HOARE LEA

UCL BSU COMPLIANCE

BSU TEMPORARY WORKS

Y93 SERVICES SUPPORT AND SUSPENSION SYSTEMS

Audit sheet

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Y93 SERVICES SUPPORT AND SUSPENSION SYSTEMS

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100 REFERENCE DOCUMENTS

This specification is written based on legislation, standards and guidance in force in the UK generally, and within England by default. For projects in Scotland, Wales, Northern Ireland, the Channel Islands and the Isle of Man, give appropriate consideration to any locally applicable legislation, standards and guidance that deviates from or is additional to those in force within England. Similarly for projects outside the UK comply with the corresponding national legislation, standards and guidance.

Comply fully with the edition (including amendments, replacements and associated normative references) of each of the following, current at the time of tender:

Where a standard referred to in this section conflicts with a standard referred to in an associated 'engineering system' section (e.g. S10, S63, T31, V21, W63, Y10, Y30, Y52, Y60, Y62, Y63, Y89, etc.) of this specification, the standard referred to in the engineering system section prevails.

BS 476-24	Fire tests on building materials and structures. Method for determination of the fire resistance of ventilation ducts
BS 4078-1	Powder actuated fixing systems. Code of practice for safe use
BS 4078-2	Powder actuated fixing systems. Specification for tools
BS 8539	Code of practice for the selection and installation of post-installed anchors in concrete and masonry
BS EN 12236	Ventilation for buildings. Ductwork hangers and supports. Requirements for strength
BS EN 12385	Steel wire ropes. Safety
BS EN 13411	Terminations for steel wire ropes - Safety
BS EN 14713	Zinc coatings
BS EN 10210	Hot finished structural hollow sections of non-alloy and fine grain steels
BS EN 13501-3	Fire classification of construction products and building elements. Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers
BS EN ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods
BS EN ISO 10244	Steel wire and wire products. Non-ferrous metallic coatings on steel wire. Zinc or zinc alloy coatings
BS EN ISO 27830	Metallic and other inorganic coatings. Requirements for the designation of metallic and inorganic coatings
ISO 17893	Steel wire ropes. Vocabulary, designation and classifications
BESA DW/144	Specification for sheet metal ductwork
BSRIA BG 10/2010	Structural fixings for ductwork systems
BSRIA COP 22/2002	Wire rope suspension systems. A code of practice for service installers
HSE ACOP L113	Safe use of lifting equipment: Lifting Operations and Lifting Equipment Regulations 1998
CFA GN	Construction Fixings Association (CFA) Guidance Note: Procedure for site testing construction fixings

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200 GENERAL ITEMS

The external AC unit supplying Central Building 17 shall be located on a temporary steel structure located in Malet Place.

Structure will be capable of supporting the load of the cooling unit approx 1500kg and associated ductwork as well as two number maintenance staff. A deck shall be constructed to allow an accessible route underneath the platform from the existing fire escape indicated on the drawings. A tower structure will be required to support the ductwork route up to the second floor louvre level. All required hand rails and toe guards shall be provided. A solid screen shall be placed on the elevation facing the existing building and on the elevation facing down Malet place to reduce noise. Access ladders shall be lockable to avoid public or unauthorised access to the platform.

Fixings can be achieved through the building louvres into plant areas for stability but connections to brick building fabric should be avoided if possible.

Refer to main contract documents for full builderswork specificatoion.

Provide for the support and/or suspension of services and the safe transfer of services dead load and dynamic load to the building structure. Support means holding in place from below the horizontal under compression stress and/or bending stress. Suspension means holding in place from above the horizontal under tension stress and/or bending stress. Allow for all shear stress and lateral loadings as may occur subject to physical arrangements implemented.

The transfer of supported and suspended loads must not adversely affect either the structure or fabric to which it attaches, nor the performance of the service being supported or suspended.

All support and suspension systems must ensure both the initial and ongoing safety of the supported and/or suspended services.

The support and suspension system must not diminish the thermal, acoustic or mechanical performance of the suspended or supported service. The support and suspension system must not introduce condensation nor facilitate its formation.

Install the support and suspension system to transfer loads thus:

- ~ (A.) From the service or, (AA.) from associated intermediate physical support (e.g. cable tray, ductwork hanger, pipework clamp)
- ~ (B.) To and via the support or suspension component (e.g. threaded rod, wire rope, catenary system, channel (unistrut))
- ~ (C.) To the fixing with the structure/fabric

Structure includes all secondary support and access steel work designed, fabricated, supplied and installed to support the engineering services within this works package. A requirement for Installer to provide secondary steelwork, where not specifically detailed on the Structural Engineering drawings, is set out in Section A20 Preliminaries / General Conditions.

Design, specify, procure, install and test the support and suspension system and all its component parts to comply with BS 8539 as applicable. (BS 8539 is considered to be an appropriate standard because it refers to applications vulnerable to progressive collapse including suspended ceilings, and suspended services such as pipework, ductwork or cable tray.)

Ensure that the support and suspension system is designed, specified and installed to prevent progressive collapse and the potential risk to human life in the event of such collapse. Commission specialist design services from manufacturers or other competent professionals to ensure that the

support and suspension system as installed eliminates all material and unmanageable risk of progressive collapse.

Design, specify, procure and install all component parts to comply fully with manufacturer's instructions for design and installation.

210 Loadings

Provide all suspension and support components with sufficient Safe Working Load (SWL), Working Load Limit (WLL), or other approved loading classification sufficient to support all design loads. These loads arise from services to include, but not limited to, the following:

- ~ Ductwork
- ~ Pipework
- ~ Cable trays, basket and ladder
- ~ Lighting
- ~ Signs

Ensure that all fixings and fixing points to the building structure or fabric are approved or otherwise classified as fit for purpose and correctly installed to maintain such approval or classification.

Ensure that all suspended and supported services have sufficient strength and appropriate rigidity at each point of suspension and/or support for transfer of its loads to the suspension and/or support system.

Use suspension and support components in accordance with the manufacturer's instructions taking due account of all:

- ~ Vertical loads
- ~ Lateral loads
- ~ Dynamic loads
- ~ Tensile, compressive and shear loads

Include for loads arising from fluid content, insulation, acoustic quilt and installation, maintenance and servicing loads e.g. persons inside ductwork performing cleaning activities.

Subject to receiving normal maintenance, as recommended by the manufacturers, and in-service use in accordance with the design conditions provide all support and suspension systems to sustain their design performance properties throughout their expected service life.

220 Support and suspension elements

Support services from below and include the following main components:

- ~ Fixing to structure or fabric e.g. anchor or clamp
- ~ Support element such as Unistrut, angled bracket or threaded rod
- ~ Attachment to or around service such as ductwork support e.g. circular duct ring; profiled straight channel, cable tray profiled hanger.

Suspend services from above and include the following main components:

- ~ Fixing to structure or fabric e.g. anchor or clamp
- ~ Suspension element such as wire or threaded rod

~ Attachment to or around service such as ductwork support e.g. circular duct ring; profiled straight channel, cable tray profiled hanger.

Use solid wire, wire rope, threaded rod or similar products designed specifically, or otherwise approved by manufacturer, for supporting suspended loads.

Use stranded wire support systems only by prior agreement with the Contract Administrator and in applications limited to non-fire rated ductwork branches which have supplementary means of lateral support. Do not use for supporting fire rated ductwork, pipework or electrical containment services. Do not joint wire rope, or other similar continuous reel supplied suspension elements to increase their length. Use only continuous reel length suspension elements.

Joints to any non-continuous support or suspension element, such as threaded rod, must be made with products designed specifically, or otherwise approved by manufacturer, for securely jointing and holding supported or suspended load.

230 Support and suspension terminations

Provide all hooking loops within wire rope systems with a solid thimble eye.

Use closed eye fixings on suspended services. Where closed eye fixings are not practicable for application use double loop (Pigs tail) open hook fixings.

Attach a ferrule or other such means to the loose end of any wire rope to prevent fraying.

Protect all sharp edges and protrusions (including surfaces, edges, crevices, points, wire ends, screw heads, corners, brackets, braided cable, clamps, pins, drop rods etc.) by fitting suitable safety measures such as, but not limited to, corner saddles, chamfering, cutting back excess lengths as appropriate, or proving protective caps where relevant. Additionally, where sharp edges and protrusions exist, provide warning tapes (black/yellow) and soft padding to areas based on the risks posed.

240 Types of structure

Liaise with the project Structural Engineer to ensure that the structural elements to be used for supporting services loads are capable of this.

Only attach the suspension system to the following types of structure after confirming suitability:

~ Exposed primary steelwork (e.g. main structural columns and beams)

~ Exposed secondary steelwork (e.g. light gauge steel such as roof purlins, facade side rails)

~ Profiled/composite decking

~ Concrete

~ Other structural elements

Do not drill any structural steel work without permission from the Structural Engineer.

Do not attach suspension system to the following:

~ Any non-suitable structure or fabric

~ Any structural engineer/architect barred structures

250 Installation

Design, install and adjust the suspension system to fix services to the required design height and orientation.

Where mechanical lifting assistance is required provide, in accordance with HSE ACOP L113, all necessary temporary suspension arrangements during installation of the suspension system as required. Transfer the mechanically lifted load to the suspension system gradually and evenly.

Locate fixings directly above the suspension point. If this is not possible then check with the manufacturer the suitability of the fixings to accept lateral loads at the angle involved.

Use only parts from the same manufacturer for each independent suspension system. Only mix different manufacturer parts if all are fully compatible without degradation of performance or manufacturer warranty.

Use components from a single manufacturer.

Ensure that all suspension rods, wire ropes and other suspension components are evenly tensioned with no nicks, cuts, fraying, twisting, deformation, or deflection of wire ropes by other objects.

300 ATTACHMENT TO STRUCTURE

310 Methodology

Attach the suspension support system building structure by one or more of the following methods providing in all cases that the manufacturer's instructions, BSRIA COP and standards are adhered to:

- ~ Expansion anchors and screw fixing to concrete
- ~ Adhesive bonding anchors
- ~ Holorib or composite system e.g. embedded channel in slab for use with wedge fixings, T-head bolts, or similar fixings on the underside
- ~ Powder fixing (where such use is permitted)
- ~ Clamps and clips
- ~ Other

Ensure that reinforcement bars are not damaged, cut or otherwise affected as part of the attachment fixing. Report all damage to the Structural Engineer.

Comply with BS 5080 for all fixings in concrete and masonry.

Select and install fixings in accordance with BS 8539 Code of practice.

Provide slip restraints where rope wire attachment to structure is not perpendicular to structure.

320 Direct attachment

Ensure that no cutting, digging in, or other deformation to either wire loop or item being looped occurs.

Use manufacturers recommended corner saddles, preformed eyes or other recommended corner protection.

330 Expansion anchors and screw fixing

Comply with specification section Y90.

340 Composite systems

Comply with specification section Y90.

350 Powder fixing

Comply with section Y90 of this specification.

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400 APPLICATION SPECIFICS

410 Safety margin and redundancy

Provide a minimum level of redundancy that will ensure the transfer of suspended load to immediately adjacent supports in the event of failure of any single system component. The immediately adjacent support must sustain the additional load.

Provide an enhanced level of redundancy that will ensure the transfer of suspended load to adjacent supports in the event of failure of two or more system components connected to single suspended load for the following items:

420 Fire rating

All elements of the support and/or suspension system used for fire resisting ductwork must be capable of bearing the load of the ductwork under specified fire conditions relating to such ductwork. Guidance set out in the following Association for Specialist Fire Protection Blue Book publications show the factors relevant to supporting fire resisting ductwork:

- ~ Fire Resisting Ductwork: classified according to BS EN 13501-3
- ~ Fire Resisting Ductwork: tested to BS 476-24

All elements of the support and/or suspension system used for support and/or suspension of services must be capable of bearing the load of the service under any specified fire conditions relating to that service.

Provide all such certification and other manufacturers evidence of the fire rating for different exposure times under conditions of standard fire test procedures.

500 CORROSION RESISTANCE

Provide details of proposed materials and corrosion performance of suspension components at tender stage to Contract Administrator for comment.

All suspension components in zones to be galvanised / hot dipped galvanised.

600 SCHEDULE OF INSTALLER'S SUBMISSIONS

610 Design proposals and specialist contractors

Provide to the Contract Administrator at least 4 weeks before implementation, details of all proposed support and suspension systems to include the following:

- ~ details of any suspension or support systems specialist to be used and the nature of their engagement
- ~ details of the proposed systems and how they comply with this specification
- ~ details of system manufacturers' certification of proposed system components
- ~ details of any consultation and agreement with the structural engineer where required e.g. in respect of lateral loads imposed by catenary systems
- ~ details of physical layout and orientation of all systems elements

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620 Certificates and test results

Provide all design assumptions, documentation and certification of installed components and installation and maintenance guides.

630 Maintenance and inspection

Provide details of all recommended inspection regimes necessary to ensure the long term integrity of the support and suspension system.

END OF SECTION Y93