50518:2019+A1:2023 Monitoring and Alarm Receiving Centre

BS EN 60529:1992 + A2:2013 Degrees of protection provided by enclosures (IP code)

BS EN 60598 series. Luminaires - Particular requirements

BS EN 60598-2-22:2014+A1:2020 Luminaires - Particular requirements. Luminaires for emergency lighting

BS EN 60754 series. Test on gases evolved during combustion of materials from cables

BS EN 60839-11-1:2013 Alarm and electronic security systems - Electronic access control systems. System and components requirements

BS EN 60839-11-2:2015 Alarm and electronic security systems - Electronic access control systems. Application guidelines

BS EN 61000 Electromagnetic Compatibility

BS EN 61400-2: 2014 Wind turbines Part 2: Small wind turbines

BS EN 61427-1: 2013 Secondary cells and batteries for renewable energy storage. General requirements and methods of test. Photovoltaic off-grid application

BS EN 61439 Low-voltage switchgear and control gear assemblies

BS EN 61537: 2007 Cable management - Cable tray systems and cable ladder systems

BS EN 62034:2012 Automatic test systems for battery powered emergency escape lighting

BS EN 62040-1: 2008 Uninterruptible power systems (UPS) - Part 1: General and safety requirements for UPS

BS EN 62040-3: 2011 Uninterruptible power systems (UPS) Part 3: Method of specifying the performance and test requirements

BS EN 62305 series. Protection against lightning

BS EN 62305-4:2011 Protection against lightning - Electrical and electronic systems within structures

BS EN 62446-1:2016 incorporating amendment 1:2018
Photovoltaic (PV) systems. Requirements for testing,
documentation and maintenance

BS EN 62606:2013+A1:2017 General requirements for arc
fault detection devices

BS EN 62717:2017+A2:2019 LED modules for general
lighting. Performance requirements

BS EN IEC (British Standard European Norm International Electrotechnical Commission)

BS EN IEC 60309 series. Plugs, fixed or portable socket-
outlets and appliance inlets for industrial purposes

BS EN IEC 61084-1: 2024 Cable trunking systems and cable
ducting systems for electrical installations - General
requirements

BS EN IEC 61400 series. Wind energy generation systems

BS EN IEC 61439 series. Low-voltage switchgear and control
gear assemblies

BS EN IEC 61439-6:2012 Low-voltage switchgear and control
gear assemblies - Busbar trunking systems (busways)

BS EN IEC 61557-12:2022 Electrical safety in low voltage
distribution systems up to 1000 V AC and 1500 V DC.

Equipment for testing, measuring or monitoring of protective
measures - Power metering and monitoring devices (PMD)

BS EN IEC 61851 series. Electric vehicle conductive charging
system

BS EN IEC 61851-1:2019 Electric vehicle conductive charging
system - General requirements

BS EN IEC 61851-22:2002 Electric vehicle conductive
charging system - A.C. electric vehicle charging station

BS EN IEC 62722 series. Luminaire performance

BS EN ISO (British Standard European Norm International Organization for Standardization)

BS EN ISO 1461:2022 Hot dip galvanized coatings on
fabricated iron and steel articles. Specifications and test
methods

BS EN ISO 7599:2018 Anodizing of aluminium and its alloys.
Method for specifying decorative and protective anodic
oxidation coatings on aluminium

BS EN ISO 9001:2015+A1:2024 Quality management
systems. Requirements

Annex B Standards referred to

BS EN ISO 10121 series. Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation

BS EN ISO 10140-3:2021 Acoustics. Laboratory measurement of sound insulation of building elements - Measurement of impact sound insulation

BS EN ISO 10211:2017 Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations

BS EN ISO 10319:2024 Geosynthetics. Wide-width tensile test

BS EN ISO 10535:2021 Assistive products. Hoists for the transfer of persons. Requirements and test methods

BS EN ISO 10581:2020 Resilient floor coverings. Homogeneous poly(vinyl chloride) floor covering. Specifications

BS EN ISO 10874:2012+A1:2020 Resilient, textile and laminate floor coverings. Classification

BS EN ISO 11058:2019 Geotextiles and geotextile-related products. Determination of water permeability characteristics normal to the plane, without load

BS EN ISO 11998:2006 Paints and varnishes. Determination of wet-scrub resistance and cleanability of coatings

BS EN ISO 12236:2006 Geosynthetics. Static puncture test (CBR test)

BS EN ISO 12572:2016+A1:2024 Hygrothermal performance of building materials and products. Determination of water vapour transmission properties. Cup method

BS EN ISO 12944 series. Paints and varnishes. Corrosion protection of steel structures by protective paint systems

BS EN ISO 12944-5:2019 Paints and varnishes. Corrosion protection of steel structures by protective paint systems - Protective paint systems

BS EN ISO 12951:2020 Textile floor coverings. Determination of mass loss, fibre bind and stair nosing appearance change using the Lisson Tretrad machine

BS EN ISO 13438:2018 Geosynthetics. Screening test method for determining the resistance of geotextiles and geotextile-related products to oxidation

BS EN ISO 13788:2012 Hygrothermal performance of building components and building elements. Internal surface temperature to avoid critical surface humidity and interstitial condensation. Calculation methods

Annex B Standards referred to

BS EN ISO 14001:2015+A1:2024 Environmental management systems. Requirements with guidance for use

BS EN ISO 14341:2020 Welding consumables. Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels. Classification

BS EN ISO 16890 series. Air filters for general ventilation

BS EN ISO 19712 series. Plastics. Decorative solid surfacing materials

BS EN ISO 24011:2012 Resilient floor coverings. Specification for plain and decorative linoleum

BS EN ISO 24343-1:2012 Resilient and laminate floor coverings. Determination of indentation and residual indentation - Residual indentation

BS EN ISO 52120-1:2022 Energy performance of buildings. Contribution of building automation, controls and building management - General framework and procedures

BS ISO (British Standard International Organization for Standardization)

BS ISO 3864-1:2011 Graphical symbols. Safety colours and safety signs - Design principles for safety signs and safety markings

BS ISO 15686 series. Buildings and Constructed Assets – Service Life Planning

BS ISO 19822:2018 Fertilizers and soil conditioners. Determination of humic and hydrophobic fulvic acids concentrations in fertilizer materials

BS ISO 23601:2020 Safety identification. Escape and evacuation plan signs

ISO IEC (International Organization for Standardization International Electrotechnical Commission)

ISO/IEC 27001:2022 Information security, cybersecurity and privacy protection. Information security management systems. Requirements

ISO/IEC 27002:2022 Information security, cybersecurity and privacy protection. Information security controls

ISO/IEC 27005:2022 Information security, cybersecurity and privacy protection. Guidance on managing information security risks

Publicly Available Specification (PAS)

PAS 24:2022 Enhanced security performance requirements for doorsets and windows in the UK. Doorsets and windows intended to offer a level of security suitable for dwellings and other buildings exposed to comparable risk

PAS 100:2018 Specification for composted materials

PAS 6463:2022 Design for the mind. Neurodiversity and the built environment. Guide

Other Standards

ANSI/ASHRAE Standard 134-2005 (R2014)

ANSI/ASHRAE Standard 135-2024

ASTM C946-10 Standard Practice for Construction of Dry-Stacked, Surface-Bonded Walls

BESA DW 172 - Specification for Kitchen Ventilation Systems

ENA G98 Recommendations for the Connection of Type Tested small-scale Embedded Generators (Up to 16A per Phase) in Parallel with Low Voltage Distribution Systems

ENA G99 Recommendations for the Connection of Generating Plant to the Distribution Systems of Licensed Distribution Network Operators

ETSI EN 303 645 Cyber Security for Consumer Internet of Things. Baseline Requirements

IGEM/UP/11 Edition 3 - Gas installations for educational establishments

IGEM/UP/19 Edition 2 - Design & application of interlock devices/associated systems in gas appliance installations in catering

IGEM/UP/1101 Guidance on Gas Installations for the Management and Staff within Educational Establishments

Loss Prevention Standard LPS 1175: Requirements and testing procedures for the LPCB certification and listing of intruder resistant building components, strongpoints, security enclosures and free-standing barriers

NFPA 102 - National Fire Protection Association's Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures

Renewable UK Small Wind Turbine Standard, 2014

UL 1642 Lithium batteries

UL 1973 Batteries for Use in Stationary and Motive Auxiliary Power Applications

Annex C

Other publications referred to

Other publications referred to

Legislation

Building Safety Act 2022

Climate Change Act 2008

Environment Act 2021

Equality Act 2010

Fire Regulation Reform Order 2005

Gas Safety (Installation and Use) Regulations (GSIUR)

Health and Safety at Work Act 1974

Machinery Directive 2006/42/EC

The Building Regulations 2010

The Construction (Design and Management) Regulations 2015

The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

The Ecodesign for Energy-Related Products and Energy Information (Lighting Products) Regulations 2021

The Education (Independent School Standards) Regulations 2014 applicable to academies, free schools and sixth form colleges

The Electric Vehicles (Smart Charge Points) Regulations 2021

The Fire Safety (England) Regulations 2022

The Furniture and Furnishings (Fire) (Safety) Regulations 1988

The Health and Safety (Safety Signs and Signals) Regulations 1996

The Lifts Regulations 2016

The Regulatory Reform (Fire Safety) Order 2005

The School Premises (England) Regulations 2012 applicable to maintained schools

The Workplace (Health, Safety & Welfare) Regulations 1992

Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2012

Voyeurism (Offences) Act 2019

Weeds Act 1959

Wildlife and Countryside Act 1981

Other Documents

Advisory Committee for Roof Safety (ACR)

ACR [M] 001: Test for non-fragility of large element roofing assemblies

Association of Play Industries (API)

Code of Practice for Provision of Impact Attenuating Surfaces

Association for Specialist Fire Protection (ASFP)

Ensuring Best Practice for Passive Fire Protection in Buildings

Fire-stopping: Linear joint seals, penetration seals and cavity barriers

Audiovisual and Integrated Experience Association (AVIXA) DISCAS

DISCAS Display Image Size for 2D Content in Audiovisual Systems

British Constructional Steelwork Association Limited (BCSA)

National Structural Steelwork Specification (NSSS)

British Drilling Association (BDA)

Health & Safety Manual for Land Drilling 2015: A Code of Safe Drilling Practice

British Standards Institution (BSI) Published Document (PD) Scheme

PD 6662:2017 Scheme for the application of European Standards for intrusion and hold-up alarm systems

PD 6678:2005 Guide to the specification of masonry mortar

PD IEC TR 63079:2017+A2:2020 Code of practice for hearing-loop systems (HLS) (Incorporating corrigendum July 2023)

Building Engineering Services Association (BESA)

DW 144 Specification for Sheet Metal Ductwork

DW 172 Specification for Kitchen Ventilation Systems

Building Research Establishment (BRE)

BR187 External fire spread: Building separation and boundary distances

BR211 Radon: Guidance on protective measures for new buildings

BR443:2019 Conventions for U-value calculations

BR497:2016 Conventions for calculating linear thermal transmittance and temperature factors

BRE IP1/06:2006 Assessing the effects of thermal bridging at junctions and around openings

Special Digest SD3:2002 HAC concrete in the UK: assessment, durability management, maintenance and refurbishment

Building Services Research and Intelligence Association (BSRIA)

BSRIA Guide AG 7/98 Library of system control strategies

BSRIA Guide AG 16/2002 Variable-flow water systems - Design, installation and commissioning guidance

BSRIA Guide BG 2/2010 Commissioning Water Systems

BSRIA Guide BG 29/2021 Pre-Commission Cleaning of Pipework Systems Amended 6th edition

BSRIA Guide BG 50/2021: Water Treatment for Closed Heating and Cooling Systems

BSRIA Guide BG 57/2015 Legionnaires' Disease Risk Assessment

BSRIA Guide BG 58/2015 Legionnaires Disease - Operation and Maintenance Log Book

Centre for Window and Cladding Technology (CWCT)

CWCT standard for systemised building envelopes (all parts)

CWCT Technical Note 65: Thermal fracture of glass

CWCT Technical Note 66: Safety and fragility of overhead glazing: guidance on specification

CWCT Technical Note 67: Safety and fragility of overhead glazing: testing and assessment

CWCT Technical Note 92: Simplified method for assessing glazing in Class 2 roofs

Changing Places Consortium

Changing Places: 'The Practical Guide'

Chartered Institution of Building Services Engineers (CIBSE)

AM10 Natural ventilation in non-domestic buildings

AM17 Heat pump installations for large non-domestic buildings

CCW Commissioning Code W: Water distribution systems

Annex C Other publications referred to

Guide B: Heating, ventilating, air conditioning and refrigeration

Guide D: Transportation systems in buildings

Guide L: Sustainability

Guide M: Maintenance engineering and management,
Appendix 12.A1

TM50 Energy efficiency in commercial kitchens

TM52 The limits of thermal comfort: avoiding overheating

Committee for Plant Supply and Establishment (CPSE)

Handling and establishing landscape plants

Concrete Structures Group (CONSTRUCT)

National Structural Concrete Specification (NSCS)

Consortium of Local Education Authorities for the Provision of Science Services (CLEAPSS)

CLEAPSS G9 Fume Cupboards in Schools

CLEAPSS Guide G225 Local Exhaust Ventilation in D&T

Construction Industry Research and Information Association (CIRIA)

C632F - Guidance on glazing at height

C760 - Guidance on embedded retaining wall design (CIRIA)

C766 – Control of cracking by restrained deformation in
concrete (CIRIA)

C768F - Guidance on the construction of SuDS

C713F - Retrofitting to manage surface water

C753F - SuDS Manual

Department for Education

Automated external defibrillators – a guide for schools

Building Bulletin 93: Acoustic design of schools: performance
standards

Building Bulletin 100: Design for fire safety in schools

Building Bulletin 101: Guidelines on ventilation, thermal
comfort and indoor air quality in schools

Building Bulletin 103: Area guidelines for mainstream schools

Building Bulletin 104: Area guidelines for SEND and
alternative provision

DfE cyber security standards for schools and colleges

DfE network cabling standards for schools and colleges

Annex C Other publications referred to

DfE network switching standards for schools and colleges

DfE wireless networking standards for schools and colleges

DfE's Sustainability and climate change strategy

Early Years Foundation Stage (EYFS) Statutory Framework

Good Estate Management (GEMS)

Keeping children safe in education 2024

Managing Older School Buildings: A guide for estates maintenance staff

Plan for Change: Break Down Barriers to Opportunity

Reinforced Autoclaved Aerated Concrete (RAAC): identification guidance

SEND Code of Practice: 0 to 25 years

Department for Environment, Food and Rural Affairs (DEFRA)

Construction Code of Practice for the Sustainable Use of Soils on Construction Sites

Third National Adaptation Programme (NAP3)

Statutory biodiversity metric: user guide

Sustainable procurement: the Government Buying Standards (GBS)

Department for Transport

Cycle Infrastructure Design

Inclusive Mobility: A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure

England and Wales Cricket Board (ECB)

Developing your school site

Performance Standards for Non-Turf Cricket Pitches

Energy Networks Association

EREC G98 Requirements for Connection of Fully Type Tested Micro-generators

EREC G99 Requirements for Connection of Generation Equipment

Environment Agency

Environmental good practice guide for ground source heating and cooling

European Organisation for Technical Assessment (EOTA)

EAD 090062-01-0404:2024 Kits for external wall claddings mechanically fixed

EAD-040083-00-0404:2020 External thermal insulation composite systems (ETICS) with renderings

Fire Protection Association

LPC Design Guide for the fire protection of buildings

Fire Protection Association on behalf of RISC Authority

RC62: Recommendations for fire safety with PV panel installations, 2023

FLL

Green Roof Guidelines

Forest Research and University of Reading

Tree Species Guide for UK Agroforestry Systems

Gate Safe

Gate Safety by Design - Help and Advice for Schools with Automated Gates

Green Roof Organisation (GRO)

The GRO Biosolar best practice design guide 2024

The GRO Green Roof Code

Ground Source Heat Pump Association (GSHPA)

Vertical Borehole Standard

Health and Safety Executive (HSE)

Arboriculture and Forestry Advisory Group safety leaflets

Children's Play and Leisure – Promoting a Balanced Approach

Guidance on Managing the Risk of Hazardous Gases when Drilling or Piling Near Coal

HSE L8 (Legionnaires' disease. The control of legionella bacteria in water systems - Approved Code of Practice and guidance)

HSG 258 Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)

HSG 274 Part 1: The control of legionella bacteria in evaporative cooling systems

HSG 274 Part 2: The control of legionella bacteria in hot and cold water systems

HSG 274 Part 3: The control of legionella bacteria in other risk systems

INDG 139: Using electric storage batteries safely

OPSTD 1-2011: Powered perimeter gates

Safety Signs and Signals: Guidance on Regulations

Workplace health, safety and welfare. Workplace (Health, Safety and Welfare) Regulations 1992. Approved Code of Practice and guidance

Home Office

Fire safety risk assessment - educational premises

Horticultural Trades Association (HTA)

National Plant Specification Guidance

Institute of Acoustics and the Association of Noise Consultants (IOA/ANC)

Acoustics of Schools: a design guide

Institution of Civil Engineers (ICE)

Specification for Piling and Embedded Retaining Walls (SPERWall)

Institution of Engineering and Technology (IET)

Code of Practice for Electric Vehicle Charging systems, 5th Edition

Code of Practice for Grid-connected Solar Photovoltaic Systems

Guidance Note 3: Inspection & Testing, 9th Edition, 2022

IET Guidance Note 3: Inspection & Testing, 9th Edition, 2022

Institution of Lighting Professionals (ILP)

Guidance Note 1 - Reduction of obtrusive light

Guidance Note 8 - Bats and artificial lighting

Institution of Structural Engineers (IStructE)

Appraisal of existing structures

Assessing higher-risk buildings under the Building Safety Act: a compendium of structural typologies

Eurocode Manuals Volumes 1 to 7

Standard method of detailing structural concrete

Structural robustness and disproportionate collapse in buildings

Non-Contradictory Complementary Information (NCCI)

International Code Council and Modular Building Institute

ICC/MBI 1200-2021 - Standard for Off-site Construction: Planning, Design, Fabrication, and Assembly

Joint Council for Qualifications (JCQ)

Instructions for conducting examinations – Table 1 Secure Room ("The Box")

Liquid Gas UK (UKLPG)

UKLPG Guidance and Codes of Practice

Ministry of Housing, Communities and Local Government (MHCLG)

Fire safety risk assessment – educational premises

Manual to the Building Regulations

Modern Methods of Construction working group: developing a definition framework

National Planning Policy Framework

The Building Regulations Approved Documents

Monash University & Modular Construction Codes Board

Handbook for the design of modular structures, 2017

National Fire Protection Association (NFPA)

NFPA 855 Standard for the Installation of Stationary Energy Storage Systems

National House Building Council (NHBC)

NHBC Standards 2025

National Police Chiefs' Council (NPCC)

Police requirements for CCTV systems' guidance: 2022

National Security Inspectorate (NSI)

Standards and codes of practice

NCP 120 Code of Practice for Intruder Alarms

NCP 109 Code of Practice for the design, installation, commissioning and maintenance of Access Control Systems

Natural England

Environmental Benefits from Nature User Guide

Traditional orchards: planting and establishing fruit trees

Urban Greening Factor for England User Guide

NHS England

Health Technical Memorandum 05-03: Operational provisions
Part B: Fire detection and alarm systems including the reduction of false alarm and unwanted fire signals

Play England

Managing Risk in Play Provision: Implementation Guide

Royal Society for the Prevention of Accidents (RoSPA)

Fencing for children's play areas

Gates and access to play and wheeled sports areas

Royal Society for the Protection of Birds (RSPB)

Build a dead hedge for wildlife

Safer Parks Consortium

Safer Parks: Improving access for women and girls

Secured by Design

Secured by Design: New Schools

Society of Light and Lighting (SLL)

Code for Lighting (2022)

Guides LG4, LG5, LG12 and LG14, and Factfile 7

Sport England

Accessible and inclusive sports facilities

Artificial Grass Pitch (AGP) - Acoustics

Artificial Sports Lighting

Artificial Sports Surfaces for Outdoor Sport

Carpet Hybrid Pitches for Community Sport

Comparative Sizes of Sports Pitches & Courts

Compact Athletics Facilities

Life Cycle Costings of Natural Turf Pitches

Natural Turf Sports Surfaces

Recycling of Artificial Grass Carpets

Selecting the Right Artificial Surface for Hockey, Football, Rugby League and Rugby Union

Floors for Indoor Sports

Sports and Play Construction Association (SAPCA)

Code of Practice for the Construction and Maintenance of Athletics Tracks

Code of Practice for the Construction and Maintenance of Fencing Systems

Code of Practice for the Construction of Outdoor Multi Use Games Areas

Code of Practice for the Design, Construction and Improvement of Natural Sports Turf

Steel Construction Institute (SCI)

SCI publications and technical guidance

P354 - Design of Floors for Vibration: A New Approach

The Concrete Centre

Publications and technical guidance for concrete materials, design and construction

Trees and Design Action Group (TDAG)

Tree Species Selection for Green Infrastructure: A Guide for Specifiers

Tree Species Soil Volume Guide

Trees in Hard Landscapes: A Guide for Delivery

UK Green Building Council (UKGBC)

Net Zero Carbon Buildings Framework

UK Net Zero Carbon Buildings Standard (UKNZCBS)

UK Net Zero Carbon Buildings Standard

UK Rain Gardens

Rain Garden Guide

Urban Design London

Designing Rain Gardens: A Practical Guide



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