AUGUST 2020

NR(HS) TECHNICAL STANDARDS

RETAIL WORKS

ST.PANCRAS
INTERNATIONAL

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WELCOME

INTRODUCTION

This document is for use by:

- Tenants and their fit-out teams, specifically, services consultants and contractors.

- Suppliers and their project delivery team.

The details in this document apply to shops, catering outlets and bars, retail storage areas, commercial, promotional displays and pop up shops within St. Pancras International.

This document sets out Network Rail High Speed's technical and engineering requirements for the tenant fit-out and retail and commercial activities.

It aims to provide guidance on the system design and installation methods acceptable for new developments and routine or interim changes within buildings managed by Network Rail High Speed (NR(HS).

At NR(HS) we recognise that retailers and caterers often have services and system designs that are proven and established across parts or the extent of their commercial portfolio.
We may require modifications to these principles as we have to respect the nature of the location at high profile rail termini like St. Pancras International, and the need to ensure that all systems and services installed are compatible with the station's systems in order to protect the building itself and the critical railway operation.

London St. Pancras Highspeed

WELCOME

This document is not to be taken in isolation. It forms part of a suite of documents that apply to work within St. Pancras International, a Grade I listed building.

In addition to compliance with technical requirements any works being undertaken at St. Pancras International must also comply with 'London St. Pancras Highspeed Guide: Retail Works' and with the Detailed Letter of non-objections issued by London St. Pancras Highspeed before work can commence.

The document is split into sections covering:

- General principles
- Electrical services
- Mechanical services
- Structural

Each of the above section has mandatory requirements and design principles.

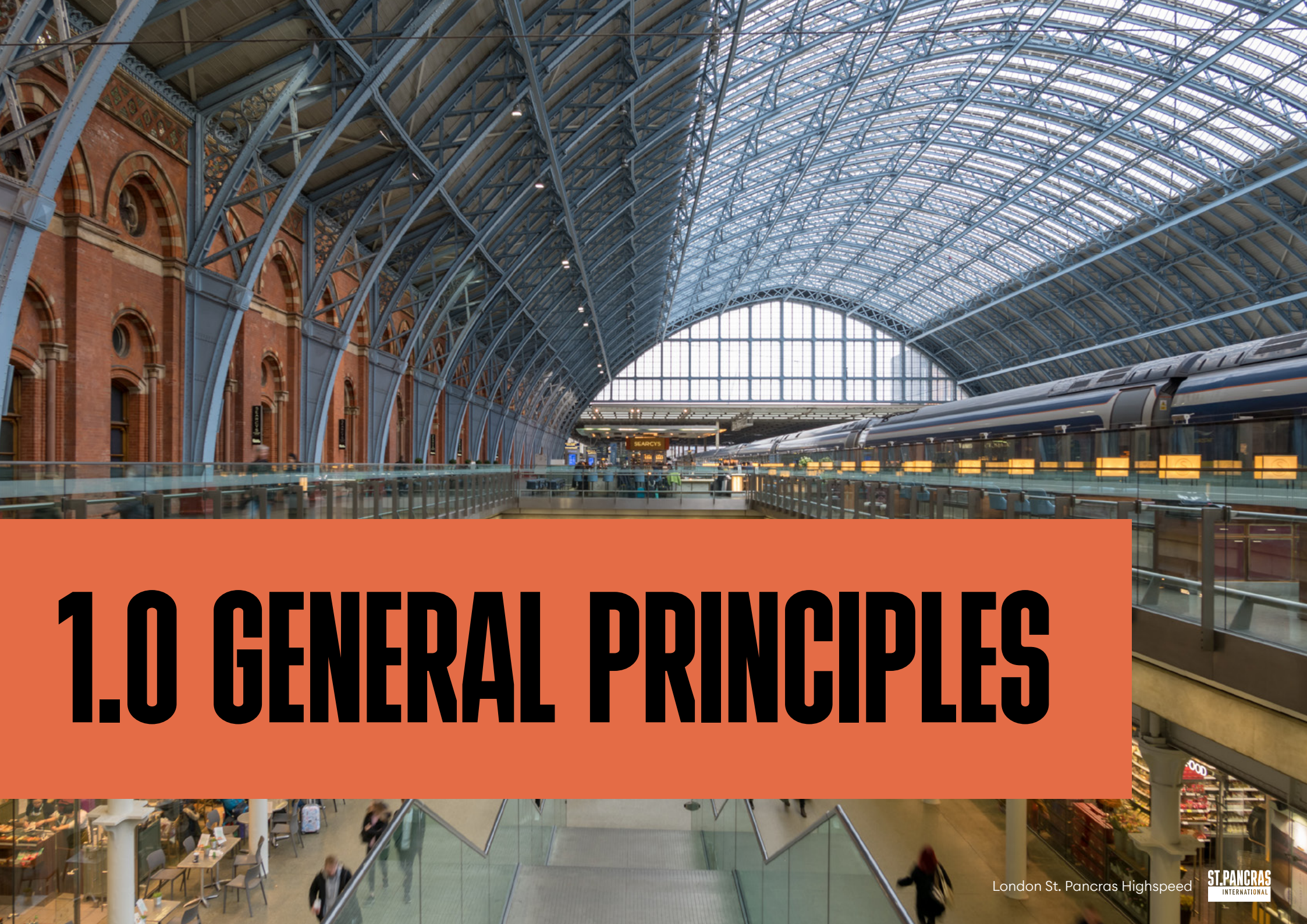
A **Mandatory requirement** is a specific performance required to meet NR(HS)'s need.

Exemptions from the above are not normally considered - however, where the project team feels there is a strong business case for non-compliance with a particular requirement, this business case should be forwarded to the project manager.

This must have supporting documentation - including a full risk assessment - for final consideration.

The document provides **Design principles** for the various Facilities within the Stations. Methods on how to satisfy the mandatory requirements may be included and, whilst these do not have to be adopted, it is expected that the project team give them consideration when conducting option selection assessment.

1.0 GENERAL PRINCIPLES



London St. Pancras Highspeed

ST.PANCRAS INTERNATIONAL

1.0 GENERAL PRINCIPLES

MANDATORY REQUIREMENTS*

GP.1.0 LISTED BUILDING REQUIREMENTS

All works must be carried out in compliance with the Detailed Letter of non-objection and drawing revisions referred to within that document, and with London St. Pancras Highspeed Guide: Retail Works.

The integration of the technical aspects into the design, and therefore the submission of construction drawings and specifications must have taken place at Detailed Design. Should a need arise to deviate from these or complement these while on-site, the contractor must obtain written agreement from London St. Pancras Highspeed prior to proceeding with the relevant works.

Carrying out unauthorised works to a Grade I listed building can lead to enforcement action and criminal prosecution.

No change, attaching to, or any modification, e.g. painting, cleaning, of any part of the St. Pancras historic building is permitted to the landlord fabric unless agreed in writing by London St. Pancras Highspeed by means of a Detailed Design Letter of Non-Objection, and works are carried out to a methodology in compliance with London St. Pancras Highspeed requirements.

In no circumstances can any intervention to any fabric of historic character be undertaken, even if concealed. All design work must have removed the need for any interface with historic fabric. For the avoidance of doubt this includes such items as drilling into mortar joints or using some form of adhesive.

The potential risk of damage to the station's landlord and historic fabric during operation must also be considered and designed-out as far as practical (e.g. impact damage or leak).

The integration of services into the fit-out design must have been done in a manner that will minimise their visual impact and this should have been submitted and reviewed at Detailed Design. If any equipment needs to be added or the fixing/construction method remains to be agreed upon, this must be discussed and agreed in writing with NR(HS) and London St. Pancras Highspeed prior to these works being implemented.

Tenants must ensure that all their services are properly interfaced and maintained; and that landlord's services are accessible to reduce the risk of potential damage to historic fabric due to system failure.

* The following assumes a non-objection has been granted by the landlord and that relevant statutory provisions are met in full.

1.0 GENERAL PRINCIPLES

GP.1.1 SUPPORTING OF SERVICES

- **Supporting of services general requirements**

  All lighting fittings ventilation grilles and diffusers, cable tray, pipework and the like must be independently supported.

  Services must not be supported from suspended ceilings unless the ceiling system and fixings have been specifically designed for this purpose. BS EN 13964:2014 provides a code of practice for the design, structural performance installation and maintenance of suspended ceilings. For further detail of ceilings refer to clause GP.1.6.2 of this standard. Piped services support must allow for the loads imposed by movement caused by thermal expansion.

- **Areas with a dedicated primary support system provision**

  Where a dedicated primary support system has been provided this must be used by the tenant fit out to allow the suspension of their services, ceiling and secondary grid systems. It is not permitted to attach to any other landlord fitment. For detail refer to clause D.1.4 of this standard.

- **Areas with no dedicated primary support system provision**

  Services must be independently supported from parts of the structure that are designed, and known to have, adequate load bearing capacity for the loads imposed by them. Any fixing into the landlord slab must be agreed. No fixing is permitted into brick and iron ceiling structure at St. Pancras International.

London St. Pancras Highspeed

1.0 GENERAL PRINCIPLES

GP.1.2 SERVICES PENETRATIONS

All penetrations through walls, floors or roofs for services must be fire stopped to at least 60 minutes fire resistance, or to the fire resistance of the building element through which it passes if this is greater, horizontal separation may be rated at 120 minutes fire resistance. All penetrations through floors must also be water sealed to prevent leakage through the floor. Pipes must be installed with sleeves built into the floor with puddle flanges and projecting at least 100mm above floor level.

Fire dampers must be installed into ductwork penetrating through fire compartment walls or floors following the manufacturer's recommendations for fire integrity.

Interference strip but no adhesive is to be used if fire stopping adjacent to historic fabric. Fire damper access hatches must be provided or sufficient size to allow easy resetting. Fire dampers shall be back indicated onto the station building management system.

GP.1.3 FIRE ENGINEERING STRATEGY

The Retail shell and core services designer will convey the responsibilities and requirements for continuation of the fire protection systems into the retail and catering units by the Tenants fit-out contractor. The Tenants fit-out contractor must ensure that the continuation of fire protection systems meet these requirements.

Retail fit out works in a station environment should be classified as off-site pre-manufacture with assembly on site. No hot works are to be undertaken on site. Refrigeration pipework will use Zoomlock fittings without exception. No grinding or hot cutting will be permitted.

GP.1.4 SUSTAINABILITY ISSUES & ENVIRONMENTAL PROTECTION

Any works being undertaken within the station will be expected to be designed in compliance with London St. Pancras Highspeed Sustainability Strategy.

This strategy sets out the objectives and targets to be achieved and is published on the London St. Pancras Highspeed website. The strategy is delivered through joint plans developed with stakeholders including NR(HS). Designers shall work with NR(HS) to ensure that they deliver against the plans.

Energy consumption and energy usage must be in line with the targets that are set in the Policy.

1.0 GENERAL PRINCIPLES

GP.1.5 ENERGY IMPACT ISSUES

GP 1.5.1 ENERGY EFFICIENCY TARGETS

The tenant will need to demonstrate they have considered how to minimise energy consumption in line with Building Regulations and London St. Pancras Highspeed Sustainability Strategy.

GP.1.5.2 REFRIGERANT SELECTION

Tenants must comply with respect to the selection of refrigerant for new installations as well as the management requirements for existing refrigerant material and associated equipment.

As guidance Tenants should promote the evaluation of alternative (non-HFC) refrigerants and associated equipment.

GP.1.5.3 AIR CONDITIONING (COOLING) SYSTEMS

Where centralised cooling capacity is available retailers will be provided with connections to these cooling systems. If stand- alone split DX air conditioners have been permitted during the design review then the condenser must be located as agreed with the planning and listed building authorities. The installation in an 'outdoor' location such that unnecessary additional heat loads are not imposed on the building's cooling system requires specific consultation and consent from Historic England and the London. Borough of Camden. The installation of an A/C will be considered as a last resort, and the shortest acceptable route to outside between the indoor and outdoor units shall be established. Heat exchangers connected to central plant within tenanted areas will be encouraged where external condensers cannot be located. Location of plant is subject to Landlord's approval and might require additional consultation and consent.

GP.1.5.4 REFRIGERATION (CATERING) EQUIPMENT

Refrigerated display cabinets shall have doors, or plastic curtains if in back of house, to trap cold air and reduce energy used. If a remote condenser is agreed with the planning and listed building authorities, the specification, service route and location must have been agreed at Detailed Design. The installation in an 'outdoor' location via the shortest acceptable route to outside between the indoor and outdoor units must have been established and agreed with the relevant authorities. Display Condensate removal may be boil off type or pumped via the station vacuum drainage system.

1.0 GENERAL PRINCIPLES

GP.1.6 FINISHES WITHIN A RETAIL ENCLOSURE

This section refers to the materials and finishes within a retail area and is based on sound knowledge of materials used throughout the station. This is to be read in conjunction with the London St. Pancras Highspeed Guide: Retail Works.

The following areas have been considered:

- Walls
- Ceilings
- Floors
- Glass

GP.1.6.1 WALLS

Timber studding may not be used for wall construction, metal stud is required to reduce the fire load potential. Walling systems will typically be drylined, taped and jointed meeting the requirements of BS8212 and British Gypsum linings guide (C07).

- **Security**

  Any applied wall hung panels must be designed so that the system does not allow any deviation which may cause the panels to become dislodged.

  The system must not allow any deflection which may allow the concealment of any devices or packages. Finger traps must also be avoided where such systems are used.

- **Safety**

  All wall lining systems must in all respects meet the requirements of the relevant Building Regulations and standards and all Fire Officer requirements. If panel systems are used the maximum size of any panel must be such that two people can easily and safely remove the panel.

- **Fire**

  All wall finishes must conform to Class 0 surface spread of flame (BS 476-6:1989 +A1 2009 & BS 476-7:1997) and category 1 of BS Smoke Emission Test.

1.0 GENERAL PRINCIPLES

GP.1.6.2 CEILINGS

- **Generic Ceiling Types**

  Ceilings within retail areas are by their nature “special”. Tenants tend to fit out the retail units in a far more elaborate manner than that of other station spaces.

  Mineral Fibre ceilings must not be used, as they are fragile and are readily marked or damaged. As a minimum, even in office areas spun glass fibre ceiling tiles or metal pan type must be used.

  Special ceilings within tenant areas are acceptable so long as they consider some basic principles in respect of access to the areas above the ceilings and the suspension systems. These basic principles are outlined below.

  Ceilings within food preparation areas require special criteria and it is the responsibility of the tenant to ensure all Health and Safety and hygiene regulations are adhered to. Any ceiling which is not readily demountable (lay in grid) must be installed with appropriate access hatches to enable easy maintenance to equipment within the ceiling void area. The hatches must be hinged and fitted with a suitable locking device.

- **Support**

  Where suspended ceilings are used the grid system must be hung on galvanised metal rod or strap hangers. Under no circumstances should wire hangers be used for any type of ceiling within a retail area.

  All hangers and supports must be fixed back to the structural soffit. If this is particularly onerous then a secondary support system must be introduced to avoid fixing to services. This sub grid must in turn be fixed back to the structural soffit at suitable centres. Proof that the soffit and/or sub grid can take the loading of the ceiling system must be provided.

  No part of the ceiling can be fixed or supported back to any service supply or duct work.

- **Heights**

  Ceiling height must have been submitted and agreed at Detailed Design. Station security must also be considered when setting the height (e.g. ceiling in fitting rooms cannot provide access to hidden space where an item could be concealed). In exceptional or difficult situations where a lower ceiling is necessary, suitable security control measures will need to be worked through with NR(HS) and building control. Consideration should be given to storage of combustible materials and the operation of fire systems.

London St. Pancras Highspeed

1.0 GENERAL PRINCIPLES

- **Loading**

  Any suspended ceiling used must conform to BS EN 13964:2014 and must be regularly inspected (bi-annually) for evidence of sagging. All suspension systems must be clearly labelled with the name of the ceiling contractor and the maximum design load must be clearly displayed.

  If gantries are used above, then “fragile” warning signs must be incorporated. Cables and other services must be independently supported, nothing must be allowed to rest on the ceiling grid. Signage, CCTV, Customer Information Screens and the like must all be suitably supported.

- **Lighting**

  Any lighting utilised must conform to the minimum requirements of London St. Pancras Highspeed as stipulated in the London St. Pancras Highspeed Guide: Retail Works for lighting in terms of performance and manufacture. All lighting fittings must be independently supported.

- **Security & Fire**

  There are suspended ceiling systems which can provide fire separation however these rely on a high level of policing to maintain the fire integrity within the building, therefore suspended ceilings must never be solely relied on to provide fire protection to the building structure.
  All ceiling systems must be non combustible and nontoxic in the event of fire, must not constitute a hazard to the building occupants or those maintaining the ceiling or services within the void.

  Solid ceilings such as plasterboard can however have a fire integrity so long as all penetrations such as access hatches are detailed in such a way as to maintain the overall ceiling performance.

  Where access above the ceiling is possible from an adjacent area privacy and security must be maintained. Wherever possible the design of the ceiling systems must take these issues into consideration.

  Any removable access hatches installed into the ceiling system must be of a maximum size which allows one person to handle the panel comfortably and safely. The access panel must be sized to enable safe access to the working area, suitable for maintenance to the equipment.

London St. Pancras Highspeed

1.0 GENERAL PRINCIPLES

GP.1.6.3 FLOORS

This section refers to floor areas within retail units. It includes raised areas and refers to ramps and steps within these units.

The type of floor finish must be appropriate to the existing floor construction.

Where a raised floor construction is to be provided, a hard tile finish must not be used unless the sub floor contains measures to bind or allow such a tile to remain fit for purpose.

The nature of the substrate plays a large role in determining the success of the final floor finish. Lateral movement can be accommodated by incorporating movement joints, but vertical deflections will seriously damage the floor. Hard finishes should therefore never be laid where there is the possibility of any vertical movement.

Timber floors are effective in resisting vertical movement however the fixing system and final specification should be carefully considered. Timber floors are prone to lateral expansion, need regular specialist maintenance and do not perform well if exposed to damp or wet conditions. Where pipework passes within voids, leak detection systems must be used and checked/maintained. Leak detection to have remote alarm that is audible to staff. Additional measures might be required to be installed by the tenant.

A stainless steel edge must be in place between the landlord floor and the tenant floor, and a 30mm stainless steel ring between any cast iron column and the tenant floor. (See drawings in the appendices of the London St. Pancras Highspeed Guide: Retail Works)

No intervention must take place into the landlord terrazzo strip, even that contained within the tenant's demise.

- **Slip resistance**

  DIN 51130 shall be used to determine the required slip resistance of flooring. R12 shall be used for kitchens and back of house areas.

The slip assessment tool (SAT) may be used for guidance: http://www.hse.gov.uk/slips/sat/index.html

- **Impact resistance**

  The dynamic impact from heavy objects, cases, bottles, point loads from delivery cages etc. will cause damage to hard floors which are not bedded correctly. Even with a solid bed some materials are vulnerable.

  Conglomerate stone and some natural products such as granite, perform better than ceramics and are therefore acceptable.

  Resilient floors perform better under impact and in situations where the subfloor has a degree of flex to it this is the recommended solution. The type of floor finish will be subject to consent by the landlord. Refer to the types of flooring materials permitted in the London St. Pancras Highspeed Guide: Retail Works.

- **Flatness**

  The subfloor must reflect the required flatness of the final floor. The practice of laying a thicker adhesive bed to compensate for inaccuracies is not permitted. The recommended flatness should be checked using a 3m long flat edge and no deviation from the edge should be more than 3mm.

- **Edge trims**

  The junctions between station finishes and retail units must be carefully considered. A stainless steel angle trim must be installed between the Station finishes and the Tenant space.

  The suggested type of edge trim is from the Gradus company ELAR751040 or similar. It should be noted that this type of trim cannot be radiused so consideration must be given to its use at an early stage of the design process.

- **Expansion joints**

  Expansion joints in floors must be approved by NR(HS) and London St. Pancras Highspeed.

1.0 GENERAL PRINCIPLES

GP.1.6.4 GLASS

This section refers to glass installed by the tenant including that used for decorative purposes, mirrors and any glass shelving and such like used within the retail area.

- **General requirements**

All toughened and laminated glass used in all situations within the building must be permanently marked in a position which will be visible after installation in accordance with BS EN 12600:2002. The glass must be stamped or etched in one corner of each individual panel.

The following information must be included in the marking:

- British Standard Number BS EN 12600:2002
- Code to identify the material, T -Toughened, L-Laminated.
- Safety class A, B, C
- Name or trademark or BSI licence number

- Shelving

  Glass for shelving must meet all relevant safety requirements and British standards relating to free standing furniture. As a minimum requirement the glass must be toughened. No exposed edges should be allowed to be positioned is such a way as to allow accidental injury to persons utilising the facility, in particular consideration should be given to low level shelving and the relationship to children. All shelving must be mechanically fixed into position.

  Glass fronted cupboards must also be toughened glass. Specialist equipment, display cabinets, etc. must have accompanying documentation relating to the specification and performance of the glass.

- **Glass for mirrors**

  This section refers to any glass used as a mirror applied to a base build substrate anywhere within the building.

  Types of glass

  The glass for this type of installation shall be mirrored glass with a safety film applied to the reverse. The specialist film applied to the reverse of the mirror gives the glass a safety performance and specification. If the mirror is broken the film holds the fragments of glass in place and so reduces the risk of injury.

  Joints

  There are two methods of addressing the joints for mirror glass. Any other options should be discussed with the standard owner before instigation.

  The acceptable joint details are: -Open 2–4 mm depending on the glass tolerances and thickness. Silicone 4–8 mm filled with high modulus clear silicone.

  Fixing

  The preferred method of fixing is that the mirror should be bonded over the entire area and adhered to the substrate such as ply or MDF which has a minimum thickness of 6mm, using either 3M 468 MP Transfer Tape. Alternative silicone-bonding agents can be used such as Dow Corning 895 structural silicone or 797 silicone both are neutral cure products, evenly distributed over an entire area.

  Equivalent bonding agents may be considered but evidence must be provided of the products performance before using them. This method should always be supplemented with adequately designed proprietary mechanical fixings such as top and bottom “Z” fixed to the substrate (this substrate must be capable of withstanding the appropriate loadings set out in the Structural Design Criteria and of accepting the incorporated fixings).

  Care must be taken to ensure that the mirror film or reverse surface is not compromised by the substrate.

1.0 GENERAL PRINCIPLES

GP.1.7 PERMANENT INTERNAL WALLS

Display furniture along brick walls has been assumed free standing, but may, if required for reason of safety and only to aid their general stability, be attached to restraint bars of approved type and method of fixing. These bars are only permitted in some location and at a specific height. (Refer to drawings in the Appendices of the London St. Pancras Highspeed Guide: Retail Works).

GP.1.8 BEER CELLARS & STOREROOMS

Where a beer cellar or storeroom is to be used to store CO2 cylinders, a local CO2 detector must be installed by the tenant within the storage area. This detector is to be powered from the local electrical supply but must have a battery back-up to ensure continuation of operation in the event of a temporary power failure. An alarm should be incorporated which will sound if the battery fails or is becoming discharged. All detectors must have a 'healthy' green indicator and a fault/alarm indicator.

1.0 GENERAL PRINCIPLES

DESIGN PRINCIPLES

GP.1.9 FIRE PROTECTION STRATEGY

Mechanical and Electrical services within retail developments will be designed to support and complement the fire protection strategy for the station.

GP.1.10 BUILDING COMPARTMENTATION

Compartmentation is primarily concerned with the control of the spread of fires; however, it is important to recognise that compartmentation can also play an important role in controlling the spread of smoke. There are two levels of compartmentation which need considering:

Primary

This type of compartmentation is concerned with sub-division of the building. The degree of sub-division will depend on such factors as:

- Use of buildings/fire load
- Availability of sprinkler protection
- Height of the floor of the top storey and size of building
- Degree of fire resistance for compartmentation given in Approved Document B

Secondary

This type applies to risk areas, such as kitchens etc. As a minimum 30 minutes fire protection is normally required for fire safety purposes, however, greater fire resistance may be required for property protection and to minimise operational interruption. The table below indicates where fire resisting construction is normally required.

Type of room:

Separation of public from non-public areas. (non-exhaustive)

BETWEEN	FIRE RESISTANCE IN MINUTES
Shops & services corridors	30
Storerooms & sprinkler protection	60
Kitchen (with cooking appliances)	60
Electrical cupboards c/w smoke detection	30
Basement storage rooms	60

1.0 GENERAL PRINCIPLES

GP.1.11 ENERGY IMPACT ISSUES

GP.1.11.1 CATERING

The energy requirements of catering establishments are subtly different from those apparent in the specialist product retailing sector. The energy demands can be considered in two groups related to front and back of house areas. The catering seating area often requires significant energy for lighting and air conditioning. The food counter and kitchen areas require energy for warming, cooking, dishwashing and ventilation. These are the key areas requiring concerted design effort if an efficient design solution is to be achieved.

For purposes of good design, energy efficiency and workplace comfort the key issues that must be addressed by any retail project are as follows:

- Design advice
- Energy controls - Technology and housekeeping
- Lighting levels
- Types of lamp and light fitting
- Means of air conditioning
- Refrigeration

The following sections attempt to provide specific advice predominantly related to retail projects and appropriate to the designer for both shell and core and fit out works.

GP.1.11.2 ENERGY CONTROLS – TECHNOLOGY & HOUSEKEEPING

Energy efficiency is most simply realised by switching equipment and systems off when they are not needed. This requires some design consideration and some staff training to ensure effective management practice.

Switching is most cost effectively achieved by simple, well labelled switches for all lighting, air conditioning, ventilation and cooking equipment. The designer/ contractor must however design and circuit the systems to enable switching to take place.

The following are some suggested areas for consideration: -

- Clearly label all light switches and make switches accessible.
- Provide clearly labelled switches inside the demise for plant located remotely.
- Separately circuit lighting to provide different levels of light for normal hours of operation, stock taking, window display and security.
- Separately circuit refrigeration equipment requiring to be ON 24 hours/day.
- Separately circuit air conditioning units, ventilation plant and cooking equipment such they can be switched OFF out of hours.
- Provision of adequate thermostatic controls and simple time controls.
- Pan recognition and induction cooking is encouraged.

GP.1.11.3 LIGHTING PERFORMANCE & LAMP SELECTION

Lighting installations should comply with Part L of the Building Regulations. The document provides good practice advice on the ‘efficacy’ required for display and general lighting.

Preferred lamp selections are LED meeting the colour temperature (kelvin) and Lux levels as determined by London St. Pancras Highspeed. GLS and 240v tungsten halogen lamps should not be used.

1.0 GENERAL PRINCIPLES

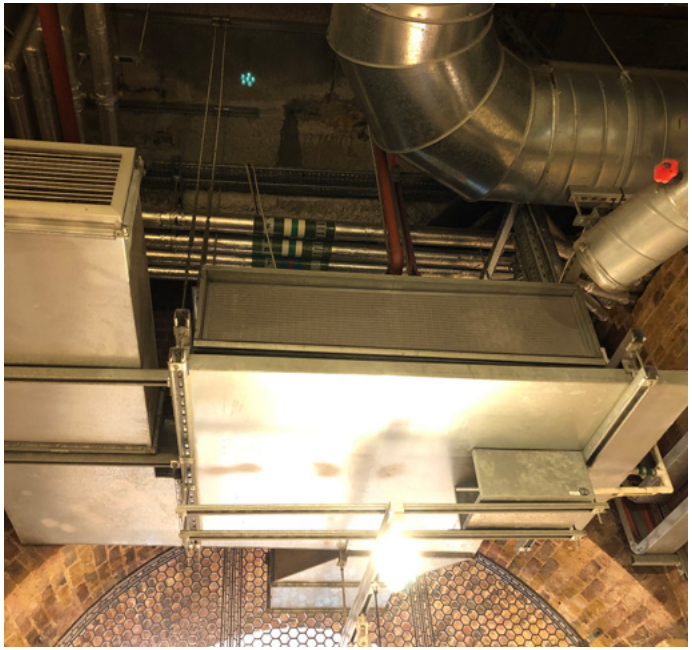
GP. 1.11.4 ENERGY SOURCES – CATERING KITCHENS

Gas, where available, may be used as the fuel source for cooking and local hot water generation applications where a suitable flue may be installed. Landlord and Historic England consent is required for flue and plant installation.

GP. 1.11.5 VENTILATION – CATERING KITCHENS

Key considerations

- Appraisal of the necessary kitchen exhaust air volume required.
- Reduction to a minimum the distance between the hood and outside if required.
- Reduction of the pressure drop on the exhaust fan and selection of an energy efficient fan.
- Selection of an efficient exhaust hood.



London St. Pancras Highspeed

2.0 ELECTRICAL SERVICES

2.0 ELECTRICAL SERVICES

ES.2.1 ELECTRICAL SERVICES COVERED BY THIS STANDARD

All electrical systems installed within retail facilities located within St. Pancras International.

ES.2.2 SAFETY, STANDARDS & STATUTORY REGULATIONS

The design, installation and maintenance of the electrical system within the retail unit must always be given the highest priority and must not be compromised by cost cutting, lack of attention to detail and the influence of time constraints.

Easy access for authorised personnel to equipment, clear and understandable labelling of systems and good quality information records available to the end user at hand-over stage shall always be provided. This is particularly important for equipment mounted above potentially restrictive access ceilings, such as plasterboard.

Tenants and their suppliers must adhere to the latest edition of the relevant British Standards including all statutory regulations, associated memoranda and in particular, the following:

- Electricity at Work Regulations.
- Memorandum of Guidance on the Electricity at Work Regulations - Health and Safety Executive Booklet HS (R)25.
- BS 7671:2018 IEE Wiring Regulations Current Edition (18th Edition).
- Guidance Notes on the IEE Wiring Regulations published by the IEE.
- British Standards (BS) and Harmonised European Standards (e.g. BSEN).
- British Standards Institution Codes of Practice (BSCP).
- Health and Safety at Work Act and other Statutory Health and Safety Documents.
- Building Regulations England and Wales. Note in particular the requirements of Part L with regard to energy consumption.
- Construction (Design and Management) Regulations (CDM).
- Electrical Equipment [safety] Regulations.

2.0 ELECTRICAL SERVICES

ES.2.3 REDUNDANT SERVICES

Remove all redundant equipment and services at the completion of any new works.

Therefore, any existing switchgear or cabling that becomes redundant during the course of any works must be removed from site. Cables shall be stripped back to their point of origin.

ES.2.4 SUPPLY VOLTAGE

Due to harmonisation the tolerance will be 230v +/- 10%.

ES.2.5 DESIGN & TESTING OF ELECTRICAL SYSTEMS

All electrical installations must be fully designed, installed, tested and commissioned to comply with the testing requirements of BS 7671:2018 to ensure the safety of personnel and integrity of the unit. Copies of test certificates must be available for inspection before switching on.

ES.2.6 ELECTRICAL CUPBOARD

All retail units must have a dedicated room or cupboard to house any electrical distribution equipment.

The size of the cupboard must comply with the Electricity at Work regulations with particular attention to access requirements.

ES.2.7 ELECTRICAL SUPPLY CAPACITY

The design of the electrical system and equipment must always be based on most efficient use of energy. The supply capacity shall be base on design that incorporates energy efficient design.

The designer must establish at the earliest possible stage of the project that the supply provided within the electrical cupboard is of sufficient capacity to serve the load. If found to be inadequate the design must be reviewed and if possible be reduced to an acceptable level before a request for additional power is made.

ES.2.8 CABLES

All power, extra low voltage, data and communication cables and their containment systems installed within the unit must be low smoke halogen free (LSHF) and be of reduced flame propagation. This also applies to wiring in display cabinets and similar items of equipment used within a retail unit.

2.0 ELECTRICAL SERVICES

ES.2.9 CONTAINMENT

PVC conduit, trunking, skirting or dado height trunking must not be used. LSF type only. Cable containment should be concealed from public view.

ES.2.10 CABLE & CONTAINMENT IDENTIFICATION

To aid future tracing and identification, all cables and containment systems passing outside the demise of the retail unit must be clearly and permanently labelled. BS7671 refers.

ES2.11 FIRE SEALING

All fire barriers up to and including the demise of the unit must be fully installed and maintained immediately following any construction or refurbishment works. In the event of future services being installed through the fire barrier, it must be correctly re- established using a proprietary method approved by a recognised person/means.

ES.2.12 ESCAPE LIGHTING

Escape lighting must be installed within the unit to meet the requirements of clause ES.2.9 of this standard.

ES.2.13 LIGHTING

Luminaires must have/be:

- Selected from a manufacturer's standard range (not specially designed for the project).
- Easy to clean and maintain.
- Long term availability of spare parts.
- Simple and fast to install.
- Supported by a safe and secure method.
- Internal fuse protected to BS 1362:1973.
- Paint finish resistant to discolouration from ultraviolet radiation.
- CE marked.
- Constructed to an ingress protection (IP) rating to suit the designated environment.
- Where available from a standard range LSF wiring shall be specified within the luminaire.
- End caps and other components manufactured from LSF material if appropriate. This is not required for external areas.
- Sound baffles and fire barriers must be installed for continuous luminaire systems to maintain the building integrity.

2.0 ELECTRICAL SERVICES

ES.2.14 FIRE ALARMS & VOICE ALARM

The Station Building's fire alarm detection system must be extended to include the area covered by the unit. This will either be by a direct extension or via an agreed method of interface/panel hardware. The unit will also include a public address/voice alarm system. If the tenant wishes to install an audio system, an over-ride that will automatically activate in the event of a fire will be required.

ES.2.15 IT & TELECOMMUNICATION SERVICES

Each unit is provided with an interface unit to facilitate interconnection of their installation/ system with the station wide telecoms system. The tenant telecom requirements and detail shall be managed through the station incumbent communications maintainer. It shall be the tenant's responsibility to request from the appointed supplier their overall telecoms requirements which will be provided via the designated Communication Equipment Rooms (CER) located at various locations throughout the stations.

Generally, each unit has a multi-pair telephone and 4 core fibre cabling which are to be terminated at a Tenant Distribution Box within the unit demise, located adjacent to the tenant's metering position.

Wi-Fi is available from London St. Pancras Highspeed through its designated agent. Wi-Fi is provided to the public free of charge in St. Pancras International. Services for tenants are also available for the tenants' internal use.

Tenants are not permitted to install Wi-Fi services nor are tenants permitted to install Wi-Fi on the premise without written permission.

The Wi-Fi services from London St. Pancras Highspeed include the placement of access points within the tenant space, high speed connection to the internet.

The tenant may have a dedicated secure VLAN and if set up correctly the connections are as secure as current technology permits.

The service is on diverse route 10Gb/s fibre links.

London St. Pancras Highspeed designated agents will provide firm quotations upon receipt of the tenant requirements.

2.0 ELECTRICAL SERVICES

DESIGN PRINCIPLES

ES.2.16 ELECTRICAL CUPBOARD

Each retail unit should be provided with a dedicated electrical cupboard constructed under the Shell & Core contract for new developments or via the tenant during fit out works.

The cupboard will normally contain the following: -

-
- Electrical incoming power supply.
- Energy meter (with data cable installed for remote reading back to central point).
- Switch isolator.
- Fire alarm/voice alarm system termination junction box.
- Train information system coiled cable for the future full installation of the system within the unit. The installation of the T.I.S. within the retail unit is to be carried out under the Shell and Core contract, this shall also include the power supply (derived from the landlord's power system). The installation of the T.I.S and its location must have been agreed at Detailed Design.
- A smoke detector.

The installation of the final circuit electrical distribution/control equipment within the cupboard can result in an increased heat gain. The design shall ensure that the cupboard is adequately ventilated to ensure that any residual heat is safely dissipated. The electrical equipment/wiring shall be designed to function correctly at the ambient temperature within the cupboard. Station maintenance staff shall be provided with the right of access to the cupboard.

- The electrical cupboard must remain accessible and shall not be constrained by the storage of goods in front the cupboard door.
- The cupboard shall not be used to store any items.
- Water, gas and drainage pipework shall not be run through or terminate in the designated electrical cupboard.
- Electrical cupboard should not be provided by the retailer in an area designated as an escape route.
- The cupboard must be a lockable, 1/2 hour fire rated enclosure, complete with auto-locking facility and automatic self-closing device. Station maintenance staff shall be provided with key access to the electrical cupboard and retail areas. The electrical cupboard must remain accessible.
- Statutory signage, Danger, voltage and Fire Door keep locked signage is required to the face of the cupboard door.
- With the possible exception of large electrical capacity users, requiring a sub- main distribution switchboard, the electrical cupboard need not be a floor to ceiling enclosure. Small cupboards minimise the risk of inappropriate materials being stored and maximise the retail facility area. Where a full height floor to ceiling cupboard is necessary, the cupboard's floor should be sloped forwards to hinder the cupboard being used as a store.

2.0 ELECTRICAL SERVICES

ES.2.17 ELECTRICAL DISTRIBUTION

The system, including all switchgear, circuit protective devices and cables shall be designed, installed, tested and commissioned to ensure compliance with BS 7671:2018 latest edition. Sub-circuits shall supply either lighting or small power, not both. MCBs protecting lighting circuits shall not exceed 20 amps rating. To ensuring that these protection devices are not used as the lighting control, lighting switches shall be installed external to the electrical cupboard.

Where a 3-phase supply is provided the connected loads shall be distributed across the supply phases to achieve a balanced system.

ES.2.18 SWITCHGEAR

Distribution boards shall be mounted in the retail facilities electrical cupboard at a height that provides ease of access for fault findings etc., without the use of a raised platform. A circuit identification label shall be permanently fixed to the front of each distribution board that identifies the source of supply (sub-station, transformer and supply switchboard) as well as a unique reference. A circuit chart, identifying the item served, connected load, protection device's rating, outgoing cable type and size, must be fixed to the inside face of the cover.

Distribution boards shall be equipped with appropriately rated miniature circuit breakers (MCBs) and residual current devices (RCDs, RCBO's), etc. rated to suit the distribution system and individual circuit protection requirements.

The maximum size of a distribution board shall be 12-way TP&N. If the quantity of required ways exceeds this then consideration should be given to providing a second distribution board and reduce the area of coverage. Dual feed, single enclosure distribution boards are not acceptable for general services. All incoming supply cables must be fully shrouded to allow work to be undertaken on the board following isolation of the incoming isolator.

If a preferred supplier of switchgear is used at the station the retailer shall use these.

ES.2.19 CIRCUITS

Lighting circuits shall be looped wired between luminaires with tee-off wiring only at final connections.

Lighting in suspended ceilings shall be via plug-in ceiling roses or by equivalent easy method of isolation and disconnection. The luminaire flexible final connection to the fixed circuit wiring shall be located as close as practicable in an accessible position adjacent to the luminaire enabling quick and easy disconnection and ensuring clear visibility of the flexible cable between luminaire and its fixed wiring connection.

Safety dictates that all circuit stations and interconnections including final connection to equipment shall be suitably housed in conduit junction or station boxes ensuring that access to the wiring stations must be via removal of a cover plate.

All 13A socket outlet radial and ring circuits shall be protected at the distribution board by RCD's with 30mA trip rating or suitably rated RCBO's.

Cash till 13A socket outlets should be on separate circuits from the general 13A socket outlet ring circuits.

2.0 ELECTRICAL SERVICES

ES.2.20 CABLE/WIRING INSTALLATION SYSTEMS

ES.2.20.1 LOW SMOKE HALOGEN FREE

The high-level requirement is that cables must not propagate fire and if a fire occurs the fumes must be free from harmful gases and should not produce dense smoke.

The main cause of death in a fire is smoke inhalation. In tandem with reduced smoke emission requirements from all building materials, there is a need to ensure cables and containment systems installed are free of any halogens or their derivatives and in a fire condition, toxic gases are within certain limits. Therefore, all cables shall be low smoke halogen free (LSHF) and be of reduced flame propagation whether they be mains power, communication, data or extra low voltage control cables.

Containment systems, cable supports, ties and clips if not manufactured from metal shall also be manufactured from LSHF materials.

Compliance with the requirements herewith should not be taken as the sole criteria for acceptance of cable e.g. additional performance requirement related to the functionality of the circuit should also be satisfied. (For example, circuit integrity in fire).

Cables must not be installed in the building without proof of compliance with the above standards.

Acidity of Combustion Gas	BS EN 60754-1:2014	Test on insulation and or sheath sample to determine corrosiveness of material when burned in furnace.
Flame Propagation	BS EN 60332-1-2:2004+A11:2016, BS EN IEC 60332-3-10:2018 CATEGORY A, B & C (IEC332)	Cable sample is placed in a chamber and subject to flame for a set time, the flame is then removed, and the cable should self extinguish. Part 3 deals with bundles of cables.
Smoke Emission	BS EN 61034-1:2005 + A1:2014 BS EN 61034-2:2005 + A1:2013 (EIC 1034)	Cable sample is placed in a 3-metre cube chamber and burned; a photo electric cell measures the reduction in light transmission.

In order to achieve conformity and to ensure that their product delivers the standard claimed by the manufacturer, cables shall only be purchased from companies operating under a product certification scheme such as the British Approvals Service for Cables (BASEC).

Multiple cable runs (3 or more) shall always be laid and fixed securely on cable trays for the full length of their run, especially in ceiling and floor voids.

Cables/wiring supplying life safety systems shall be run on an independent cable tray system and not with other services.

Joints will not be accepted unless express permission is obtained from the client. Any cable damaged during installation shall be removed and replaced.

2.0 ELECTRICAL SERVICES

ES.2.20.2 ARMOURED CABLES

Armoured cables shall have stranded copper conductors and be 600/1000V grade, manufactured to BS 6724:2016, with an overall black halogen free LSHF sheath and be of reduced flame propagation. The insulation shall be cross linked polyethylene (XLPE).

The armouring of single core cables shall be aluminium to BS 2897:1970 and multi core cables shall be galvanised steel wire to BS 1052:1980.

Armoured cables shall be used for all main and sub-main circuits.

Armoured cable shall be fixed using clamps or ties as appropriate to the cable.

All cables shall be correctly secured and supported throughout their length using purpose made non-flammable cleats or clips. As a general rule, main and sub-main cables should be laid single depth on the appropriate type of containment system.

The following installation methods are considered acceptable assuming compliance with the legislation applying to Grade I listed buildings, i.e. there can be no fixing into or onto any historic fabric and all cables must be hidden from public view to preserve the special character of St. Pancras International.

1. Fixed direct to the tenant's surface.

2. Fixed onto cable tray or basket. Tenant expected to run their own cable trays within the demise, suspended from existing unistrut. 25% capacity to be left for future allowance on tray.

3. Fixed direct onto a channel support system using appropriate cleats.

4. Fixed onto cable ladder.

Methods 1 and 2 should be used for smaller cable sizes, and methods 3 and 4 adopted for larger cables.

As a basic requirement all cables are to be installed in a neat, tidy and safe manner in accordance with BS7671:2018. Cables joining or leaving a multiple cable run shall do so in an orderly and logical manner.

ES. 2.20.3 NON-ARMOURED CABLES

Single core insulated cables shall be rated at 450/750V and have stranded copper conductors manufactured in accordance with BS 7211:2012 with an LSHF insulation installed within conduit or trunking.

Flat twin and earth cable manufactured to BS 7211:2012, 300/500V this type of cable shall not be installed.

Flex type cable shall not be used for fixed wiring.

Due to the reduced mechanical protection characteristics of non-armoured cables, it will always be necessary to enclose them in steel conduit or trunking, as appropriate.

It should be noted that all three phase and neutral circuits should be run, either in armoured cables or single core cables within the same conduit or trunking. Where it is seen as a benefit to use non-armoured cables in any LV installation and conduit or trunking is felt inappropriate, mineral insulated cables should be considered.

Where cables are terminated at a distribution board, they shall be labelled with the circuit identification reference number. This shall include the neutral and earth cables for any circuit.

2.0 ELECTRICAL SERVICES

ES. 2.20.4 FIRE SURVIVABLE CABLES

Fire survivable cables selected for power circuits shall comply with the following categories C, W, & Z and BS 7846:2015.

ES. 2.20.5 INSTALLATION REQUIREMENTS

The careful selection of the most suitable cable route and the method of installation to improve the reliability of the system and not affect the fabric or special character of St. Pancras International.

The cables shall be protected from mechanical damage. For items that have only a single supply only MICC cable complying with BS 6387:2013 Cat. CWZ and BASEC approved to BS EN 60702 pt. 1,2&3 shall be used.

ES. 2.20.6 MODULAR WIRING SYSTEM

Modular wiring is a prefabricated armoured wiring system complete with factory fitted plug and sockets.

Where used the design and installation of modular wiring systems shall comply with the following design requirements:

- All components and materials shall comply with the relevant British Standards.
- For low power consumption circuits only, with a maximum back-up protective device of 32 amps.
- The design current of the circuit shall not exceed the current rating of the connectors/plug and sockets.
- Be designed in compliance with BS 7671:2018.
- The inner wires shall be LSF sheathed.
- The outer sheath shall be metal armour Modular wiring installation requirements.
- The system shall be installed in full compliance with the manufacturer's instructions.
- Within ceiling voids, the cable shall be supported/ fixed to cable trays or basket and not laid on the ceiling system.
- The system shall be accessible throughout and is not to be installed within a floor screed.
- The final connection to the luminaire may be via a modular plug/socket or a plug-in ceiling rose. When a plug-in ceiling rose is used it shall be located adjacent to the luminaire to enable the quick and easy removal of the luminaire.
- The length of flex between the plug-in ceiling rose and the luminaire shall be as short as possible and protected from mechanical damage.
- Consideration shall be given to the location of junction/distribution boxes with regard to future identification of their location and ease of access.
- As the plug and sockets are interchangeable there is the possibility of an isolated section becoming inadvertently energised by a plug being inserted into a live section of the system. To help to prevent this, all components of the modular wiring system shall be labelled with the circuit reference. This shall include each length of cable and all plugs and sockets.
- Supplies from different transformers shall not be installed within the same junction/connection box.
- Any open unused socket shall be provided with a blank cover to protect against danger.

2.0 ELECTRICAL SERVICES

ES. 2.20.7 LED CONTROL/DRIVERS

Energy efficiency class A+: rated as ‘energy efficient’ under Part L1A of the Building Regulations are required.

ES. 2.20.8 SEGREGATION OF SERVICES

Generally, to meet the requirements of BS 7671:2018, separate wireways should be provided for the following services:

- Low voltage power
- Fire alarms and escape lighting distribution
- Telecommunication, data, and extra low voltage controls (BMS, CCTV and FIDS).

Correct separation must be given to mains voltage and voice and data cables. The minimum distance between power and telecommunication cables shall be as shown in Appendix C of Guide Note 5 of the IEE Wiring Regulations - Guidance Note on Protection Against Electric Shock published by IEE.

Public Address 100V speaker circuits and microphone cables should be adequately screened to avoid induced signals and cable selection should be undertaken to minimise the effects of electromagnetic interference.

ES. 2.20.9 FINAL CONNECTIONS

Final connection to fixed items of equipment, including luminaires and heating and ventilation plant, may be by one of the following methods:

- Wiring to heating and ventilation plant and other special equipment should terminate at plant local switch disconnectors or connection boxes with fixed stations.
- Flexible cable from plug-in ceiling rose (max length of 500mm).
- Flexible cable from fused connection unit.
- Single core cables in flexible conduit.
- Armoured cable with additional loop.
- Mineral insulated cable with additional loop.
- Wiring to equipment requiring a single-phase supply should terminate in a fuse connection unit or isolator as appropriate.

The connection method should suit the situation. Any expected vibration or movement should be allowed for in the length of cable.

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2.0 ELECTRICAL SERVICES

ES. 2.20.10 COMMUNICATIONS & DATA CABLES

Cables shall incorporate screening where appropriate for EMC compliance.

ES. 2.20.11 BASIC GUIDE TO CABLE SIZES

In addition to meeting the requirements of BS 7671:2018, the designer should consider the maximum conductor size which the station of the equipment can physically accept. If conductor sizes are becoming excessive, in order to bring the cable size within acceptable limits consideration should be given to, either running the supply cables in parallel or reducing the load or area covered by the circuit. As a guide, the respective minimum and maximum conductor sizes which should be used are shown. Cable calculations should be undertaken on the assumption that all cables to be installed on cable ladder/tray will be touching.

ES. 2.20.12 MINIMUM & MAXIMUM CONDUCTOR SIZES

SERVICE	MINIMUM CONDUCTOR SIZE MM2	MINIMUM CONDUCTOR SIZE MM2
Lighting circuits	1.5	4.0
13A power outlets (ring circuits)	2.5	4.0

ES. 2.20.13 CABLE INSTALLATION

All cables shall be installed in accordance with BS 7671:2018 and manufacturers' recommendations.

Where it is necessary for cables to run beyond the retail area boundary, it is essential that disruption to the areas concerned is minimised.

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2.0 ELECTRICAL SERVICES

ES.2.21 CABLE CONTAINMENT

Cables must not be laid on ceiling systems and require routing on metallic cable trays and trunking. Cables must be fixed to cable tray by means of propriety cleats or ties, with fixings spacing in accordance with cable manufacturer's recommendations.

Cables are to be run on cable tray or ladder, appropriately sized to suit the number. Multiple runs of armoured cables shall be run on cable tray or ladder.

To minimise the risk of damage non-armoured cables shall run supported on cable trays to within 600mm of termination points.

Non-armoured cables shall not be run within wall partitioning without additional mechanical protection. Cable trays or wire basket shall be provided for telecommunications, data and extra low voltage controls cabling.

PVC conduit, skirting or dado height trunking shall not be used.

ES.2.22 IDENTIFICATION OF CABLES/CONTAINMENT

ES.2.22.1 CABLE IDENTIFICATION

To enable future cable tracing, all cables must be given an individual dedicated circuit identification reference and this information shown on the cable label. An approved proprietary cable labelling system shall be used, and this fixed in accordance with the manufacturer's instruction.

Information to be provided on label:

- The service concerned shall be included on the label, typically "Power Supply", "Fire Alarm", "Public Address" and "Escape Lighting".
- The Retail unit number.
- Unique reference identification.
- A unique reference for every cable shall be adopted. The reference system shall sequentially follow on from that given to the supply points provided in the retail electrical cupboard under the Shell and Core contract. E.g. the power, fire alarm, public address, & other such services.
- Cables run on open containment systems such as cable trays, ladders and wire baskets require to be individually labelled.
- All labelling shall correspond correctly with as-built information.

Throughout the station building to assist service identification the cabling of specific systems is colour coded and this requires be continued in retail facilities. The following coloured sheathed cables for life safety systems shall be used:

- Fire/voice alarm systems Red.
- Escape lighting White.
- Power 240/415 supplies Orange
  (Note: power includes hot smoke extract fans and fire shutter supplies).
- If ceiling voids are to be sprayed, cables shall be masked at a number of points along their length to ensure correct identification after completion of this operation.

2.0 ELECTRICAL SERVICES

ES.2.22.2 CONTAINMENT SYSTEMS IDENTIFICATION

With the exception of conduit, tray/cable containment systems must be labelled to identify the designated cable service. Typical designated services are 'Fire Alarms', 'Communication Cables', 'Power Distribution' and 'Escape Lighting. The labelling shall be clearly visible and carried out in a durable manner. On compartmentalised trunking labels must be fixed to the cover stating each compartment's designated service.

ES. 2.22.3 LABEL TYPE

The lettering for cables/tray/containment systems shall be upper case 3 mm high/12 point Arial black on a contrasting background.

Cables carrying life safety systems, label shall have lettering upper case 3 mm high/12 point Arial white on a red background.

Cables carrying life safety circuits, not run on tray shall have an additional label "LIFE SAFETY SYSTEM" the life safety label shall have lettering 6 mm high/24 point Arial white on a red background, this is in addition to the cable identification reference.

Tray/trunking carrying life safety cables shall be separately labelled "LIFE SAFETY SYSTEM" the life safety label shall have lettering 6 mm high/24 Arial white on a red background.

Labels shall be purpose-made manufactured from non-flammable Low Smoke Zero Halogen materials utilising a proprietary labelling system.

The design life of the label and the ability to read the information on it shall not be less that of the cable it serves, and shall be suitable for the environment where the cable is located i.e. U.V. stable, water resistant when cables are located within a pit and duct system.

The label shall have the information indelibly marked on to it.

Self-adhesive plastic labels shall not be used, except on flat surface cable trunking. For core identification, sleeve type shall be used.

ES. 2.22.4 LABEL LOCATIONS

Each cable/tray/containment system shall have labels fitted as follows:

- At intervals in not exceeding 5 metres.
- Each end of cable/tray/containment system.
- Major change of route i.e. when leaving main cable tray to join secondary tray system.
- Each side of a fire break/barrier.
- Each side of a wall or floor slab.
- Termination point within equipment i.e. distribution board at this point only the circuit reference is required.

Labels must be positioned ensuring that they are not obscured by adjacent cables or other services, such as pipework and ductwork. Labels shall be securely fixed to avoid them being accidentally detached during the installation of other services.

ES. 2.22.5 SWITCHGEAR/ELECTRICAL EQUIPMENT IDENTIFICATION

As for cable identification electrical equipment shall also be identified. The reference given shall follow the same format as for the supply cable to the item of equipment. The label shall comply with the requirements for that of a cable identification label.

ES. 2.22.6 RECORDING THE INFORMATION

All record information is to be contained in the health and safety file in accordance with the current Construction Design regulations.

2.0 ELECTRICAL SERVICES

ES.2.23 FIRE SEALING

Approved proprietary fire sealing systems shall be used that have been tested in accordance with the requirements of BS 476-20:1987 & BS 476-22:1987 and BS 476-23:1987. They shall be constructed to ensure that no derating of cables is required due to overheating.

Consideration shall be given to any detrimental effect caused by the system on the sheathing of the cables.

Where cables, ducts or trunking pass through fire barriers or structural elements forming fire compartmentation approved proprietary fire sealing systems shall be installed to maintain integrity.

The preferred method is the use of a Fire block system. Where new work is being undertaken and existing fire barriers are penetrated, allowance must be made for the repair or reinstatement of these to the same standard.

Fire sealing must also be installed internally within trunking systems as they pass through fire compartments.

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2.0 ELECTRICAL SERVICES

ES.2.24 ESCAPE LIGHTING

ES.2.24.1 GENERAL

Escape lighting, in accordance with BS 5266-1:2016-TC latest edition requirements, must be installed throughout in retail facility's public and staff areas to provide safe evacuation illumination in the event of the failure of the general lighting.

The escape lighting shall be designed to ensure a minimum illumination level of 1 lux at any point at floor level throughout the retail unit.

Escape lighting testing facilities shall be provided which simulate a mains supply failure to the general lighting. Testing provisions shall enable the escape lighting system to be tested without the need to isolate the retail facility's electrical supply or the general lighting circuits.

Escape lighting test switches should be provided as part of the retail facility tenant's fit- out installation. The number of circuits monitored should be subject to the retail facility's size and its area internal compartmentation, ensuring that the local escape lighting operates should the general lighting in the area fail as a result of a supply fault. Test switches are to be clearly labelled as to their use and if sited external to the electrical cupboard require to by key operation.

ES. 2.24.2 SELF-CONTAINED LUMINAIRES

Self-contained escape lighting is approved as acceptable in retail facilities.

Self-contained luminaires shall be non-maintained complete with minimum maintenance sealed nickel cadmium battery packs rated for 3 hours, incorporating self testing electronic circuitry. These must be dedicated escape lighting luminaires and not incorporated into general lighting luminaires.

Luminaires shall be connected evenly over the available phases.

ES.2.24.3 INTERNALLY ILLUMINATED EXIT SIGNS

Internally illuminated exit signs where required, must be illuminated at all times therefore maintained self contained or sustained type luminaires shall be installed. These must be positioned in accordance with Approved Document B, Building regulations. The installation of these must have been agreed at Detailed Design and recorded on the set of drawings referred to on the Detailed Design Letter of non-objection.

2.0 ELECTRICAL SERVICES

ES.2.25 LIGHTING

ES.2.25.1 GENERAL

The design of the lighting system shall always strive to achieve the lowest possible energy consumption.

To work towards NR(HS)/London St. Pancras Highspeed policy of reduced energy consumption the lighting installation shall meet Part L of the Building Regulations “Display lighting shall have an initial (100 hour) efficacy of not less than 15 lumens per circuit watts”.

The general area lighting shall have an efficacy of not less than 65 lumens per circuit watts. The above values are not very arduous, and the designer shall strive to improve on these figures.

- “Last man out” switches shall be provided for all retail units. These should control the lighting along the exit route. It should not be possible to switch all lighting on from one switch to avoid surges on the system.
- Poor quality/incorrectly installed luminaires and control gear represent a high fire risk, this is unacceptable. It is therefore a requirement that all equipment shall comply with the relevant B.S/E.N.
- LED is the preferred light source for retail areas.
- The lighting designer must consider the effect the lighting may have on both the able bodied and those with sensory or physical disabilities. Extreme high illuminance levels and glare can cause discomfort and result in visual confusion.
- Lighting control shall be provided to enable energy reduction when areas are not in use.
- Cold cathode lighting must only be installed out of the reach of the public and its control gear mounted in an electrical enclosure suitably positioned in an accessible location to authorised staff only. Fireman’s switches must be provided for all cold cathode lighting and be located such that they are easily visible and clearly identifiable (labelled) with the concerned lighting.
- Luminaires must be positioned ensuring that no safety risks result from lamp and control gear heat emissions.

ES.2.25.2 LUMINAIRES & LAMPS

Luminaires/lamps shall comply with the following:

- Supported by a safe and secure method.
- Louvers, diffusers and removable gear trays must be fastened with safety chains or cords with adequate slack to facilitated removal of louvers and diffusers.
- Non metallic diffusers must be of a minimum smoke producing material complying with part “B” of the Building Regulations.
- Designed to be manufactured from environmentally friendly materials.
- Internal fuse protected to BS 1362:1973
- CE marked.
- Constructed to an ingress protection (IP) rating to suit the designated environment.
- LSF wiring within the luminaire.
- Fire barriers must be installed for continuous luminaire systems that pass between fire compartments to maintain the building fire integrity.
- Have the highest light output ratio possible for the type, to provide high efficiency.

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ES.2.25.3 LAMP CONTROL GEAR

Lamp control gear shall comply with the following:

- Remote gear located within a purpose made enclosure securely supported and not laid on the ceiling system.
- Minimum power factor: High frequency 0.95; Switch start 0.9.
- No PCB compounds.
- Comply with ENEC BSI and EMC requirements.
- CE marked.

ES.2.26 ELECTROMAGNETIC COMPATIBILITY (EMC)

The retail facility's electrical systems, equipment and plant shall meet EMC regulations.

ES.2.27 SUPPLIES TO LIFE SAFETY EQUIPMENT

Retail facility fire engineering requirements may include life safety equipment such as motorised fire shutters and hot smoke extract systems.

Fixed fire suppression systems to Catering hoods are required where high risk cooking is carried out.

The requirement for such systems must be established at an early stage of the project and the details of these agreed at Detailed Design.

ES.2.28 COOKING EQUIPMENT AUTOMATIC ISOLATION

An emergency switch-off control system must be installed to enable the incoming supply (electrical or gas) to kitchen cooking appliances to be remotely isolated.

Emergency mushroom head push buttons that when activated automatically disable all supplies to cooking appliances, are to be located at kitchen entrances, exits and escape doorways in a visible and easily accessible position. These must have been identified on the approved drawings. The operation of any one cut-out button shall isolate all cooking appliances. These devices require to be strategically positioned. To ensure that they are not likely to be confused with other electrical control devices they are to be clearly labelled as to use and function.

The locations of the emergency cut-out buttons shall be agreed and approved by the station fire officer, statutory provisions and where not safety critical, the landlord.

An individual contactor shall be installed to isolate the electrical supply to each cooking appliance that requires control by the emergency cut-out system. A single contactor switching the retail facilities incoming supply is considered inappropriate primarily due to the need for other supplies to remain unaffected, such as lighting.

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Contactors shall be located in the retail facility's electrical cupboard adjacent to the supply switchgear and be clearly labelled, detailing the cooking appliance concerned.

Gas supplies to cooking equipment shall be controlled by a single solenoid valve on the retail facilities incoming gas supply.

Automatic isolation of the supply (gas or electric) to cooking appliances shall also be provided for the following functions:

- When the dedicated kitchen extract ventilation ductwork fire suppression system is activated.
- When the dedicated kitchen extract ventilation ductwork fire suppression system is activated the supply to the cooking equipment concerned must be automatically disabled.
- When the extract fan of a dedicated kitchen extract ventilation system is not on or a fault cause the fan to stop the supply to the cooking equipment concerned must be automatically disabled.
- On activation of any fire alarm device within the retail facility the supply to all the cooking equipment in the kitchen must be automatically disabled.

Note that the supply to lighting etc. must remain unaffected on activation of any of the above kitchen cooking equipment automatic isolation systems. The installation of an emergency cut-out push button system does not detract from the need for local isolation switches on the power supplies to appliances.

Only on restoration to normal operational conditions shall it be possible to reset the supplies to the cooking appliances (i.e. extract fan running/fire alarm system re-set) Re-instatement of the supplies shall be by manual reset at each individual contactor/gas solenoid valve. It shall not be possible to bypass the safety interfaces.

ES.2.29 CONSIDERATION OF FUTURE MAINTENANCE & SAFETY

Tenants and their principal designers should ensure the requirements of the CDM regulations are adhered to in respect of life cycle maintenance ensuring the facility can be maintained safely, economically and to a high standard.

ES.2.29.1 CE MARK

All equipment installed within Retail units shall be fully tested and fit for purpose. Equipment must bear the CE Mark where purchased within the European Union (EU). For equipment purchased from countries outside the EU where a CE Mark has not been provided, assurances shall be given to NR(HS)l that it conforms to similar tests as those covered by the CE Mark.

ES.2.29.2 BUILD-UP OF DUST IN CEILING VOIDS

Ceiling voids shall be designed to allow for future access for maintenance and cleaning. Build up of dust around luminaires and transformers can become a future fire and health hazard. The retail unit operators should instigate a policy of regular inspections. Unnecessary activation of the fire Alarm system is a huge inconvenience and it is NR(HS)'s aim to minimise these. A managed cleaning regime could avoid them.

ES.2.29.3 PURPOSE BUILT CABINETS WITH INTEGRATED ELECTRICAL APPARATUS.

Purpose built cabinets shall be designed with safety in mind and with consideration of heat build-up. Forced air solutions have been used in the past but these have been prone to failure due to blocked filters and poor maintenance. Merchandise has been displayed too close to the lamps resulting in heat damage to the merchandise and risk of fire. Termination of wiring and connections to inbuilt luminaires shall be to the same standard as that expected in the rest of the retail unit.

2.0 ELECTRICAL SERVICES

ES.2.30 FIRE ALARM SYSTEMS

All retail facilities require public address and automatic fire detection cover. The fire alarm installation shall comply with all requirements of BS 5839-1:2017 and BS EN 54- 2:1997+A1:2006.

Tests must be carried out to ensure that alarm audibility requirements are achieved.

ES.2.30.1 FIRE ALARM SYSTEM AS AN EXTENSION OF THE STATION BUILDING'S SYSTEM

The retail facility's fire alarm system shall be an extension of the station building's system. The point of works demarcation between the retail facilities incoming services installation and the tenant's fit out works shall be at a junction box/tenant fire alarm panel located in the retail facility.

The Tenant shall extend the system to cover the complete retail facility from the system extension junction box/tenant fire alarm panel. No extensions or joints to the station building's public address voice alarm loudspeaker circuits are allowed other than at the system extension junction box provided by NR(HS). The system must be fully tested by the Station fire alarm/PAVA contractor who will undertake a full commissioning test of the installation prior to connection into the main fire alarm/PAVA system. On connection into the main system a full cause and effect test will be undertaken prior to final completion of work.

ES.2.30.2 FIRE ALARM SYSTEM INTERFACES

Where system's interfaces apply, circuit provisions at the fire alarm system extension junction box shall be made as part of NR(HS)'s retail facilities incoming services to enable the necessary connections by the retail facility tenant's fit-out contractor.

ES.2.30.3 SMOKE DETECTION

All areas of the retail facility require smoke detection including office, store and electrical cupboard. Ceiling void smoke detection is required where the void is 800mm or greater in depth. Additionally, ceiling void detection shall be installed where plant and equipment are housed within the ceiling void as this represents a fire risk.

Any detector should be easily accessible, for testing and for inspection in the event of an alarm signal. They should never be placed above sections of ceilings which may restrict quick access.

London St. Pancras Highspeed

2.0 ELECTRICAL SERVICES

ES.2.30.4 FIRE ALARM BELLS OR SOUNDERS

With the exception of where voice alarm applies, alarm by means of bells or sounders, as appropriate, is required throughout the retail facility area. Requirements shall be determined by NR(HS) on a project specific basis as part of the fit-out works and the proposed location must have been agreed and recorded on the drawings attached to the Detailed Design Letter of non-objection. Tests must be carried out to ensure that alarm audibility requirements are achieved.

ES.2.30.5 CALL POINTS

Call points may be required within the units as part of the fire evacuation strategy. Consideration should be given to escape distances. It may be possible not to install call points in the public areas if call points are located in staff controlled areas and travel distances are met. If a particular fire risk is present, such as kitchen or cooking areas, an additional call point will be required even if one is available external to the unit.

The location must have been identified in the drawings attached to the Detailed Design Letter of non-objection and if a free-standing post is required, it must be as per the drawing in the London St. Pancras Highspeed Guide: Retail Works.

ES.2.30.6 PUBLIC ADDRESS VOICE ALARM

There are instances where additional loudspeakers are not required in the retail facility in order to achieve the audibility requirements and these tend to be when:

- The retail unit has an open grid suspended ceiling where there are existing loudspeakers.
- The retail facility's public area is small and there are existing loudspeakers in close proximity in the station concourse or has no internal public circulation section.

The number of loudspeakers required to provide clear audibility is dependent on ambient noise levels and area acoustics. Generally, a loudspeaker will be required for every 36 sq. meters with a minimum of one pair of loudspeakers evenly distributed per retail facility. Loudspeaker layout spacing should not exceed six metres with the norm being twice the floor to ceiling height.

PAVA loudspeaker circuits are classified fire alarm circuits and therefore require to be carried out in fire survival cabling. This cabling shall be the same as that of the station system.

Retail facility's audibility requirements could dictate that more than two loudspeakers are required in which case the loudspeakers must be circuit interleaved between different amplifier circuits. NR(HS)'s incoming services circuit extension provisions to each retail facility enables loudspeaker circuit interleaving by the Tenant.

The new installation will be fully tested prior to handing over to the Station PAVA system contractor who will commission the new installation prior to final connection into the main system.

ES.2.30.7 PUBLIC ADDRESS SYSTEMS

Clear audibility of public address announcements throughout the public areas of retail facilities is essential. Retail facility public address loudspeaker installations shall be extensions of the station building systems. As part of NR(HS)'s incoming services to retail facilities, provisions are made to enable the extension of the area loudspeaker circuits into the retail facility by the tenant.

2.0 ELECTRICAL SERVICES

ES.2.30.8 RETAIL FACILITY MUSIC SYSTEM

A retail facility's music system must be interfaced with the station building's public address system to automatically silence the music during public address announcements.

Should a retail facility have a background music system, this requires to be interfaced with the building's public address system to automatically temporary silence the music system during public address announcements. Portable music players and systems that allow unauthorised staff to tamper with volume controls are not allowed. The music system should incorporate a control input that accepts a volt-free contact from the interface unit to mute its output. The interface unit should preferably be located adjacent to the retail facility's public address system circuit extension junction box.

Where a music system applies, the fit-out works shall include a local power supply and public address system interface connection to interrupt the music system during public address announcement.

The system's interface unit shall be clearly labelled 'Public Address Interface' and located in an accessible location. A tenant's music system should not 'carry' sound to adjacent zones or the concourse.

ES.2.30.9 COMPANY EARLY WARNING

A company early warning system operates in some station buildings, this public address system enhancement enables station management to inform station staff of specific incidents and corresponding required actions.

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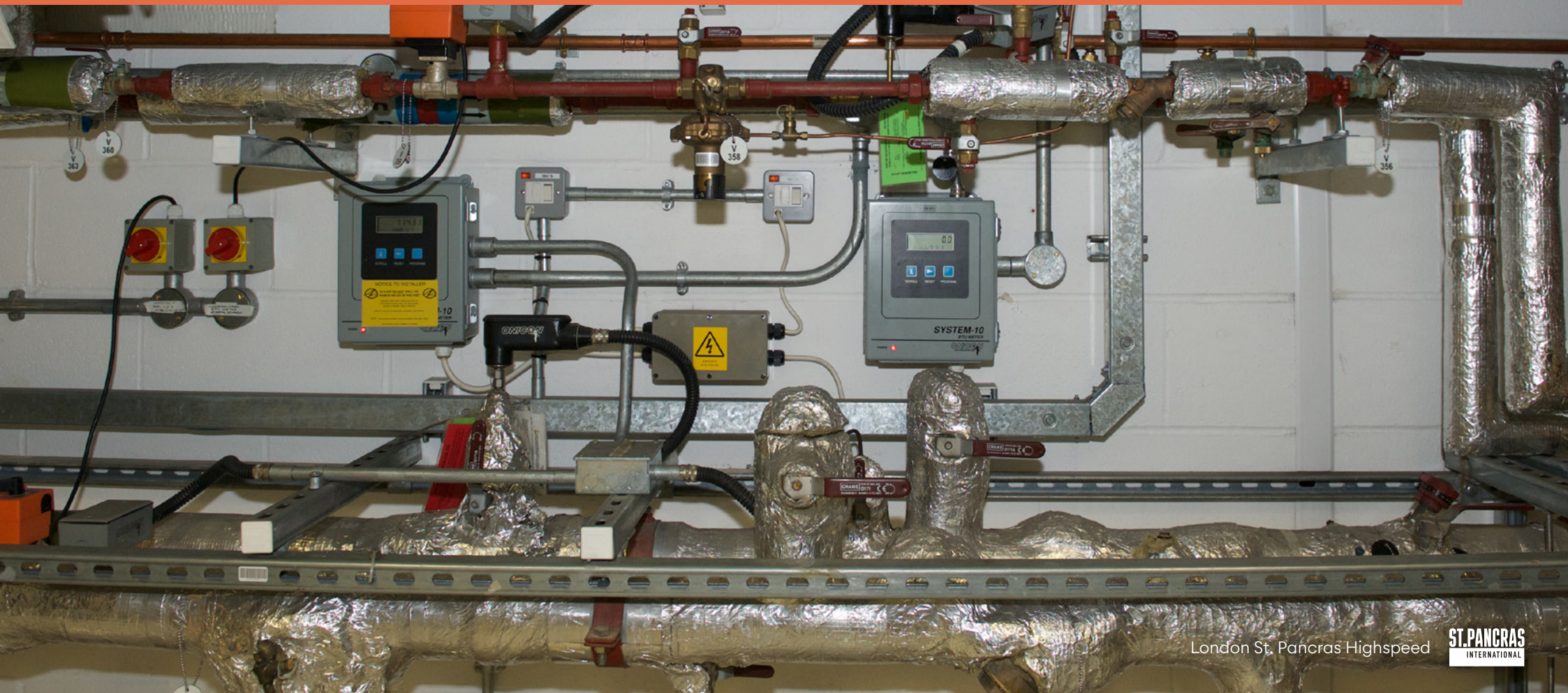
3.0 MECHANICAL SERVICES



3.0 MECHANICAL SERVICES

MS.3.1 SCOPE & CAPACITY

Information on the Retail shell and core services extent, size, capacities and operating constraints will be conveyed to the tenants fit-out designer/contractor by completion of data sheets examples of which are available from London St. Pancras Highspeed Retail project manager.

If the station services design strategy requires the tenant to install equipment or distribution pipework outside the retail space the location, routes and space restrictions for these will, once agreed in principle with London St. Pancras Highspeed, be clearly shown on drawings attached to the data sheets. Examples of where this is necessary are: -

- Kitchen extract ductwork and fans.
- Condensers and refrigerant piping for split packaged air conditioners.
- Condensers and refrigerant piping for chilled food storage and display units.

Retail shell and core services should be terminated at demise line of the retail facility. The HVAC equipment provided by the tenant must comply with primary services design strategy.

Electrical supplies to all HVAC equipment installed under the fit-out must be fed from the Tenants distribution board and metered supply.

MS.3.2 ENERGY MANAGEMENT & EFFICIENCY

The fit-out installation must be designed and installed to be efficient in the use of energy. Systems that allow simultaneous heating and cooling to occur must not be used. Time controls must be provided for all heating, cooling and domestic hot water heating systems and configured to prevent these systems operating when the retail facility is unoccupied.

3.0 MECHANICAL SERVICES

MS.3.3 VENTILATION

An outdoor air supply will normally be provided for all retail spaces via a ducted fresh air and extract system. The fresh air supply will be filtered and tempered to avoid any thermal load on the retailers cooling and heating installation.

Where air handling systems are provided as part of the retail fit-out installation they must be designed and installed to operate safely under fire conditions. An air handling system can be defined for this purpose as any system with an air handling unit and/or extract fan. Fan coil units or other recirculating fan system will be configured to turn off in a fire condition.

Guidance for the control of air handling systems in fire conditions are described in section MS.2.6 of this standard.

MS.3.4 DESIGN STRATEGY FOR CATERING AREAS VENTILATION SYSTEMS

All catering outlets must be provided with separate dedicated extract ventilation systems for cooking and kitchen areas. Extract systems will normally be provided by the tenant under the fit-out of the facility so that they are fully responsible for operation and cleaning. Full accordance with TR19 is required. Permanent access to cleaning doors at 1500mm centres shall be included. The design of Retail shell and core services will not inhibit the tenant's ability to comply with these requirements in any way.

Kitchens and cooking areas must be located where it is possible to provide extract ventilation systems that can exhaust to the outside without long duct runs and the design must ensure that standards for extract ventilation systems are not compromised by inappropriate siting of cooking facilities.

A strategy for routing ductwork to the outside of the building and the siting of extract fans will be established by the Retail services designer in conjunction with Network Rail. Tempered fresh air systems must be provided to replace air removed by extract systems. Replacement air must not be drawn from concourses or any other area of the building unless the ventilation systems for those areas have been specifically designed to provide this. Ventilation and comfort cooling systems may need to be provided for the ancillary areas associated with catering facilities such as toilets, locker rooms and administration offices.

Recirculation/Filtration type cooking hoods alleviate the onerous obligations of installing and maintaining kitchen extract ductwork, however they bring their own risks from poor maintenance and insufficient control measures, Recirculation hoods are considered viable only for low risk cooking operation and this does NOT include deep fat frying of any description.

Fixed fire suppression meeting UL300/BRE requirements will be required where high risk cooking takes place or at the discretion of NR(HS) and/or the station fire strategy.

The provision of any services for these areas should be to meet the specific requirements of the catering tenant as well as meeting station guidelines.

3.0 MECHANICAL SERVICES

MS.3.5 METERING

Gas and water (heating/cooling + potable) supplies must be energy metered.

Meters will be provided at the demise of each catering facility, as part of the Retail shell and core services installation, to measure the consumption of gas and each water service separately. Meters must be easily accessible for reading and must not be obstructed by the fit-out. Isolating valves will be provided on both the inlet and outlet of each meter.

MS.3.6 DRAINAGE & LEAK DETECTION

Drainage must be installed to meet Technical Guidance Document H Drainage and Wastewater Disposal in accordance with the Building regulations.

Where vacuum systems are installed, they should meet the requirements of I.S. EN 12109: 1999 Vacuum drainage systems inside buildings or I.S. EN 1091. St. Pancras International is fitted with Vacuum drainage and tenants will be required to design and install in accordance with this. Areas with raised or hollow floors will require the provision of leak detection via constant monitoring devices with an audible alert signal. To be placed in concealed areas and at likely failure points, the use of remote alert sounders may be required.

Bunding will be required around stored water devises and might also be required around passing services.

MS.3.7 GREASE INTERCEPTION

The drainage system must be designed and installed to ensure grease is not discharged into the station's drainage system. Grease interceptors must be provided by all catering tenants to prevent grease entering the building's drainage system.

Grease interceptors are to be installed on the outlet of all pot wash and pre-rinse sinks as a minimum and are to have the following features: -

- Automatic grease separation and removal to container.
- Strainer to separate solids.
- 90% minimum grease removal efficiency.
- Be under both planned and reactive maintenance contract to ensure compliant operation.

3.0 MECHANICAL SERVICES

MS.3.8 PACKAGED AIR CONDITIONERS & COOLING EQUIPMENT

The condensing units for split packaged air conditioning and food storage units must be located in an external position designated for this purpose. Each condenser must be labelled by the retailer to indicate its function and the area served. Cooling coils must be provided with drip trays as for fan coil units.

MS.3.9 CONTROLS

All controls necessary for the functioning of station units and/or packaged equipment must be provided by the tenant. Sensors for air temperature must be located where they can accurately measure the conditions in the retail unit and are not covered by shelving or displayed goods, e.g. in recirculation ducts to fan coil units or extract ductwork from the space.

Time controls must be provided to enable all plant and equipment installed in the retail unit to be shut down when the unit is unoccupied.

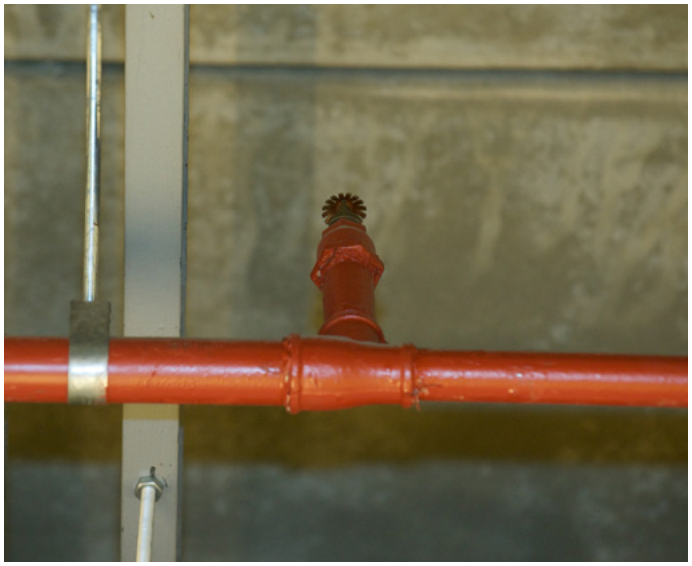
There is no need for the retailer's heating, ventilating and air conditioning systems to interface with the station Building Management System (BMS).

MS.3.10 SPRINKLER SYSTEMS

Sprinkler protection must be provided as required by the specific Fire Safety Strategy for that building.

The tenant must provide the retail facility with sprinkler protection. Sprinkler installations must comply with BS EN 12845:2015 and the LPC Rules. The hazard classification must be Ordinary Hazard Group 3 to Life Safety Standard. All sprinkler heads must be of the fast response type with an RTI less than 50.

Sprinklers must be installed by LPS 1048 Certificated Installers and an LPS Certificate of Conformity issued for all installations.



3.0 MECHANICAL SERVICES

MS.3.11 FLEXIBLE DUCTWORK

The use of flexible ductwork must be limited to the final connections to grilles and diffusers and shall not exceed 1.5m in length. All grilles and diffusers must be independently supported, not from the ceiling grid unless it has been specifically designed to do so.

Where flexible ductwork is used to connect high velocity station devices it must be attenuated to prevent noise breakout.

MS.3.12 NOISE & VIBRATION

The retail fit-out installation must not increase the noise level in areas outside the retail space. The transmission of both airborne noise and vibration from installed plant and equipment must be attenuated. Any plant installed remotely from the retail space (e.g. roof mounted fans, air conditioning condensers) must not compromise noise levels locally.

Station building noise level criteria are given below.

CRITERIA FOR NOISE FROM MECHANICAL SERVICES	
Station Area	**DBA**
Main concourse	45
Mezzanine or upper level	55
Retail unit	45
Catering unit	45
Staff Support Area	
Service corridor/delivery route	60
Staff rest room	40
Store area	50
Food prep area	40

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3.0 MECHANICAL SERVICES

DESIGN PRINCIPLES

MS.3.13 COOLING & HEATING

Design solutions and their applications for heating and cooling of retail facilities will be established in the room data sheets.

Possible solutions are: -

- Direct electric heating is not acceptable.
- Chilled water from central plant provided as a primary service for the Tenant to install fan coil units in the retail space. This will be the solution where a supply of primary chilled water with adequate capacity is already available.
  The central plant can be either the buildings general cooling system or plant dedicated for retail facilities.
- Condenser water provided as a primary service for the Tenant to install packaged water-cooled air conditioners in the retail space. This is an acceptable solution where a supply of condenser water is available from an existing cooling tower or evaporative condenser. Check with London St. Pancras Highspeed project manager at concept stage.
- Split packaged air conditioning units or heat pumps installed by the Tenant. This might be an acceptable solution only where it can be demonstrated that the provision of primary chilled water either from existing plant or new dedicated plant is not cost effective and the installation does not have a harmful impact on the Grade I listed building. Condensing units must be remote. Such installation will require consent from heritage stakeholders and must be discussed very early on with London St. Pancras Highspeed retail project manager.

LTHW heating from NR(HS) central plant is a primary service for connection to fan coil units within the tenanted areas.

MS.3.14 INTERNAL DESIGN CONDITIONS

Retail facilities should be designed to meet the conditions shown in the table below. But this guide is best practise and some retail locations may deviate due to their location in the station and their necessary design/function.

INTERNAL DESIGN CONDITIONS			
Area	Design Temperature C		Humidity
	Summer	Winter	% Saturation
Catering seating area	23	21	60 max
Retail unit	23	21	60 max
Rest rooms	23	21	60 max
Toilets	24	20	-
Storage area	-	16	-

Retail fit-out systems must be designed to match the capacity of the retail facility and no thermal load is to be transferred to adjacent concourses or any other area of the building unless the systems for those areas are deemed to be able to accept this.

3.0 MECHANICAL SERVICES

MS.3.15 SMOKE CONTROL SYSTEMS

All smoke ventilation systems are to be compatible with the fire engineering strategy for the building. Smoke ventilation system will normally be provided as part of the Landlord obligations.

The Retail fit-out must not compromise smoke extract strategy.

MS.3.16 SPRINKLER SYSTEMS

The general requirements for the design of sprinkler systems are described below.

MS.3.16.1 SPRINKLER INSTALLATIONS

The provision of sprinkler systems, their classification and whether they are to be property protection or life safety systems must be assessed as an integral part of the fire protection strategy and means of escape for the building.

Sprinkler systems must be designed and installed in accordance with the LPC Rules and BS EN 12845:2015. Fast response sprinkler heads with an RTI less than 50 must be used in all systems. An LPS 1048 certificate must be obtained for every installation.

Sprinkler protection must be provided in all retail shops and catering areas, designed for Ordinary hazard Group III to life safety principles as described in the LPC Rules.

MS3.16.2 INSTALLATION IN RETAIL FACILITIES

Sprinkler heads installed in open type ceilings must be fitted with baffle plates of a size determined by the sprinkler designer. The fusible element of the sprinkler head should be sited so that it is between 75 and 150mm below the baffle plate.

The tenant must ensure that the sprinkler spray pattern is not obstructed by shop fittings or displayed goods. At least a 500mm clear space must be maintained between sprinkler deflectors and any permanent or temporary obstruction e.g. shop fittings, shelving, display signs or goods.

No isolating valves are to be installed in the sprinkler system other than those specified in this standard.

No sprinkler system or zone is to be shut down without the written approval of NR(HS).

3.0 MECHANICAL SERVICES

MS.3.17 PROVISION FOR CATERING AREAS VENTILATION SYSTEMS

Systems should be designed to deliver the ventilation rates identified by the catering tenant for whom the facility is being provided. Ventilation rates for ancillary areas should be designed to meet normal health and comfort requirements.

The Retail shell and core services designer will ensure that all central air conditioning and ventilation systems in the same fire zone as any catering facility are configured to operate in the event of fire.

All central air handling systems not in the same fire zone as the catering facility, but whose fresh air inlets are sited where there is any risk of smoke or fumes re-entering the building from a fire in the catering facility, must be configured to operate in the same way.

MS.3.18 AIR HANDLING UNITS

The requirements for the control of air handling systems in fire conditions are described below:

- Air handling/Recirculating plant will be interfaced via the fire alarm system and will shut down in a fire activation.

- Plant may only be reinstated upon full reset and reinstatement of the fire alarm system.

MS.3.19 FAN COIL UNITS

All fan coil units for either chilled water or direct expansion systems are to be provided with a condensation tray that extends under the full width of the cooling coil, the return tube ends and the control valve assembly. Condensation trays must be correctly installed with falls to the drain connection.

The drainage pipework from the tray must be run to discharge over a tundish located in an accessible position and the condensate drainage pipework connected to the primary service pipe provided. Condensate drains from fan coil units should be discharged to the foul drainage system via traps with a seal depth of at least 150mm.

Where plastic hoses are used to connect to the fan coil drain tray, they must not exceed 1.0m in length and be fully supported. Fan coil units must be installed with easy access for the replacement of air filters. Fan coil units should be sited so that routine maintenance can be carried out without disturbing retail activities. Where at all feasible access should be outside the retail space.

3.0 MECHANICAL SERVICES

MS. 3.20 GAS SUPPLY

Gas supplies when available may be provided only for catering facilities and where they can be installed in accordance with the Gas Safety Regulations. Gas installations shall comply with the following:

- The Gas Safety (Installation and Use) Regulations 1998, Approved Code of Practice 76(L56) HSE.
- Institution of Gas Engineers, IGE/UP/1 - Soundness testing and purging of industrial and commercial gas installations.
- Institution of Gas Engineers, IGE/UP/2 - Gas installation pipework, boosters and compressors on industrial and commercial premises.

All pipework shall be run in ventilated and easily accessible areas. Gas must not be run in public areas. Gas fired hot water generators are to be installed in plant rooms. Fail safe, manual reset, gas shut-off valves must be provided which operate automatically from heat detectors positioned over the equipment and emergency shut-off buttons located at exits to the plantroom. Safety controls must comply with the requirements of BS 6644:2011. Gas supplies to kitchens must be provided with automatically operated fail-safe, manual reset, shut-off valves and shut-off buttons.

Safety controls for gas fired catering appliances must comply with the requirements of BS 6173:2019. The shut-off button or device must be located adjacent to the main escape route from the cooking area, clearly labelled and accessible even in the event of a fire.

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3.0 MECHANICAL SERVICES

MS.3.21 DOMESTIC HOT & COLD-WATER SERVICES

Hot and cold-water services will normally be provided only for catering facilities. The following services may be provided: -

- Potable water
- Cold water down service
- Domestic hot water flow and return.

There are a number of standards and guides which apply to water service systems (in addition to the Water Supply Byelaws) with which the tenant and his services designer and installer must be familiar with. These are primarily aimed at avoiding the wastage and contamination of water. The hot and cold water installation must comply with these standards the principal ones being: -

- BS EN 806-2 &-3 and BS 6700:2006 - Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.
- Water Research Council publication - Water Fittings and Materials Directory.
- CIBSE Technical Memorandum TM13 - Minimising risk of Legionnaires' Disease.
- Health and Safety Executive publication L8 - The control of legionellosis including legionaires' disease.

The water services installation must not in any way restrict the ability of the tenant to comply with Approved Code of Practice: The prevention or control of legionellas is as published by the Health and Safety Commission. CIBSE Guidance Note GN3:1993 describes designers and installers responsibilities in this respect.

MS.3.22 HOT WATER SERVICES

The requirements for design and installation are: -

- No Dead legs permitted.
- Distribution system must maintain circulated water at not less than 55 °C.
- Water stored in calorifiers or water heaters to be maintained at not less than 60 °C.
- Distribution pipework to be kept to the minimum to avoid unnecessary heat loss.
- Safety devices to be fitted to prevent scalding or over pressurisation.
- Isolating valves installed to enable system and connected equipment to be maintained.
- Accurate information on the system and its operation to be handed to the user on completion of the installation.

Hot water taps must be labelled with a warning notice where the water temperature gives rise to a risk of scalding, (guidance suggests 60°C). Where primary services have been provided for the tenant the temporary bypass valve must be shut by the services fit-out contractor when commissioning the system.

3.0 MECHANICAL SERVICES

MS.3.23 POTABLE & COLD-WATER SERVICES

The requirements for design and installation are: -

- Water storage sealed and have screened vents and overflows.
- Distribution pipework and storage tanks insulated to prevent water temperatures exceeding 20°C.
- Storage tanks accessible for cleaning and disinfection.
- Potable water outlets to be clearly identified.
- Isolating valves installed to enable system and connected equipment to be maintained.
- Accurate information on the system and its operation must be handed to the user on completion of installation.

The water services installation must not in any way restrict the ability of the tenant to comply with Approved Code of Practice: The prevention or control of legionellas is as published by the Health and Safety Commission. CIBSE Guidance Note GN3:1993 describes designers and installers responsibilities in this respect.

MS.3.24 WATER QUALITY

If the tenant requires this to be softened or treated, they must provide the necessary equipment to do this.

MS.3.25 DRAINAGE/SANITATION

The tenant's drainage installation must be provided with adequate access points to allow internal cleaning of all parts of the system. Access points must not be obstructed by kitchen equipment or shop fittings. Ventilation of systems are to be natural wherever possible. The use of air admittance valves must be minimised.

Above ground drainage systems must be submitted to an air pressure test to a positive pressure of at least 40mm water gauge for a minimum period of 5 minutes.

Sanitation systems must be installed so that stresses of expansion and contraction, due to temperature variation are not transmitted to the drainage installation provided as part of the primary services installation. Pipe joints must not be embedded in walls, floors or structures. Station pipes must remain accessible for rodding and maintenance.

3.0 MECHANICAL SERVICES

MS.3.26 MATERIALS & INSTALLATION

MS.3.26.1 PIPEWORK

Potable and domestic water service pipework must be installed to minimise the risk of microbiological contamination. Long dead legs to infrequently used draw off points must be avoided. All main and sub-circuits must be provided with regulating and isolating valves.

All retail fit-out equipment served by circulating water systems is to be provided with isolating valves. Where more than one station unit is provided, regulating valves are to also be provided for each unit. In large retail units with sub-circuits in the pipework system, isolating, regulating and commissioning valves are to be installed so that each circuit can be balanced.

Pipework must be installed so that it accessible for inspection. No joints are to be formed in the thickness of any wall, floor or ceiling.

Pipes must be adequately supported and allowed to move freely to accommodate thermal expansion without undue stress on fixings or equipment to which it is attached. Provision for expansion should be made by changes in the direction of pipework to utilise the natural flexibility of pipework and avoid the necessity for expansion compensators.

Pipe sleeves must be fitted where services penetrate walls and floors and appropriately fire stopped. All pipework penetrations through floors must have pipe sleeves fitted with puddle flanges projecting at least 100mm above the floor so that the penetration is watertight. Drain cocks and air vents must be provided to allow the fit-out installation to be filled and drained independently of the primary services installation. Automatic air vents must be piped to discharge into a permanent drain in a visible, frost free location.

MS.3.26.2 DUCTWORK

Ductwork is to be manufactured and installed to HVCA Specification DW144. Ductwork must be installed with electrical continuity throughout to comply with the IEE Regulations (BS 7671:2018).

Where the Fit-out installs ductwork that passes through a fire barrier a fire damper must be correctly installed into the fire compartment wall or floor following the manufacturer's recommendations for fire integrity. A factory fitted sub frame should be provided to allow duct movement and prevent overstressing of the fixings in the event of a fire in accordance with HVCA specification DW 144 or DW 143. The method of fixing fire dampers to dry lined walls must be fully integrated with the support system for the wall, so that the wall and damper assembly will maintain the fire rating specified, under fire conditions, with the additional load imposed by the connecting ductwork.

Fire dampers must have a fire resistance of at least the fire resistance of the fire compartment element in which they are installed when tested in accordance with BS 476-23:1987.

3.0 MECHANICAL SERVICES

MS.3.27 PUTTING INTO SERVICE

All ductwork is to be clean before it is put into service. The normal level of cleanliness and protection to be provided during installation is to be intermediate as defined in HVCA DW/TM2 Guide to Good Practice - Internal Cleanliness of New Ductwork Installations.

All pipework should be hydraulically tested to at least one and a half times the maximum working pressure of the system. The test pressure should be maintained for a minimum period of four hours without loss of pressure.

All new pipework installations are to be flushed and cleaned in accordance with CIBSE Commissioning Code W and BSRIA Application Guide BAG08/91 before putting into service.

Cold water down service, mains cold water, domestic hot water, treated hot water, treated cold water and sprinkler systems must be disinfected before being put into service in accordance with the requirements of BS EN 806.

Disinfection must include all water storage tanks, cisterns, calorifiers and water heaters.

Following the sterilising procedure and after the systems have been flushed and refilled, test samples for bacterium and chlorine residue must be taken and recorded.

All heating and chilled water pipework are to be treated internally, before commissioning, firstly to remove corrosion products and then to inhibit corrosion.

Following the cleaning procedure and after the systems have been refilled and dosed, test samples are to be taken as required by BAG08/91 Table 4 - Acceptable limits for sample water test results. The project manager will require evidence that the systems have been adequately flushed and chemically cleaned before permitting primary services isolation valves to be opened.

All contaminated water drained from systems must be discharged to meet local authority and water company requirements or removed from site and disposed of responsibly.

No new pipework should be connected to an existing system without the authority of the relevant NR(HS) SPM who will require evidence that it has been adequately flushed chemically cleaned and sterilised. The existing system must be fully isolated during flushing and cleaning.

MS.3.27 PUTTING INTO SERVICE

All balancing dampers, fire dampers and duct mounted sensors and controllers must be accessible for adjustment and maintenance. Fire dampers must have visual status indicators and access doors provided for inspection. Cleaning doors for catering and fast food outlet extract systems must be provided.

Isolating and regulating valves must be located in easily accessible locations. All pipeline components that require inspection or maintenance (e.g. strainers, air vents, drain cocks) must be installed so that they can be easily reached.

3.0 MECHANICAL SERVICES

MS.3.29 THERMAL INSULATION

Thermal insulation is to be specified and installed in accordance with BS 5422:2009 and BS ISO 7617-1:2001

- Pipework Thermal insulation must be applied to all chilled, heating, refrigeration, hot water and cold-water pipework and equipment to control energy losses and condensation risk.

- Ductwork Thermal insulation must be applied to supply and recirculation air ductwork where the in-duct air temperature is significantly above or below the surrounding air temperature to prevent energy losses, and all unheated fresh air ductwork to avoid condensation.

- Materials Thermal insulation, its surface finishes and claddings, and all adhesives, coatings, surface finishes, mastics, sealers and primers used in the application of thermal insulation, must have as a minimum the following properties when installed and operating at the service conditions for which it has been specified:- Fire propagation BS 476-6:1989 +A1 2009 Surface spread of flame BS 476-7:1997, Class 1 Building Regulations 1991 Part B, Class 0; and Ignitability BS 476-12:1991, Not ignitable against when tested against ignition sources A and B.

Where insulation passes through fire compartment walls it must be classified under as BS 476-4:1970 Non-combustible and must be installed to provide at least the same fire resistance as the wall. All insulation must be entirely compatible with the material of the surface to which it is applied. All insulation materials must be completely free of asbestos or any other material which is known to have a health risk. Supports for services having vapour sealed insulation must not penetrate the insulation or vapour barrier.

MS.3.30 IDENTIFICATION

All pipework must be identified in accordance with BS 1710:2014 with colour banding 150mm wide either side of a 100mm wide band of the code indication colour. The contents of each pipeline must be indicated in 25mm high lettering clearly contrasting with the colour banding. All valves must be provided with a label to denote its function and on large installations the area it serves.

Ductwork systems are to be identified in accordance with Appendix B of HVCA Specification DW144. The following information is to be indicated on every identification symbol:

- The description of the air handling plant.

- The air handling plant number as defined on the primary ductwork.

- Whether an extract duct is exhaust, extract or recirculation.

- The area served by zone branch ducts. All plant must be clearly labelled.

External remote plant such as condenser must be labelled by the retailer to indicate its function and the area served.

3.0 MECHANICAL SERVICES

MS.3.31 COMMISSIONING AND TESTING

All mechanical systems must be fully tested by a competent person, and systems certified as required.

4.0 STRUCTURAL

London St. Pancras Highspeed

4.0 STRUCTURAL

MANDATORY REQUIREMENTS

S.4.1 SCOPE

This section covers loading criteria, performance requirements and constraints associated with elements of structure within the retail enclosure.

Note: consent may be required from London St. Pancras Highspeed and heritage stakeholders and early consultation is required.

S.4.2 STRUCTURAL DESIGN RESPONSIBILITIES

The Tenant fit out contractor with their designers and suppliers have the responsibility to ensure the structure, materials and installation meet with the requirements of this standard. They must employ the services of a Charted Structural/Civil engineer to advise and oversee all matters relating to the safe structural performance for their element of work.

In addition, a structural review or appraisal must be carried out, submitted for independent verification by an appointed NR(HS) framework Structural Consultant, in the following situations:

- When a structural modification is proposed to an existing enclosure i.e., new/removal/relocation of walls, provision of new service penetrations.
- Loads exceed the stated maximum defined in this document.
- Installation of heavy equipment and signs.
- Installation of equipment that may impart unacceptable dynamic response in other parts of the support structure, give cause to premature breakdown of materials and nuisance to occupants.
- Cutting chases into tenant screed.
- Core drilling through the station floor slab.

S.4.3 DESIGN & LOADING PROVISION IN LANDLORDS RETAIL ENCLOSURE

The following loading has been built into the design of the landlord's retail unit, for specific use by the fit-out contractor, loading must not be exceeded.

- Imposed floor load - 4 kN/m^2, 4.5 kN concentrated load.
- Fixtures and fittings attached to a wall (to account for localised lightweight displays e.g. pictures, posters) - 0.5 kN/m per run wall line (accounting for both faces).
- Floor finishes (75 mm thickness) * - 1.8 kN/m^2.
- Services and ceiling - 0.4 kN/m^2.
- Security roller shutter doors on the line of all open frontages. Load support reactions are assumed to be applied at each end of the opening-1.0 kN/m run.

*Caution Note: - The floor finish load allowance is not an "extra over" allowance where enclosures have existing finishes in place. The allowance will ONLY apply where an enclosure is void of a built-up finish and allowed for in the original Shell & Core build. Details must be checked with the provider of the enclosure.

4.0 STRUCTURAL

Raised platform floors must be designed to the imposed floor loading criteria given above. Protective barriers must be provided to prevent people falling where any part of a floor is raised more than the height of two risers (or 380 mm if not part of a stair). The height and design to meet the requirements of Approved Document B of the Building regulations.

TYPICAL BARRIER DESIGN LOADING	
- 0.74 kN/m	Horizontal line load considered to act at a height of 1100 mm above finished datum level
- 1.0 kN/m^2	Applied to infill
0.5 kN	Point load applied to any part of infill

Width segregation barriers within the width of stairs and ramps to be designed to meet a 1.5kN/m horizontal load.

S.4.4 DEDICATED PRIMARY GRID SUPPORT FRAMEWORK SYSTEM

The support system and design consist of single lines of continuous support made up from support member(s) running the full width or length of the enclosure on a grid spacing of 1800 mm centres. The support member is of a type that will:

Provide flexibility in hanger position along the member length.

- Be compatible with conventional ceiling and services suspension fixing systems.
- Accept secondary accessories and fixtures.
- Allow repeated re-use.

Aluminium materials have been excluded from use. The dedicated primary grid has been installed as high as possible above the services void, fixed directly to the structural soffit or framework supporting the floor/ roof of the building structure.

Structural framework floor/roof.

Continuous dedicated primary support system on an 1800 mm grid.

The support member has been designed to the loading criteria given in the table below. Loads have been treated as permanent dead.

LOADING CRITERIA FOR PRIMARY SUPPORT MEMBER & ANCHORAGE DESIGN	
Uniformly distributed load suspended off the member as point loads at 1200 mm spacing	0.4 kN/m^2 over the whole enclosure
Concentrated load to account for localised mechanical equipment or similar and for reason of safety in the event a person gains access.	0.9 kN
The single concentrated load must be so placed as to produce the maximum effect in the member or element a) Greatest member moment, shear b) Maximum anchorage load	
The member and its fixings must be capable of supporting the loads in a combined condition	

4.0 STRUCTURAL

S.4.5 PERMANENT INTERNAL NON-LOAD BEARING WALLS

The installation of new partitions or walls will need to have been agreed by means of a Detailed Design Letter of non-objection. New or replacement internal partitions must conform to the following category of duty and crowed pressure loading. Design, performance, methods of testing for strength and robustness must comply with BS 5234:1992 Parts 1 and 2.

Partition grades given in the table below are non-load bearing with no allowance other than that described in the British Standards for externally attachment loads.

LOCATION	GRADE	CROWDED PRESSURE
Public circulation areas - where there is difference in adjacent level	Heavy duty (HD)	3.0 kN/m
Public circulation areas - where there is no difference in adjacent level	Heavy duty (HD)	1.5kN/m
Non-public/limited public access areas	Medium duty (MD)	0.75 kN/m

Additional loads onto a wall for fixtures and fittings and security roller shutter doors defined in clause D.1.3 must be applied.

Partitions with external load attachments from signs, secondary cladding, equipment etc. must be appropriately designed and constructed to carry the loads. The requirements of this table still apply.

S.4.6 CLOSED ROOF & EDGE PROTECTION OVER RETAIL ENCLOSURES

The following design loading criteria has been used: -

- Closed roof - “no access other than that necessary for cleaning and maintenance”.
- Permanent roof edge protection.
- 0.36 kN/m horizontal load considered to act at a height of 1.1m above finished floor level.
- 0.5 kN/m^2 applied to any infill.
- 0.5 kN point load applied to any point of infill or rail.

S.4.7 CORROSION PROTECTION TO STEELWORK

Internal steelwork covered with a cladding, hidden or masked out from public view may be left unpainted unless required to be fire protected.

S.4.8 ELECTRICAL CONTINUITY OF STEELWORK

All exposed steel structures must be electrically continuous to ensure the equipotential requirements are met as required by BS 7671:2018 - Requirements for electrical installations - IEE wiring regulations.

- This requirement applies to any exposed steel member or framework where there is a likelihood of any physical contact.

5.0 APPENDICES

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5.0 APPENDICES – HOARDING

5.1 HOARDING SPECIFICATION FOR INTERNAL WORKS

RISK ASSESSMENT

Any construction or maintenance work carried out at the station must be separated from public area with the use of a suitable Hoarding or fencing system.

All proposals must be approved by NR(HS) and supported by a letter of non objection issued by the landlord, prior to installation.

- The type of system used will be dependent on the type and duration of the work being carried out. It should be dependent on the results of a risk assessment taking into account the type of work, duration and location.

- Some hoarding systems may be required to completely seal the site from the public for reasons of H&S, dust or noise. Any system used should be of uniform type and continuous and should not create a risk to any members of the public. Ad-hoc systems such as medical screens or barrier tape must not be used. Plastic/Polythene sheeting is not permitted, FireFly or similar LPCB product is required.

- The team responsible for the project or the maintenance work must identify the safety hazards and all other issues such as noise, dust.

5.0 APPENDICES – HOARDING

STRUCTURAL REQUIREMENTS

- The hoarding shall be designed to safely accommodate imposed loads.
- All loading calculations must be in accordance with the Temporary Works Procedure and comply with BS5975:2008+A1:2011 .
- The hoarding shall not impose any load upon, be mechanically fixed to, or suspended from any existing structure.

FIRE INTEGRITY

- The hoarding shall be designed to comply with the Building Regulations Approved Document B Vol 2, Appendix B, Table B1.
- All doors are to have an integral threshold strip to tie the base of the frame together. It should be fixed to the floor by the same method as the hoarding (typically non mechanical) and form a safe diminishing threshold.
- Doors will be inward opening.

SECURITY/ACCESS

- Hoardings shall form a continuous barrier around the site area to provide a secure working area with restricted controlled access points preventing both accidental and deliberate unauthorised access to the site area. Whilst hoarding may not rest or adhere to the building fabric, it must be positioned to prevent gaps of more the 20mm.
- All doors shall be fitted with overhead door closers to achieve positive self-closing. All access doors within hoardings shall be secured using a mechanical digital lock (i.e. mortice latch with internal lever to facilitate means of escape). Fixed leaves shall be secured by a by a Yale type, self-engaging night latch (fixed to the top of the door only; bottom bolts into the existing floor finish are not permitted). Padlocks, hasps and staples are not permitted. The code for the hoarding lock must never be identified on or around the hoarding.
  A framed barrier netting may be required to prevent items being thrown over the hoarding, the netting will be perforated and framed using a non combustible material. A solid firefly type material may also be acceptable subject to approval.

5.0 APPENDICES – HOARDING

CONSTRUCTION

- Generally internal Hoardings are to be free standing.
- Hoarding are to be erected and constructed so that mechanical fixings into the existing floor, wall and ceiling finishes are not required. Structural stability is to be achieved using changes in hoarding direction and internal weighted raking shores or shoes as appropriate.
- Where hoardings are placed on existing floor finishes or abut other concourse finishes a survey should be undertaken to ascertain the condition prior to the installation.
- The minimum height of the solid hoarding is to be 2400mm.
- Multi-layer Tac mats must be incorporated at all site working exits within the hoarding area to eliminate trafficked dust onto the public area. These must be maintained/ changed throughout the project period to maximise their efficiency.
- When erected, the hoardings shall have no protrusions, cracks, splinters, projecting elements, rough edges or changes in direction (both externally and internally) which pose a hazard to either the station user/customer/staff or the site operatives.
- Hoarding fixing shall not be obviously visible in the front face of the hoarding. All screws should be of suitable length to ensure that no sharp ends protrude through. All heads shall be countersunk.
- The hoarding shall be so designed that it may be both constructed and removed in a safe manner.
- Doors and access to the hoardings must match the finishes of the hoarding generally and co-ordinate with the security/design requirements.
- Safety signage and contact lists may be incorporated on the hoarding door once submitted to and not objected by London St. Pancras Highspeed. This must be limited to the minimum legal requirement.
- The Contractor shall be responsible for ensuring that the hoardings remain in good repair (including redecoration/repair as appropriate) throughout the length of the project. The Contractor should be able to show evidence of checks carried out.
- Graphics for hoardings must be approved by London St. Pancras Highspeed before installation. Any notice displayed on an elevation into the public area must have been agreed with London St. Pancras Highspeed/NR(HS).

APPROVALS

- Hoardings proposals shall be prepared prior to installation, including graphics were applicable.
- The proposals shall include design specifications, details, dimensional layout and programme phasing.

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