Department for Education

School output specification

Technical annex 2C: external fabric

December 2023

Contents

Summary

Technical Annex 2C provides the minimum requirements for the external envelope of the buildings and its perimeter, including safety and sustainability measures. It is to be read in conjunction with the Generic Design Brief (GDB) and School-specific Brief (SSB).

Who is this publication for?

This document is for technical professionals involved in the design and construction of school premises, as part of the Employer's Requirements of the DfE Construction Frameworks (the DfE Construction Framework 2021 and the Offsite Schools Framework (incorporating Modular and MMC delivery) (MMC)). It may also be used as the basis of similar documentation for other procurement routes using the Output Specification.

Uniclass codes

This document captures Uniclass codes for the management of exchange of information. To access all codes and associated titles reference should be made to Uniclass 2015 | NBS (thenbs.com).

Revision history

This table lists the key changes in each update.

ISO revision code	ISO status code	Date	Amendment
C01-C10	A	2016-2020	Previous OS 2017 versions
C11	A	2021-11-23	Amended issue of publication
C12	A	2022-05-27	Changes on NZCiO and ban of combustible insulation in external walls. Amendments to clauses: 3.2.1, 3.2.2, 4.2.2, 4.2.6
C13	A	2023-12-18	Amendments made at: 3.2.3, 3.2.4, 3.2.5 d), 3.2.9 c), 3.3.1, 4.1.1 c)

1 Introduction

1.1 Overview

1.1.1 This document is one of the Technical Annexes that forms part of the Generic Design Brief (GDB). [PM_10_20]

1.1.2 The definitions listed in GDB shall apply to this Technical Annex and all other parts of the Output Specification. [PM_10_20]

1.1.3 This document shall be read in conjunction with the GDB and all other Technical Annexes as well as the School-specific Brief (SSB), including the School-specific Annexes. [PM_10_20]

1.1.4 This document sets out the required technical standards and performance criteria for external fabric. [PM_10_20]

1.1.5 The information exchange required at each stage of the design, build and completion process is detailed in the DfE's Exchange Information Requirements (EIR). [PM_10_20_28]

1.1.6 The requirements in this Technical Annex shall apply to all parts of the works; New or Refurbished. [PM_10_20]

2 General Requirements

2.1 Overview

2.1.1 All materials shall be detailed to shed water away from vulnerable junctions and avoid uneven weathering, staining and streaking, due to rainwater, airborne pollutants, and wind. [PM_35_10]

2.1.2 Materials and finishes shall prevent the ingress of ground and surface water and maintain an acceptable appearance in accordance with the requirements set out in the GDB, Table 5 Minimum Life Expectancy. [PM_35_10_47]

2.1.3 The building fabric shall meet the requirements set out in GDB, Table 5 Minimum Life Expectancy, without failure resulting from defects in design, materials, quality or workmanship. [PM_35_10_47]

2.1.4 The building fabric shall meet the DfE Minimum Fabric Efficiency Standards as detailed in Technical Annex 2H. [PM_35_10]

2.1.5 The SSB shall be referred to in order to identify any specific requirements for pupils with SEND. [PM_10_20_90]

2.1.6 Materials should be selected that can be constructed off-site where at all possible. [PM_35_10]

2.2 Construction Detailing, Thermal Bridging and U-Values

2.2.1 The New Buildings shall be designed to the following DfE Fabric Efficiency Standards as a minimum: [PM_35_10]

Parameter	Value	Units
Roof (U-Value)	0.12	W/m²K
Wall (U-Value)	0.15	W/m²K
Ground Floor (U-Value)	0.12	W/m²K
Average window (U-Value)	1.1	W/m²K
Fabric Efficiency – Air Tightness (at 50 PA)	3	$m^3/h.m^2$

Table 1 Fabric Efficiency Standards

2.2.2 Thermal bridges shall be designed out through robust construction details, and if this is not practical their impact on heat loss shall be calculated. [PM_35_70_92]

2.2.3 Minimum thermal bridging standards are set by the Building Regulations. Thermal bridges shall be calculated for U-Values and interstitial condensation for key junction details including (but not limited to): window head, jamb, cill and threshold details, internal wall/external wall junction details, roof to external wall junction details, floor and wall joint details including volumetric modular construction. [PM_35_70_92]

2.2.4 Calculations shall meet the methodology in BR 443, BR497, BRE IP1/06 and shall be provided to the Employer. [PM_35_70_92]

2.3 Protection of Elements and the Control of Moisture

2.3.1 Where elements of buildings are constructed off-site (including volumetric modules, prefabricated units and any large elements which cannot be stored undercover on site), these shall be adequately protected such that they shall reasonably resist weather conditions and the penetration of dust and moisture to prevent their deterioration before construction work is completed. This includes interstitial condensation and cold bridging during manufacture, storage, delivery, installation and occupancy. [PM_35_10_25]

2.3.2 Deterioration in fabricated elements, including detrimental increase in water content, frost damage, decorative change, rusting and mould is not acceptable. [PM_35_10_25]

2.3.3 Dewpoint calculations shall be provided in accordance with the DfE's EIR. [PM_35_10_15]

2.3.4 Ventilation shall be provided to concealed voids and cavities formed within the external fabric of walls, roofs and suspended floors to mitigate the risk of condensation developing. [PM_35_10_15]

2.3.5 Where prefabricated elements are wrapped or otherwise protected with sheet material, this material may be incorporated into the final construction only where this is appropriate and where the sheet material can suitably accommodate the integration of other Building Elements. Temporary protection shall be removable once the fabricated element is installed into the building. Where condensation analysis indicates a dewpoint risk, impermeable materials and substitute breathable materials shall be utilised. [PM_35_10_15]

2.3.6 Appropriate protection shall be provided to materials during construction to prevent the ingress of moisture and water. This includes design of protection to the off-site fabricated element such that it can include temporary arrangements for a roof or shedding of rainwater and allowing access to key parts of the fabricated elements such

as drainage connection etc without the need to remove all the protection as construction continues. [PM_35_10_25]

2.3.7 Materials including offsite fabricated elements shall be stored in such a manner to ensure they are clear of the ground or floor surface to avoid contact with water. [PM_35_10_25]

2.3.8 Where fabricated elements are placed or fixed together on-site, or where an off-site element is incorporated into an on-site constructed building, a strategy shall be developed and implemented for ensuring the continuity of membranes, layers and barriers in both the horizontal and vertical planes where this is required to meet Building Regulations and to seal and protect the building. Special consideration shall be given to joints, laps, drips etc which are hidden or enclosed as the fabricated units are positioned or connected. [PM_35_10_60]

2.4 Refurbishment of External Envelope

2.4.1 Work required to Refurbished Buildings shall be as defined in the Refurbishment Scope of Works (RSoW), under the headings of architectural elements (including FF&E) and M&E elements (including ICT Infrastructure). [Ac_10_70_70]

2.4.2 The work shall be categorised as Renewed, Replaced, Repaired, Retained or have 'No Work'.

a) Renewed external fabric shall be designed to satisfy the relevant outputs of the GDB and this Technical Annex (and by the code in the ADS where relevant). [Ac_10_70_70]
b) Replaced external fabric shall satisfy the relevant outputs of the GDB and this Technical Annex (and by the code in the ADS where relevant), as wherever practicable within the constraints of the location, adjacent elements and sub-structure. [Ac_10_70_70]
c) Repaired external fabric shall comply with the specifications in any project-specific drawing issued as part of the SSB. The overall performance after repair shall be at least as good as that of the existing provision. [Ac_10_70_70]
d) Retained external fabric shall be left as existing, with minimal work required unless needed in order to complete other Works that form part of the Project, and the overall performance shall be no worse than the existing performance. [Ac_10_70_70]
e) Elements requiring 'No Work' shall be left as existing. [Ac_10_70_70]

2.4.3 In respect of Refurbished Works, the required level of compliance with this Technical Annex is set out in the RSoW. [PM_10_20_90]

2.4.4 The requirements in this Technical Annex refer to all parts of the Works, as set out in the SSB, except any Building elements or Building Services that are designated Repaired, Retained or ‘No Work’ in the RSoW. [PM_10_20_90]

2.4.5 All refurbishment works shall be assessed to identify where retrospective legislation may apply and works shall be carried out to comply. [Ac_10_70_70]

3 Roofs

3.1 Roofs – General Requirements

3.1.1 Roof covering shall be easily overlaid, over-coated, upgraded or replaced without affecting the roof structure below. [PM_10_20_82]

3.1.2 Where green roofs are proposed, the maintenance requirements shall be assessed and made clear to the Employer in the proposals as part of the DfE's EIR. [PM_80_10_50]

3.1.3 The performance from any green roof, whether it is in response to storm water mitigation, biodiversity, or planning constraints, shall be clarified in respect of the Employer Requirements. [Ss_45_40_47_28]

3.1.4 Thermal insulation in the roof void shall be free from damage and breaks in continuity and integrity. Dewpoint calculations are to be undertaken and any condensation risk is to be mitigated. [PM_35_10_15]

3.1.5 In coastal areas, the roof shall be designed to deter birds, from nesting and damaging roofing materials. [PM_10_20_82]

3.1.6 Reference shall be made to Table 1 for DfE Fabric Efficiency Standards. [PM_35_70_92]

3.2 Green Roofs & Bio Solar Green Roofs

3.2.1 All roofs shall comprise a bio-solar green roofing system, maximised with photovoltaics (PVs) to meet the requirements in Technical Annexes 2G, 2H and 2J. [PM_10_20_90]

3.2.2 Where Site Specific constraints and opportunities drive alternative solutions, these shall be explored and a final solution presented to the Employer for agreement. [PM_10_20]

3.2.3 Green and Bio Solar Green roofs shall be designed to take account of greening across the site to achieve a biodiversity net gain in accordance with Natural England's Urban Greening Factor Guidance; refer to Section 3.2.5 on Green infrastructure in Technical Annex 2J. [PM_10_20_90]

3.2.4 The selection of Secondary School and Primary Schools where identified in the SSB regarding green roofs shall meet the standards set out in:

a) Natural England's Urban Greening Factor Guidance [Ss_45_40_47_28]
b) GRO The UK Code of Best Practice for Green Roofs [Ss_45_40_47_28]

3.2.5 Green roof options may include:

a) sedum systems for pitched roofs [Ss_45_40_47_28]
b) substrate roofs (seeded and plug-planted) [Ss_45_40_47_28]
c) sedum on substrate [Ss_45_40_47_28]
d) extensive biodiverse green roof. [Ss_45_40_47_28]

3.2.6 Lightweight sedum blanket systems for pitched and flat roofs are not acceptable. [PM_10_20]

3.2.7 The selection of the chosen system shall:

a) comply with Local Planning Authority requirements [Ss_45_40_47_28]
b) meet a Biodiversity Action Plan (BAP) mitigating ecological impact or Biodiversity Net Gain requirement [Ss_45_40_47_28]
c) achieve the requirements of an Ecological Strategy [Ss_45_40_47_28]
d) encourage or take measures to reduce the impact of flood risk. [Ss_45_40_47_28]

3.2.8 Where photovoltaic panels are to be installed, they shall comply with Technical Annex 2G. [PM_10_20_90]

3.2.9 The environmental and site conditions are as follows:

a) roof systems shall take into account regional and local microclimates e.g., areas of high wind velocity experienced on a high-rise building or in coastal locations. Wind loads shall be calculated according to BS EN 1991-1-4:2005+A1:2010 Eurocode 1. ‘Actions on structures. General actions. Wind actions’ [PM_10_20_90]
b) the roof surface shall be orientated to ensure adequate solar exposure for the proposed vegetation [Ss_45_40_47_28]
c) where photovoltaic panels are included as part of a bio-solar roof, the application and area of vegetative green roof shall be maximised. The extent of vegetative cover for bio-solar roofs shall include the area beneath the photovoltaic panels [Ss_45_40_47_28]
d) shadowing from adjacent trees, buildings structures and changes of building level shall be taken into consideration. [Ss_45_40_47_28]

3.2.10 Design criteria & considerations are as follows:

a) the proposed roof structure and deck shall allow for the additional imposed dead load required by the type of green roof specified, weight of photovoltaic panels and water retained within the green roof during high levels of precipitation and saturation [PM_35_20]
b) waterproofing systems for use beneath green roofs shall form part of a structure designed to BS EN 1991 Eurocode 1 [PM_35_10_96]
c) as a minimum, the specified waterproofing system shall be certified to FLL Guidelines against root resistance and/or be covered by British Board of Agrément (BBA) [PM_10_20_90]

d) construction shall be in accordance with manufacturer's standard details for the irrigation and drainage of the specified system [Ss_45_40_47_28]
e) when designing and specifying the waterproofing system, the detailing (e.g., pipe penetrations, rooflight upstands etc) shall be designed to take into account the increased build-up of the green roof construction to comply with the Building Regulations (typically requirements that the waterproofing detailing to finish 150mm above the finished roof surface i.e., the green roof surface not the surface of the waterproofing) [PM_35_10_96]
f) all green roof systems shall be designed to incorporate gravel fire breaks at perimeters and penetrations e.g., rooflights, soil pipes, rainwater outlets etc. These fire breaks shall be a minimum of 300mm wide and 50mm deep [PM_35_30_26]
g) structural design criteria, as per BS EN 1990:2002 'Eurocode - Basis of Structural Design.' Designs shall be in accordance with all appropriate Eurocodes, with a notable emphasis on EN 1991 - Eurocode 1: Actions on structures [PM_35_20]
h) an external bib tap shall be provided to green roof areas for irrigation during the first 3 months after establishment as a suitable water source. [PM_10_20_82]

3.2.11 The green roof system build-up shall be configured to protect the Building and provide the appropriate water balance and nutrients to sustain the vegetation. This shall be achieved by including the appropriate combination of the following components:

a) root resistant material [Ss_45_40_47_28]
b) moisture retention/protection layer [Ss_45_40_47_28]
c) drainage/reservoir layer [Ss_45_40_47_28]
d) growing medium [Ss_45_40_47_28]
e) suitable plants. [Ss_45_40_47_28]

3.2.12 The choice of plants shall be hardy, drought resistant and low growing, selected for roofs that experience higher wind speeds, more solar radiation, have a thinner soil base and less access to groundwater than conventional plants and are to be frost resistant and drought tolerant. [Ss_45_40_47_28]

3.2.13 The system shall incorporate, as a minimum, the following (for a flat roof green roof build up): a lightweight growing material tested to BS8616, a filtration layer, drainage board for water storage, a protection layer to the top surface of the underlying waterproofing membrane comprising a bituminous/hot melt/single ply or cold applied liquid waterproofing layer to top of insulation. [Ss_45_40_47_28]

3.2.14 A dew point analysis shall be undertaken to ascertain the need for a vapour control layer subject to the type and specification of insulation and overall roof build up, including structure and decking. [PM_35_10_15]

3.2.15 Access for the purposes of inspection, repair and maintenance shall be in accordance with the section on Roof Access. [PM_10_20_90]

3.2.16 The selection of the green roof shall meet the criteria in the School-specific Brief (SSB) and one that requires minimal maintenance. Ongoing maintenance shall consider any dry spells that could impact on the volume of dry vegetative material on the roof (especially for wildflower system), and appropriate action taken to ensure no significant volume of dry material is left on the roof. [Ss_45_40_47_28]

3.2.17 All green roofs shall be installed by an approved specialist subcontractor and be provided with a 30 year parent company guarantee. [Ss_45_40_47_28]

3.3 Surface Spread of Flame

3.3.1 Internal surfaces of all roofs shall be minimum Euro Class C-s3, d2 or better (Class B-s3, d0 for other circulation spaces). [PM_35_30_80]

3.3.2 The design of the roof and the fire resistance of the inner surface shall comply with Section 8.1 on Ceilings and Soffits Performance in Technical Annex 2D. [PM_10_20_90]

3.4 External Fire Exposure

3.4.1 External surfaces of roofs shall be EU Class B roof (T4) to ENV 1187 Part 4: external fire exposure classification. [PM_35_30_28]

3.5 Roof Access

3.5.1 Access shall be designed to meet the safety requirements of workplace, health and safety legislation including, but not limited to, The Construction (Design and Management) Regulations 2015, The Workplace Health, Safety and Welfare Regulations 1992, and The Work at Height Regulations 2005. [PM_10_20_90]

3.5.2 Access provided shall ensure safety during the life of the Building by:

a) ensuring that the Maintenance Access Strategy, wherever practicable, locates plant and equipment to eliminate the need for access via roof areas [PM_80_60_50]
b) ensuring that the location and siting of roof plant, rainwater outlets and rooflights are positioned on the roof where safe access is provided [PM_80_60_50]
c) providing a protected walkway to access the area of roof where access is required as part of the Maintenance Access Strategy [PM_80_60_50]
d) provision off anti-slip surface finish, to access walkways, to reduce the risk of falling in wet and icy conditions and to protect the roof surface [PM_80_60_50]
e) ensuring maintenance staff have easy visibility of the roof [PM_80_60_50]
f) mitigating the risk of persons and objects falling from height, by the provision of edge protection by means of a guard rail or a parapet to the roof perimeter, as

defined in the Maintenance Access Strategy; the minimum edge protection height shall be 1100mm [PM_80_60_50]

g) providing permanent edge protection, where required, shall be by means of a parapet. Galvanised mild steel balustrades are permitted in non-visually obvious situations [PM_80_60_50]
h) providing glazing that can be cleaned from inside the Building, where this is a practical solution as part of the Maintenance Access Strategy and as described in the Planned Maintenance Plan. [PM_80_60_50]

3.5.3 The cleaning of all internal glazing shall be subject to a Designer's Risk Assessment to ensure safe access as part of the Maintenance Access Strategy. This shall be described in the Planned Maintenance Plan. [PM_80_60_50]

3.5.4 Non-permanent or collapsible type barriers shall not be acceptable. The provision of free-standing systems which rely on their dead weight only and are not physically fixed to the building structure for stability and strength, shall be acceptable only where there are limitations forming connections through the roof deck to the structure e.g., in modular construction. [PM_10_20_82]

3.5.5 The provision of external perimeter gutters with no parapets shall only be acceptable for pitched roofs where plant and PVs on the roof are enclosed with safety barriers and the external gutters may be cleaned safely as part of the Maintenance Access Strategy and as described in the Planned Maintenance Plan. [PM_80_60_50]

3.5.6 All rooflights, plant equipment (including photovoltaic panels) and outlets shall be readily and safely accessible for inspection, maintenance, and cleaning. All rooflights shall have edge protection to guard against falls. [PM_80_60_50]

3.5.7 Vertical access to roofs shall comply with the Building Regulations and be designed and constructed as follows:

a) the access stair is to follow the guidance in AD K for private stairs in dwellings (maximum angle if this is to avoid a steep rise) [PM_10_20_90]
b) the uppermost step is to be positioned level with the landing to ensure safe egress onto the roof and to avoid trip hazard overstep [EF_35_10]
c) to be secure, accessible with anti-slip surface [EF_35_10]
d) to have continuous handrails to allow safe access and egress from the roof [EF_35_10]
e) the door access to roof level is to be easy to both open and close [PM_10_20_82]
f) ironmongery, locks and handles are to be positioned so as to avoid finger traps and potential injury to users [Ss_25_38_20_35]
g) access to the roof from a hatch with or without a drop-down ladder arrangement or via a fixed vertical ladder shall not be an acceptable means of access. [PM_10_20_82]

3.5.8 Canopy roofs shall allow for safe access for maintenance. [PM_10_20_82]

3.5.9 Roofs shall be designed with appropriate means of permanent protection i.e., fixed parapets, guarding or balustrades to mitigate the risk of falling from height at roof edges and any changes in level. [EF_30_10]

3.5.10 Fall arrest systems shall not be permitted. [PM_10_20_82]

3.5.11 Roofs shall be designed with fixings that provide safe access and allow for future maintenance e.g., repair or re-covering of roofs without the removal of MEP plant, ductwork and service runs. This includes the location and method of fixing of MEP plant, and low or zero carbon technologies e.g., photovoltaic cells. [EF_30_10]

3.6 Emergency Escape from Roof

3.6.1 Emergency escape from the roof shall be accommodated via an openable, alarmed exit hatch for authorised use only. [PM_40_20_30]

3.6.2 The emergency escape hatch shall:

a) have edge protection with a self-closing gate to protect from accidental falls [Ss_30_30_71]
b) have a safe landing area between the gated edge protection and hatch [Ss_30_30_71]
c) provide access to an easy to reach fixed ladder for emergency egress [Ss_30_30_71]
d) a fixed handhold support on the roof to aid decent down the escape ladder. [Ss_30_30_71]

3.6.3 The escape ladder shall be housed in a designated secure area, providing access directly onto a protected escape route. [PM_10_20_82]

3.6.4 The door from the secure area shall not compromise the means of escape from other areas and/or impact on refuge areas within stairwells. [PM_10_20_82]

3.6.5 The secure space shall be accessible by authorised personnel only. In the event of an emergency, escape shall be possible without the use of a key. [PM_10_20_82]

3.6.6 The emergency escape route shall be considered in the context of the access and egress strategy for the school building. [PM_40_20_30]

3.6.7 The emergency escape route from the roof shall be considered as part of the Fire Strategy and draft Fire Safety Management Plan. [PM_40_20_30]

3.6.8 All escape hatches and any other enclosures are to be weathertight and able to be operated safely when exposed to high wind loads and stormy conditions. [Ss_30_30_71]

3.7 Special School Canopy

3.7.1 Within a Whole School Project for a non-ambulant Special School there shall be an external canopy to shelter pupils from the transport drop-off point to the main pupil entrance, which shall:

a) be at least 2.4m wide and of a length to meet the School's drop-off arrangements identified in the SSB [Ss_25_50_45_10]
b) have a structure that is robust and corrosion resistant, and able to resist dead, live, wind and snow loads relevant to its location [Ss_25_50_45_10]
c) have a roof that is robust, and resistant to UV degradation, thermal creep and sun bleaching [Ss_25_50_45_10]
d) collect rainwater and connect into a surface water drainage system or SUDs [Ss_25_50_45_10]
e) include lightning protection, if required following an assessment [Ss_75_50_45_45]
f) incorporate protection measures for impact and wheelchair use (where there are vertical support members) [Ss_25_50_45_10]
g) ensure adequate height and clearance to avoid impact with vehicles e.g., high-topped minibuses that may pass under the canopy soffit. [Ss_25_50_45_10]

3.8 Rooflights, Smoke Vents and Access Hatches

3.8.1 Rooflights, smoke vents or access hatches provided shall meet the Minimum Life Expectancy requirements in Table 5 of the GDB. [PM_35_10_47]

3.8.2 Measures shall be taken to minimise the impact of solar gain and glare from rooflights as set out in Section 3.2 on Shading Devices in Technical Annex 2E. [PM_10_20_90]

3.8.3 Openable vents and their control systems shall be designed to provide ease of use, inspection and maintenance considering both manual and/or automated mechanisms. [Ss_30_30_72]

3.8.4 The design of openable vents and their control systems shall be considered as part of the Maintenance Access Strategy with associated risks assessed and described within the Health and Safety File. [Ss_30_30_72]

3.8.5 Openable rooflights shall be designed to provide ease of use by School staff. [Ss_30_30_72_72]

3.8.6 Electrically operated rooflights shall be provided with rain sensors, and with wall mounted key operated override controls for use by School staff to avoid operation by students. [Ss_30_30_72_72]

3.8.7 The positioning of access hatches, inspection points, control gear etc shall be such that when in use disruption to the everyday running of the Building is minimised. [Ss_30_30_71]

3.8.8 All rooflights shall be designed to comply with the following:

a) CWCT 2012 December 2012 Technical Note No. 92 Simplified method for assessing glazing in Class 2 roofs [Ss_30_30_72_72]
b) TN 65 Thermal fracture of glass [Ss_30_30_72_72]
c) TN 66 Safety and fragility of overhead glazing: guidance on specification [Ss_30_30_72_72]
d) TN 67 Safety and fragility of overhead glazing: testing and assessment [Ss_30_30_72_72]
e) ACR [M] 001:2014 Test For non-fragility of large element roofing assemblies. 5th edition [Ss_30_30_72_72]
f) Minimum Life Expectancy set out in Table 5 of the GDB [PM_35_10_47]
g) polycarbonate roof lights are not an acceptable alternative to glazed rooflights due to UV degradation. [PM_10_20_82]

3.9 Drainage and Rainwater Disposal Installations

3.9.1 Rainwater disposal installations shall meet the Minimum Life Expectancy requirements in Table 5 in the GDB. [PM_35_10_47]

3.9.2 Roof drainage shall be designed in accordance with Technical Annex 2F and shall have a simple layout, with free flowing, short and direct routes fully accessible for maintenance. Drainage shall not have traps with internal outlets. [PM_10_20_90]

3.9.3 The layout shall be coordinated with the layout of all parts of the external walls. [PM_10_20_82]

3.9.4 Rainwater may be discharged externally or internally subject to available access for maintenance and cleaning of system components. [Ss_30_75]

3.9.5 The discharge of rainwater through any discharge systems shall not be audible inside the Building. See Section 12 on Public Health Engineering Services in Technical Annex 2F. [PM_10_20_90]

3.9.6 Where internal rainwater pipes are proposed these shall be able to be safely maintained from the roof and from an external manhole or inspection chamber. [PM_10_20_82]

3.9.7 All internal rainwater pipes shall be maintainable with cleaning rods. Where it is appropriate to provide internal access, these shall be positioned in rooms and spaces where their locations shall not impact on teaching and learning. [Ss_30_75]

3.9.8 Rainwater pipes passing through external walls, including secondary means of drainage i.e., via weirs, overflows and pipe penetrations shall be fully sealed. Where applicable, a fully sealed proprietary system shall be used to transfer rainwater through external walls. [Ss_30_75]

3.9.9 Chutes shall be designed and coordinated with hopper outlets to ensure full flow with no backwashing. Weirs shall be sized and located to provide surcharge overflow as required by the design. [Ss_30_75]

3.9.10 Rainwater and other drainage pipework shall not be built into external walls. [Ss_30_75]

3.9.11 All gutters shall be provided with visible overflow pipes which discharge away from the Building and are designed to prevent staining of external fabric. [Ss_30_75]

3.9.12 Gutters shall be designed to flow to external faces with no back soaking to the building fabric. [Ss_30_75]

3.9.13 Overflows shall be visible to alert operators of a blockage. [Ss_30_75]

3.9.14 Downspouts, hoppers and gutters shall be fitted with mechanically fixed leaf guards to act as a guard against blockages from balls, vegetation, birds’ nests and other objects. [Ss_30_75]

3.9.15 A robust solution for preventing ponding of water on roofs shall be provided, typically by means of suitable falls, outlets, flashing and parapet details. [Ss_30_75]

4 External Walls

4.1 External Walls – General Requirements

4.1.1 All external fabric shall comply with the requirements of the GDB, any additional requirements of the SSB and the following:

a) cladding on a school building with a storey 18m above ground level shall achieve Class A2-s1, d0 fire resistance or better [PM_35_30]
b) schools below that height must achieve Class B-s1, d0 or better [PM_35_30]
c) where school buildings are prone to vandalism, as determined by a security risk assessment at feasibility stage, and for all special schools, any cladding to ground floor external walls shall achieve Class A2–s1, d0 or better [Ss_25_20]
d) the residential areas of boarding schools shall have external walls, including the external surfaces of walls, constructed of materials achieving Class A2-s1, d0 or better [PM_35_30]
e) homogeneous materials including render are not acceptable as an external cladding material below 2.5m above ground level [PM_10_20_82]
f) external joints shall only be expressed where they form a coherent part of the design of the external building, and a strategy shall be developed for their incorporation, where expressed and concealed. [PM_10_20_82]

4.1.2 External walls, including cladding materials and fixings, shall be designed and constructed to:

a) allow for the removal of graffiti without damaging the surface of the material [PM_10_20_82]
b) resist abrasion from cleaning methods and maintenance systems without any noticeable change in surface appearance [PM_10_20_82]
c) utilise a fixing method for cladding which adheres to the same robust performance of the material itself (where face fixing methods are used, they shall match the visual appearance of the cladding material used and be tamperproof) [Ss_25_20]
d) include a damp-proof course in the outer face at a minimum of 150mm above adjacent external ground level, to prevent the penetration of ground moisture. Level thresholds to be damp proofed at main fabric junctions [Pr_25_57_21]
e) facilitate damp proof detailing inclusive of membranes, course, tanking, wrapped and bonded DPCs and cavity trays [Pr_25_57_21]
f) accommodate structural coordination and movement detailing [PM_35_20_80]
g) mitigate the impact of weathering [PM_10_20_82]
h) prevent water ingress [PM_35_10_96]
i) control cold bridging, (dew point calculations to be undertaken and the condensation risk identified) [PM_35_10_15]
j) allow full thermal enclosure of the Building with U Values in accordance with Construction Detailing, Thermal Bridging and U-Values [PM_35_70_92]

k) provide air tightness in accordance with Construction Detailing, Thermal Bridging and U-Values [PM_35_70_03]
l) accommodate the selection of frost resistant materials [PM_35_10_25]
m) accommodate adequate fire compartmentation and stopping to external envelope. [PM_35_30]

4.1.3 Generally, wall surfaces shall be sufficiently hard to resist applied or transferred impacts that occur during normal use:

a) without sustaining damage or noticeable change to the surface appearance, and without deterioration of performance; and [PM_35_10_25]
b) minimising the risk of hazard to occupants or people outside of the Building due to impact. [PM_35_10_25]

4.1.4 The adjacent external function, during normal use, shall inform the choice of external walling materials. [PM_10_20_82]

4.1.5 Materials, which are vulnerable to impact damage e.g., by people or balls, shall not be used where pupils come into normal contact with them e.g., on main access routes, games areas, and social spaces. [PM_35_10_25]

4.1.6 Materials and systems up to 2.5m above ground level shall achieve at least Classification B rating when tested for hard and soft body impact in accordance with the requirements of Category I when tested in accordance with the requirements of ETAG 004:2011 - 'External Thermal Insulation Composite Systems with Rendering', or a similar equal and approved performance standard. [PM_10_20_90]

4.1.7 Materials and systems at heights over 2.5m above ground level shall achieve at least Classification E rating when tested for hard and soft body impact in accordance with the requirements of Category II when tested in accordance with the requirements of ETAG 004:2011, or a similar equal and approved performance standard. [PM_10_20_90]

4.1.8 External walls and associated materials and elements shall not have small openings or sharp edges that could result in injury e.g., pupils' fingers being trapped. [PM_10_20_82]

4.1.9 Where cladding panels are proposed they shall be individually and independently removable (without compromising the integrity of the system) ensuring access for maintenance or replacement. [Ss_25_20]

4.1.10 The removal, repair and replacement of any areas of cladding units shall not affect the fire performance of the building envelope. All face fixings below 2.5m shall be tamperproof. [Ss_25_20]

4.1.11 Where a brick slip cladding system is used, brick slips or tiles shall not be fixed with adhesive. [Ss_25_20]

4.1.12 A brick slip cladding system shall be easy to repair, and the supporting structure shall be of stainless steel below 1m above ground level. [Ss_25_20]

4.1.13 The flow of rainwater over the surface of any cladding shall be controlled. [Ss_30_75]

4.1.14 All work shall be detailed and installed to ensure that performance is not impaired, and that the visual appearance shall uniformly age. [Ss_25_20]

4.1.15 Where a rainscreen system with timber support battens is used, the timber shall be tanalised timber impregnated with a preservative solution under high vacuum pressure. [Ss_25_20_70]

4.1.16 The specification and use of all types of Magnesium Oxide/Magnesium Oxychloride as a sheathing board is prohibited in the construction of walls e.g., SIPS panels, prefabricated off-site wall panel systems etc. [PM_10_20_82]

4.1.17 Reference shall be made to Table 1 for DfE Fabric Efficiency Standards. [PM_35_70_92]

4.2 Fire Resistance

4.2.1 Elements of structure such as structural frames, columns and loadbearing walls shall achieve 60 minutes fire resistance. [PM_35_30]

4.2.2 The external envelope of the building shall not provide a medium for fire spread. Materials comprising the external walls of school buildings with a height of 18m or more above ground level (measured from ground level on the lowest side of the building to the top of the floor surface of the top storey), shall achieve Class A2-s1, d0 or better, with the exception of the insulation which shall be Class A1 rated in accordance with Clause 4.2.6 below. [PM_35_30]

4.2.3 The use of aluminium composite material (ACM) cladding panels on external walls is prohibited. [PM_10_20_82]

4.2.4 Non fire rated High Pressure Laminate (HPL) cladding panels is prohibited on external walls. [PM_10_20_82]

4.2.5 External walls shall comply with Regulation 7 of the Building Regulations. [PM_10_20_90]

4.2.6 Insulation used in external walls of new and refurbished school buildings, shall be non-combustible, Class A1 rated. [PM_35_30]

4.2.7 External cladding shall be selected to limit the risk of fire spread restricting potential damage to the building structure and to preserve life. The selection of materials below

2.5m above ground level shall be vandal resistant. If damaged, materials shall be easy to repair and replace. [PM_35_30]

4.2.8 Plastic fittings in ground floor external walls, particularly those in timber-framed buildings, can act as weak spots where an external fire occurs e.g., airbricks, vent covers, ducts and waste pipes. Appropriate materials, collars and fire barriers shall be specified in line with the fire strategy. [PM_35_30]

5 External Doors and Windows

5.1 External Doors and Windows - General Requirements

5.1.1 External doors and windows shall meet the Minimum Life Expectancy requirements in Table 5 in the GDB. They shall be designed to accommodate wind pressure to suit location, height above sea level, exposure and Building configuration. Framing shall be thermally broken and self-draining. Composite assemblies of windows with lateral joints instead of curtain walling are not permitted. Frame fixings shall suit Pascal rating and avoid cold bridging. [PM_35_10_47]

5.1.2 External doors and associated hardware and mechanisms shall be designed in coordination with the Access and Security Strategy and the Fire Strategy, taking account of the School's existing safeguarding policy including the control of emergency exits. [PM_10_20_82]

5.1.3 External door hardware, ironmongery or control mechanism provided shall be robust and heavy duty and the following requirements shall be met:

a) all doors shall have flush door thresholds to comply with BS 8300-2:2018 - 'Design of buildings and their approaches to meet the needs of disabled people'. Access thresholds to be damp proofed and insulated to internal fabric. Level thresholds to be appropriately drained [PM_10_20_90]
b) all doors are to allow an opening force to comply with BS 8300-2:2018 [PM_10_20_90]
c) all doors shall adhere to the principle of PAS 24 - Product Assessment Specification produced by BSI for enhanced security performance of doors or shall be independently certified to the recognised security standard 'Loss Prevention Standard LPS1175 Security rating 2' [PM_10_20_90]
d) the principal entrance doors to the Building shall be power-operated, either manually activated by a push pad or automatically activated by means of movement sensors [PM_10_20_82]
e) the principal entrance doors to the Building shall have a 'hold-open' facility, interlinked to the fire alarm system, and shall be fitted within an emergency manual override. All controls shall comply with BS8300-2:2018 [PM_10_20_90]
f) inner doors to the entrance lobby of the principal entrance to the Building shall be designed to maintain security. Refer to Section 5.2 on Access Control in Technical Annex 2G. [PM_10_20_90]
g) inner doors which form the Secure Line shall:
    i) be operable by a remote control from the reception desk or general office [Ss_25_30_20_25]
    ii) include for out-of-hours operation [Ss_25_30_20_25]
    iii) have a proximity reader to both sides, including interlinking with the fire alarm system [Ss_25_30_20_25]

iv) be fitted within an emergency manual override [Ss_25_30_20_25]

h) the door from an Early Years classroom to Early Years Outdoor Play shall be fully glazed such that the glazing line is no higher than 450mm AFFL [Ss_25_30_20_25]
i) outward opening doors to Early Years classrooms and dining areas shall have a robust means of securing them in an open position, considering the adjacent external function to avoid creating a hazard, to comply with AD K6. Door guards shall be installed to opening outward doors [Ss_25_30_20_25]
j) where louvre doors are provided, they shall be faced to suit the performance requirements of the external fabric and have integral insect mesh where necessary [Ss_25_30_20_25]
k) external doors in Early Years, Key Stage 1, Special Schools (and Designated Units if specified in the SSB) which are used by pupils shall be fitted with anti-finger trap protection [Ss_25_30_20_25]
l) fob access shall take account of safeguarding measures for access to all secured areas [Ss_75_40_02]
m) suitable locking mechanisms shall be provided in accordance with Sections 2.5.4 on External Doors and Windows, 2.6.4 on Internal Door Hardware and 2.14.2 on Security in the GDB and Technical Annex 2D, being part of the suited physical key system, unless specified otherwise within the SSB. [PM_10_20_90]

5.1.4 External door hardware, ironmongery or control mechanism provided shall be robust and heavy duty and the following requirements shall be met:

a) the automated principal entrance doors to the Building shall be fitted with pull type handles/push plates to facilitate the manual opening/closing at the beginning and end of the School day [Ss_25_38_20_20]
b) pull type handles shall not be fitted to the push side of doors [Ss_25_38_20_20]
c) suitable locking mechanisms shall be provided for escape doors to prevent unauthorised egress/entrance. The design shall be fully coordinated with the Access and Security Strategy and Fire Strategy [Ss_25_38_20_20]
d) letterboxes, where provided, shall be of a style and type (anti-arson) to be agreed with the Employer. [Ss_25_38_20_20]

5.1.5 Where door closers are provided, as required by the Fire Strategy or the School-specific ADS, these shall be suitable for the age and the needs of the pupils operating the doors. [Ss_25_38_20_20]

5.1.6 Where the SSB specifies security shutters, grilles or bars on external doors or windows, these shall comply with BS 8220 3:2004 - ‘Guide for security of buildings against crime. Storage, industrial and distribution premises’, or have Loss Prevention Certification Board (LPCB) approval. [PM_10_20_90]

5.1.7 Windows, vents and shading devices shall be designed and constructed to:

a) prevent glare [Ss_25_30_95]

b) allow blinds to be fitted where required, see Technical Annex 3 [Ss_25_30_95]
c) allow for the safe and efficient cleaning of windows [Ss_25_30_95]
d) not obstruct ventilation. [Ss_25_30_95]

5.1.8 Windows, vents and shading devices shall be designed and constructed to prevent falling from height. Upper floor windows shall be fitted with opening restrictors or similar devices to restrict the clear opening to no greater than 130 mm for windows below 1500mm above finished floor level (AFFL) in areas used by pupils (making allowance for furniture placed against external walls). Where opening windows are part of the summer purge strategy the opening lights shall be fully and safely operable by staff. [Ss_25_30_95]

5.1.9 All glazing to windows and doors shall meet the following standards:

a) BS6262: Part 1:2017 - 'General methodology for the selection of glazing' [Ss_25_60_35]
b) all safety glass in critical locations (defined in Section 5 of AD K4 Protection of Impact with glazing) is third party certificated and marked in accordance with BS 6262-4. The standard requires that safety glass is indelibly marked with key information so that it is visible after installation [Ss_25_60_35]
c) toughened glass meets the requirements of the relevant product standard, BS EN 12150 [Ss_25_60_35]
d) toughened glass is heat soak tested to minimise the extent of NiS (Nickel Sulphide Inclusions) and other impurities, which lead to the failure of glazed components in-situ [Ss_25_60_35]
e) annealed float glass shall not be specified in any instance [Ss_25_60_35]
f) all windows and doors retain their structural and dimensional stability over the life cycle of the component including all working parts. [PM_35_10_47]

5.1.10 To maximise external views, cill heights to any windows in Teaching Spaces shall be as follows:

a) for spaces used by secondary pupils: the cill height is no higher than 1050mm AFFL and the glazing line (the lowest edge of the glass) no higher than 1100mm AFFL [Ss_25_30_95]
b) for spaces used by Early Years pupils (nursery playrooms, nursery group rooms and reception classrooms), KS1 and KS2 pupils: the cill height is no higher than 750mm AFFL and the glazing line no higher than 800mm AFFL [Ss_25_30_95]
c) for spaces used only by Early Years pupils (nursery playrooms, nursery group rooms and reception classrooms): the fully glazed external door facilitates views out, with manifestation in accordance with AD Part K5, whilst carrying out floor-based activities. [Ss_25_30_95]

5.1.11 Reference shall be made to Table 1 for DfE Fabric Efficiency Standards. [PM_35_70_92]

6 Suspended Flooring

6.1 Overview

6.1.1 Timber suspended floors, or floors reliant on timber elements, shall not be used at, or below, ground level. [PM_10_20_82]

6.1.2 Where floors utilising steel are provided, and where these are built or permanently fitted within 250mm of the external ground level (or below the external ground level), the following shall apply:

a) a free air gap of at least 150mm is provided to the underside of the floor and to its supporting structures [PM_35_70_94]
b) there is a clear ventilation gap of at least 50mm in the vertical plane between any walls below ground which are supported by the same structural system as the floor (or associated with the floor) and any structure retaining the surrounding ground [PM_35_70_94]
c) the free air gap below the floor and the ventilation of any structures and walls in the vertical plane below the floor and within 150mm of the external ground level, is linked such that these connect to provide a continuous area of ventilation, which connects to atmosphere, to cross ventilate all faces of the Building. As a minimum, these ventilate the floor of not less than 1,500mm2/m run of external wall or 500mm2/m2 of floor area whichever is the greater [PM_35_70_94]
d) voids formed to separate and ventilate the suspended floor, and associated elements of below ground structure and walls, are designed such that they are not affected by moisture from the surrounding ground or from ground gases [PM_10_20_82]
e) where adverse ground conditions exist including the level of ground water, flood risk and dangerous ground gases, then a solution is provided that elevates the buildings clear of the ground condition issues [PM_10_20_82]
f) a means of access to the elevated building and adjacent play space which is robust and specification-compliant is provided [PM_10_20_82]
g) retaining structures shall be built to isolate the ground from structural systems and components (except at a threshold into the Building), such that the ground is retained away from the floor edge and from any associated below ground supporting structure and/or walls. Any retaining structures shall extend to a minimum height of 150mm above ground level to prevent the ingress of water [PM_10_20_82]
h) retaining structures shall be capable of supporting the surrounding ground and preventing this from collapse into the void below the floor and any other ventilated void. Such structures shall not take support from the floor, associated structural systems and any associated external wall of the Building [PM_10_20_82]
i) the retaining structures shall be capable of supporting the ground when this is loaded with a MEWP or similar maintenance vehicle and a fire engine and any

delivery where these are identified in the Fire Plan and Design and Access Strategy and associated drawings [PM_10_20_82]

j) retaining structures shall be treated or finished such that they prevent water ingress into the void below the Building [PM_10_20_82]
k) ground exposed below the suspended floors and the structure supporting them is finished with a surface treatment of over-site concrete to a minimum depth of 100mm thickness and treated to prevent ingress of water [PM_10_20_82]
l) the design of the external works shall prevent surface water collecting outside any retaining structure [PM_10_20_82]
m) where the overall topography of the site slopes towards the Building, irrespective of localised arrangements, then continuous surface drainage shall be fitted to the face of the Building on the ‘up-slope’ and extending to a minimum of half the face of the Building to the two connected sides [PM_10_20_82]
n) surfaces below ground are specified or treated such that in its installed arrangement it meets the Minimum Life Expectancy requirements for ‘slab’ in Table 5 in the GDB [PM_35_10_47]
o) floor, and structural below-ground systems, are designed to prevent the deposit of debris into the void during the life expectancy of the element [PM_10_20_82]
p) composite steel floors are thermally modelled and designed to provide a continuous compliant insulation to avoid cold bridging and condensation. Dew point calculations are to be undertaken and condensation risk identified. [PM_35_70_92]

6.1.3 Reference shall be made to Table 1 for DfE Fabric Efficiency Standards. [PM_35_70_92]

7 Demonstrating Compliance

7.1 Overview

7.1.1 The Contractor shall demonstrate compliance with the Employer's Requirements by use of protocols detailed in the Contractor's Quality Assurance procedures capturing evidence of both coordinated design and its implementation into the construction of the School Building(s) with photographic evidence and/or third-party accreditation. [PM_70_15]

8 References

8.1 Overview

8.1.1 The following reference standard (or updated document if relevant) shall be taken account of:

a) LPS 1175: Issue 7.2 - ‘Requirements and testing procedures for the LPCB approval and listing of intruder resistant building components, strongpoints, security enclosures and freestanding barriers’ [FI_70]

Department for Education

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