

TS 3.10.06

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GENERIC TECHNICAL SPECIFICATION
FOR CIVIL, STRUCTURAL AND BUILDING ENGINEERING

SECTION NO : 06

TITLE : BUILDING WORKS

GENERIC TECHNICAL SPECIFICATION FOR CIVIL, STRUCTURAL AND BUILDING ENGINEERING

This document shall be read in conjunction with Generic Technical Specification Civil, Structural and Building Engineering – Introduction, ref: TS 3.10.00.

The clause numbering system relates to the numbering system in CESWI7 Specification.

TABLE OF CONTENTS

BUILDING WORKS	4
6.1 Pipes and joints adjacent to structures.....	4
6.2 Brickwork and Blockwork, Jointing and Pointing	4
6.3 Cavity Walls	6
6.4 Damp-Proof Course.....	6
6.5 Corbelling.....	6
6.9 Bricklaying and Blocklaying in Cold Weather	7
6.10 Preparation for Plastering	7
6.11 Fixing of Plasterboard	8
6.14 Concrete Floor Finishes	8
6.15 Floor Tiling	10
6.17 External Rendering	13
6.18 Wall Tiles.....	13
6.19 Carpentry and Joinery.....	13
6.20 Structural Steelwork	15
6.21 Roofs	17
6.22 Timber Floors	18
6.23 Door Frames	18
6.24 Windows.....	18
6.25 Glazing	18
6.27 Slating and Tiling.....	21
6.29 Asphalt Roofing.....	22
6.30 Bitumen Felt Roofing.....	23
6.31 Plumbing	24
6.32 Openings in Walls, Floors and Ceilings	25
6.34 Electrical Installations.....	25
6.35 Profiled Steel Cladding	25
6.38 Soil, Waste, Ventilation and Rainwater Pipework and Fittings	27
6.39 Conduits	27
6.40 Repairs to Plaster and Dry Lining	28
6.41 Suspended Ceilings	28
6.42 Raised Access Floors	29
6.43 Mastic Asphalt Flooring.....	31
6.44 Built-up Roofing Systems.....	31
6.45 Flashings.....	32
6.46 Caulking and Sealing Joints.....	33
AMENDMENTS RECORD	35

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BUILDING WORKS

6.1 Pipes and joints adjacent to structures

- 6.1.1 Clauses 6.1.1 to 6.1.6 from CESWI 7 are not relevant for this section heading and shall be applied under Section 6.2.

6.2 Brickwork and Blockwork, Jointing and Pointing

- 6.2.3 Clause 6.1.1 is deleted in its entirety and replaced as follows:

Brickwork and blockwork and ancillary works shall comply with the relevant provisions of BS EN 1996:Part 1-2, Part 2 and Part 3, PD 6697 and the recommendations of BS 8000: Part 3 unless conflicting with a requirement of the *Civil Engineering Specification for Water Industry (CESWI7)* or this *Supplementary Specification* or the *Particular Specification*.

- 6.2.4 Clauses 6.1.2 to 6.1.6 shall be applied.

- 6.2.5 For material requirements refer to TS 3.10.2 Section 2.14 Bricks and Blocks

- 6.2.6 Details of proposed cutting or chasing of brickwork and blockwork shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.2.7 On completion, all putlog and other holes shall be made good using masonry units and mortar of types which ensure that the face matches the surrounding masonry. Putlog and other similar holes shall, where possible, be of full masonry unit size.
- 6.2.8 Kiln fresh bricks shall not be incorporated in the works for a minimum period of 24 hours after delivery to site or as recommended by the manufacturer, whichever is longer.
- 6.2.9 If facing bricks are delivered in loads with a noticeable variation in colour they shall not be used in rotation as delivered. Bricks from different loads shall be intermingled to ensure that any differences in colour do not form defined areas in the completed brickwork.
- 6.2.10 Horizontal mortar joints shall have an average thickness of 10mm.
- 6.2.11 Bricks with double frogs shall be laid with the deeper frog uppermost and the bed joints shall have sufficient mortar to ensure that the frogs on the underside of the bricks are completely filled with mortar. Voids in hollow blocks shall not be filled with mortar.
- 6.2.12 Work below ground or below DPC level shall be built of Class B engineering bricks laid in sulphate resisting mortar, unless otherwise specified. External faced brickwork shall commence two courses below the finished ground level.
- 6.2.13 Commencement of construction of masonry work is a **Notification Point**.
- 6.2.14 Pointing shall not proceed in frosty weather.

6.2.15 Type of bonding shall be as follows:

Wall type	Bonding type
One or more masonry units thick	English bond
One masonry unit thick with fair face on both sides	Each face: stretcher bond with full width expanded metal placed in alternate courses to tie the leaves together.
Half masonry unit thick (including leaves of cavity walls)	Stretcher bond

Where normal bonding is not possible due to dimensional reasons, the *Contractor* shall inform the *Contract Administrator*. This is a **Hold Point**.

6.2.16 Pointing shall be weather struck type.

6.2.17 New masonry shall be bonded to existing work in masonry units not more than 300mm high.

6.2.18 Control joints shall have a minimum width of 10mm filled with mortar to within 20mm of the block face and pointed with an approved two part polysulphide sealant.

6.2.19 Gaps in brickwork movement joints shall be filled with an approved flexible jointing material to within 20mm of face, and externally the remaining gap will be primed and sealed using a two part polysulphide sealant in accordance with the manufacturers recommendations. Colour to match brickwork. Hemp, fibreboard, cork and similar materials shall not be used as the filler material.

6.2.20 Where the underside height of a slab or beam does not coincide with the top of a blockwork course (typically a multiple of 225mm) the residual space may be filled with concrete brickwork to a nominal depth of 75mm, 112mm or 187mm. Where impractical the blockwork shall be cut to size wet, with a mechanical masonry saw.

6.2.21 Joint reinforcement of expanded metal 40mm narrower than the width of the wall shall be provided at all positions above and below wall openings in blockwork, extending for a minimum of 600mm either side of the opening to the first and second courses above and below the opening.

6.2.22 Edge cover to joint reinforcement in brickwork and blockwork shall be as the table below:

Exposure Condition of the Masonry Brickwork or Blockwork	Type Of Steel Reinforcement	Reinforcement In Mortar Joints Between Bricks or Blocks - Cover to Outer Face of Brickwork or Blockwork
Unprotected	Galvanised to BS EN 3834	Not to be used
	Austenitic stainless	25 mm
Sheltered from severe rain and against freezing whilst saturated with water. Buried masonry and masonry continuously submerged in fresh water	Galvanised to BS EN 3834 and Austenitic stainless	25 mm
Completely protected against weather or aggressive conditions	Galvanised to BS EN 3834 and Austenitic stainless	25 mm

6.3 Cavity Walls

6.3.1 Clause 6.3.1 is deleted in its entirety and replaced as follows:

Cavity walls shall have a minimum cavity width of 50mm and a minimal air gap of 25mm between any cavity insulation and the outer skin. Cavity walls shall be built with wall ties uniformly spaced at spacings complying with the recommendations of BS 8000: Part 3, staggered, and laid to fall outwards. Additional ties shall be used near the sides of all openings, one for each third course of bricks. Care shall be taken to keep the ties within the cavity free from mortar or mortar droppings, and any mortar or debris collecting at the bottom of the cavity shall be cleaned out through temporary openings left for this purpose in the bottom courses.

6.3.3 When the cavity is to receive board or slab insulation, the bottom row of cavity ties above the DPC shall have a maximum spacing of 600mm.

6.3.4 Where a vertical damp proof course prevents bonding of the two leaves at the reveals to openings or similar locations, a vertical line of additional wall ties shall be used at a maximum spacing of 300mm and within 225mm horizontally of the openings.

6.3.5 Where a structural steel or concrete member with a width of at least 450mm interrupts the inner skin of a cavity wall the outer skin shall have one layer of expanded metal or approved equal reinforcement to every fourth course carried beyond the steel or concrete member for a distance of 900mm in each direction.

6.4 Damp-Proof Course

6.4.2 Proprietary shaped damp proof courses shall be used at junctions and corners with stepped damp proof courses where the external ground is sloping, all in accordance with the manufacturer's recommendations and the Drawings.

6.4.3 Damp proof courses used with cavity wall bridges shall be unjointed wherever possible but lapped at least 150mm and sealed with an approved jointing compound where joints cannot be avoided. They shall be fixed tightly across the cavity, stepped up towards the inner leaf and supported to prevent sagging. They shall extend at least 150mm beyond the end of the bridge.

6.4.4 Chemical damp proof courses shall be installed in accordance with BS 6576.

6.5 Corbelling

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- 6.5.2 Rises and quoins shall be racked back. Tothing shall only be used when shown on the Drawings.

6.9 Bricklaying and Blocklaying in Cold Weather

- 6.9.3 The method including precautions of bricklaying and blocklaying in cold weather shall be submitted by the *Contractor* to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.9.4 Mortar ingredients including water and masonry units shall be warmed, if appropriate, to ensure that the temperature of the mortar in the brickwork does not fall below 5°C. Mixing water shall not be heated above 60°C. In no case shall the temperature of the combined materials exceed 32°C before the cement is added. Mortars of a higher classification than that specified shall not be used for the brickwork for the purpose of preventing freezing or accelerating hardening. The use of additives to the mortar which prevent freezing or accelerate hardening shall not be permitted.
- 6.9.5 Frost damaged mortar shall be raked out and replaced. Damaged brickwork/blockwork shall be taken down and rebuilt.

6.10 Preparation for Plastering

- 6.10.4 Notwithstanding the requirements of this Clause, work shall be undertaken in accordance with the provisions and recommendations of BS 8481.
- 6.10.5 Surfaces to be plastered or rendered shall be uncontaminated, sound, stable and free from fins and projections. Inspection of the surface prior to application of plaster or render shall be a **Notification Point**.
- 6.10.6 All metal work for fixings shall be plumb, square and true to line. Cut ends shall be protected with bitumen coating solution.
- 6.10.7 At junctions between columns and panels of dissimilar backgrounds, a separating layer of building paper shall be provided over the face of the column and the steel lathing bridging over the column face, fixed to the panels at each side.
- 6.10.8 Uneven backgrounds shall be dubbed out in thickness not greater than 10mm in the same mix as the first coat. Each coat shall be cross-scratched immediately after the set, and allowed to dry out before the next coat is applied.

6.11 Fixing of Plasterboard

6.11.3 For material requirements refer to TS 3.10.2 Section 2.79 Metal Lathing.

6.11.4 Notwithstanding the requirements of Clause 6.11, work shall be undertaken in accordance with the provisions and recommendations of BS 8000: Part 8 and, where relevant, Part 0.

6.11.5 Fixing to metal firrings shall be by plaster dabs at 450mm centres and then screwed at 300 mm centres, not less than 10mm from the edge of the boards. Screw depressions shall be filled with filler finished flush with the surface.

6.11.6 The use of mechanical jointing techniques shall be approved by the *Contract Administrator* and carried out in accordance with the manufacturer's recommendations. This is a **Hold Point**.

6.11.7 The employment of bed corner jointing tape for external angles shall be subject to the approval of the *Contract Administrator*. This is a **Hold Point**.

6.11.8 Dry lined partitions shall be framed with proprietary systems complying with the provisions of BS 8212..

6.11.9 Plaster stops or steel lathing shall be used at junctions between dissimilar backgrounds which are to receive plaster.

6.12 Plastering

6.12.4 For material requirements refer to TS 3.10.2 Sections:

2.93 Plaster

2.12 Boards for Panelling

6.12.5 Notwithstanding the requirements of this Clause, work shall also be undertaken in accordance with the provisions and recommendations of BS EN 13914: Parts 1 and 2.

6.12.6 Plaster shall not be used after initial set has taken place. Retempered plaster or reconstituted mixes shall not be used.

6.12.7 If the *Contractor* proposes to use mechanical application methods, details shall be submitted including the type of plaster as recommended by the manufacturer to the *Contract Administrator* for approval. This is a **Hold Point**.

6.12.8 The undercoat shall be applied with a firm pressure and brought to a true and level surface using a straight edge. The surface shall be thoroughly scratched to provide a mechanical key for the finishing coat.

6.12.9 Each wall or ceiling surface shall be carried out in one continuous operation.

6.12.10 All arises shall be slightly rounded.

6.12.11 Succeeding coats shall not be applied until undercoats are set. Cement-based undercoats shall be dry and cured with the drying shrinkage substantially complete.

6.12.12 The finishing coat shall be smooth finish level 4 or level 1 for surfaces to receive wall tiles, flatness level 1 to BS EN 13914: Part 2.

6.12.13 Sample panels of plaster work for each type of background substrate shall be prepared for the *Contract Administrator's* approval and to act as a quality control reference. This is a **Hold Point**.

6.14 Concrete Floor Finishes

6.14.1 Clause 6.14.1 is deleted in its entirety and replaced as follows:

Screeds shall comply with the relevant provisions of the appropriate part of BS 8204, as set out below:

Type	BS 8204 Part
Cement sand levelling screeds to receive floorings including lightweight screeds	1
Concrete wearing surfaces	2
Polymer modified cementitious levelling screeds and wearing screeds	3
Mastic asphalt underlays and wearing surfaces	5
Synthetic resin floorings	6
Pumpable self-smoothing screeds	7

- 6.14.5 Screeds shall be supplied and laid by specialist *Contractors* with materials from a single source, all approved by the *Contract Administrator*. This is a **Hold Point**.
- 6.14.6 The *Contractor* shall provide details of any proposed admixtures and bonding agents, which shall comply with the relevant part of BS 8204, to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.14.7 Notwithstanding the requirements of the Civil Engineering Specification for Water Industry (CESWI7), this Supplementary Specification and the Particular Specification, which shall take precedence, checking, handling, storage and workmanship shall comply with the provisions, recommendations and commentary of BS 8000: Part 9 and, where relevant, Part 0.
- 6.14.8 The *Contractor* shall provide to the *Contract Administrator* for approval, a copy of the manufacturer's or supplier's literature and sitework instructions covering the items stated in BS 8000: Part 9 and, where relevant, Part 0 as well as samples of each proprietary material to be used. This is a **Hold Point**.
- 6.14.9 Whenever practicable, screeds shall not be laid until the work of other trades working in the same area has been completed.
- 6.14.10 Any cracks or loose pockets shall be cut back to sound concrete with the proposed method of making good submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.14.11 Gauging of screed materials shall be as described in BS 8000: Part 9.

- 6.14.12 In addition to the requirements in cold weather of BS 8204 and BS 8000: Part 9:
- (i) screeds/toppings shall not be mixed or laid when the ambient temperature is 3°C and falling
 - (ii) mixing and laying can proceed when the temperature is 1°C and rising provided the sand and water are heated.
- 6.14.13 In hot weather conditions ensure that:
- (i) full compaction can be carried out avoiding the drying out of the mix and premature stiffening
 - (ii) proper curing and full hydration takes place
 - (iii) drying is controlled to minimise shrinkage
- 6.14.14 Construction joints shall be vertical butt joints formed in the screed topping to coincide with joints in the structural concrete. Details of proposed construction joints shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.14.15 Movement joints in the base concrete shall be continued through the screed/topping.
- 6.14.16 Surface hardeners, where specified, shall be applied to fully cured concrete surfaces after the surface has been cleaned and any cracks or holes repaired.
- 6.14.17 Tolerances in the surface levels of pavings and floor screeds shall be $\pm 6\text{mm}$ with respect to finished floor level with a maximum local deviation not exceeding 6mm in 2m when measured under a straight edge with protruding feet. In the case of switchgear floors the tolerance in floor levels shall be +0, -3mm. The *Contractor* shall submit his proposals for laying pavings in the switchgear areas to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.14.18 The *Contractor* shall retain records of all stages of the installation including dates of laying and testing carried out as well as environment conditions for each area of floor finish.

6.15 Floor Tiling

General

- 6.15.2 For material requirements refer to TS 3.10.2 Section 2.45 Floor Tiles.
- 6.15.3 Floor tiling shall be laid by specialist *Contractors* with materials from a single source, all approved by the *Contract Administrator*. This is a **Hold Point**.
- 6.15.4 All fittings and special tiles including inter alia coves, skirtings, cappings, channels and stop treads shall be obtained from the same manufacturer as the floor tiles and of the same material and Standard, where included, as the floor.
- 6.15.5 Whenever practicable, floor tiling shall not be laid until the work of other trades working in the same area has been completed.
- 6.15.6 Each delivery of tiles shall be checked to ensure a match with the approved sample.
- 6.15.7 The *Contractor* shall retain records of all stages of the installation including dates of laying, testing carried out and environment conditions for each area of floor finish.
- 6.15.8 Plastic tiles and sheet flooring shall be set out and laid with continuous in-line joints
- 6.15.9 The bottom of coved skirtings shall be flush with the finished floor.
- 6.15.10 Coved skirting shall be bedded, jointed and pointed in the same manner as the tiles and with joints aligning with the floor tiling joints.
- 6.15.11 Joints for skirtings shall be welded with stop ends, internal and external mitres. Joints in skirtings shall align with the floor tiling joints.

6.15.12 All sheeting shall be capable of being welded to provide a watertight membrane, and where it abuts PVC flexible skirting. The skirting shall also be capable of being welded at junctions along their length, at corners and to the sheet flooring.

Bedding

6.15.13 Solid Tiles shall be bedded either:

- (i) in mortar on a separating layer
- (ii) in mortar bonded to the base
- (iii) with bonding adhesive

6.15.14 Where necessary a separating layer shall be laid loose with minimum laps of 100 mm and overlaid by the cement/sand bedding mortar.

6.15.15 In areas where chemical resistance is not required a grout/doping coat shall be poured onto the bedding mortar to a uniform depth of 3mm

6.15.16 Bedding mortar shall be laid to a depth not less than 15mm of more than 40mm. The mortar shall be thoroughly consolidated and screeded to the required level using screeding rules no more than 750-900 mm apart.

6.15.17 The thickness of monolithic cement/sand screeds, concrete and granolithic toppings shall not be less than 12mm nor greater than 20mm. Bay sizes shall be consistent with those used for forming the base concrete.

6.15.18 The thickness of the screed/topping on in situ concrete slabs shall be between 20mm and 40mm. On precast concrete units the topping shall be at least 100mm thick.

6.15.19 Surface hardeners shall be sodium silicate to BS 3984:1982, 'Specification for sodium silicates'.

6.15.20 The bay size for unbonded construction shall be limited to 10m² for thicknesses below 100 mm. For thicknesses 100mm or above the topping may be laid in strips not exceeding 4.5m wide and transverse butt joints formed at 10m and 6m maximum spacing for reinforced and unreinforced toppings respectively.

6.15.21 The bay size for bonded construction shall be limited to 20m² for topping/screed thicknesses between 20 and 30mm, and 15m² for thicknesses greater than 30mm. The length to width ratio shall not exceed 1.5.

6.15.22 Bedding mortar shall be machine mixed.

Joints

6.15.23 Expansion joints will be made at all junctions, between floor tiles and skirtings, walls, gullies and other floor finishes and at intervals not exceeding 4500mm centres in both directions, and directly over expansion joints in the structural concrete and supporting walls and beams in suspended floors.

6.15.24 Expansion joints shall be 10mm wide taken down to the surface of the damp proof membrane or concrete slab as appropriate. The joint filler shall be expanded neoprene strips, taken within 10mm of the final surface of the tiles and the final 10mm of the expansion joints filled with a suitable polysulphide filler

Rigid Tiling

6.15.25 Notwithstanding the requirements of the Civil Engineering Specification for Water Industry (CESWI7), this Supplementary Specification and the Particular Specification, which shall take precedence; checking, handling, storage and workmanship shall comply with the provisions, recommendations and commentary of BS 8000: Part 11 and, where relevant, Part 0.

6.15.26 The *Contractor* shall provide to the *Contract Administrator* for approval, a copy of the manufacturer's or supplier's literature and sitework instructions covering the items stated in

BS 8000: Part 11 and, where relevant, Part 0 as well as samples of each proprietary material to be used. This is a **Hold Point**.

6.15.27 The tolerance for joints between tiles shall be 0mm, +1mm.

Flexible Tiling

6.15.28 The *Contractor* shall provide to the *Contract Administrator* for approval, a copy of the manufacturer's or supplier's literature and sitework instructions covering storage, handling, installation, finishing, maintenance and care as well as samples of each proprietary material to be used. This is a **Hold Point**.

6.15.29 Dampness testing of the base shall be undertaken immediately prior to laying the flooring to demonstrate the level of dampness is satisfactory. This is a **Notification Point**.

6.15.30 The *Contractor* shall submit setting out layout drawings for the tiles using continuous in-line joints to the *Contract Administrator* for approval. This is a **Hold Point**.

6.15.314 Joints between tiles shall be of the minimum width compatible with the efficient laying of the floor. All flooring shall be neatly cut and tight around the profile of any obstructions rising above the floor surface.

6.17 External Rendering

- 6.17.1 Clause 6.17.1 shall be applied with the exception that Class M4 mortar shall be used.
- 6.17.2 If the *Contractor* proposes to use mechanical application methods, details shall be submitted including the type of render as recommended by the manufacturer to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.17.3 Rendering of each wall shall be carried out in one continuous operation, if practicable. Day joints shall be planned to coincide with surface features including changes in direction.
- 6.17.5 All arrises shall be slightly rounded.
- 6.17.6 Sample panels of rendering work for each type of background substrate shall be prepared for the *Contract Administrator's* approval and to act as a quality control reference. This is a **Hold Point**.

6.18 Wall Tiles

- 6.18.1 Clause 6.18.1 is deleted in its entirety and replaced as follows:
Wall tiling shall comply with the relevant provisions, recommendations and commentary of BS 5385: Parts 1,2 and 4 and BS 8000: Part 11 and, where relevant, Part 0.
- 6.18.2 Representative samples of the proposed tiles with manufacturer's literature for tiles, adhesives and proprietary products including their suitability and instructions for their use shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.18.3 If instructed by the *Contract Administrator*, tiles shall be inspected and tested in accordance with the provisions of BS EN ISO 10545: Part 1.
- 6.18.4 Tiles, adhesives and proprietary products shall be supplied from a single manufacturer and match the samples and details approved. The tiles shall have the same batch numbers.
- 6.18.2 Sample reference panels of tiling shall be carried out when instructed by the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.18.3 Tiles shall be installed by experienced personnel trained in wall tiling.
- 6.18.4 The background surfaces to receive tiling shall be inspected to confirm their suitability before the bedding of tiles commences. This is a **Notification Point**.
- 6.18.5 Joints between tiles shall not be grouted up until the tiles are adequately bonded to their background. The minimum period after tiling on porous backgrounds shall be 24 hours and on impervious backgrounds 3 days.
- 6.18.6 Adhesives shall comply with the provisions of BS EN 12004 and shall be determined by the adhesive manufacturer with details of type, location, exposure conditions, intended use of area and substrate conditions provided to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.18.7 Grouts for tiles shall comply with the provisions of BS EN 13888 and shall be determined by the grout manufacturer with details of type, class and exposure conditions provided to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.18.8 Proprietary pre-formed filling strips shall be used at movement joints which shall be finished with a joint sealant.

6.19 Carpentry and Joinery

- 6.19.2 Clause 6.19.2 is deleted in its entirety and replaced as follows:
The whole of the joinery shall be cut and framed together as soon as possible after the commencement of the work. Workmanship shall comply with the relevant provisions, recommendations and commentary in BS 1186: Part 2, BS 6446, BS 8000: Part 5 and,

where relevant, Part 0, BS EN 1995: Part 1 with UK National Annex and BS 1186: Part 3. Except where the work is described in the Contract as being to finished sizes, 3mm shall be allowed for each wrot face. Frames, casings and other joinery fittings shall be secured to hardwood fixing slips built in for the purpose. Where hardwood fixing slips have not been provided, receiving surfaces shall be plugged with hardwood plugs or approved proprietary type plugs

6.19.4 For material requirements refer to TS 3.10.2 Sections:

2.126 Timber and Preservation of Timber

2.27 Connections for timber

2.83 Nails

2.86 Nuts, Screws, Washers and Bolts

2.143 Anchors and post installed fixings,

2.125 Synthetic resin adhesives

2.69 Joist hangers

2.80 Metal Ties

6.19.5 The best of the timber shall be used for stressed work. Any bowed, sprung, twisted or cupped timber shall be rejected unless approved by the *Contract Administrator* for use in locations where the finished work shall not be adversely affected.

6.19.6 Timber panels shall be stored prior to fixing for a minimum of 48 hours in conditions similar to those which shall occur in the completed building.

Surface Finish

6.19.7 All ferrous metalwork, nails, screws, bolts and other mechanical fastenings shall be protected by galvanising or suitable plating for all external work, work in areas of high humidity or corrosive conditions.

6.19.8 Surface finishes shall be as described in Appendix A of BS 1186-2:1988, 'Timber for and workmanship in joinery. Specification for workmanship'. All exposed timber faces shall be 'WROT'

6.19.9 Where a 'natural' finish for staining, polishing or clear varnishing is required, timber in adjacent faces shall be matched to be uniform or symmetrical in colour and grain.

6.19.10 Where a 'natural' finish for staining, polishing or clear varnishing is required, timber in adjacent faces shall be matched to be uniform or symmetrical in colour and grain.

6.19.11 Capillary penetration shall be prevented in external joinery or in places where joinery is exposed to wet conditions.

6.19.12 Skirting boards shall be installed after the floor has been laid.

Joints

6.19.13 Unless specified structural timbers shall not be cut, notched or modified.

6.19.14 The Contractor shall ensure that notches and holes are not so positioned in relation to knots or other defects such that the strength of members shall be reduced.

6.19.15 Joints in the length of a structural member shall not be permitted unless otherwise specified. If permitted, joints over bearings shall be made in a manner approved by the *Contract Administrator*. This is a **Hold Point**.

6.19.16 Joints and bearings shall be designed and constructed in a manner that maintains all surfaces in full contact. Any joint subject to tension shall be made to resist the load as appropriate to its function.

6.19.17 All joints shall be nailed, screwed, bolted or jointed. Glued site joints shall not be permitted.

6.19.18 Where any joints are not detailed, similar joints shall be made to those detailed for similar applications and conditions of use.

Fixings

6.19.19 Screws in hardwood other than for fixing ironmongery, shall be countersunk, pelleted or, if removable, cupped.

6.19.20 Nails shall only be used in areas to be painted.

6.19.21 Masonry nails shall not be detailed.

6.19.22 Nails shall be driven on the slant so that the connection does not loosen under load. Splitting of timber by nailing shall be avoided by sensible spacing and, where necessary, pre-drilling not in excess of three-quarter nail diameter.

6.19.23 Only durable proprietary fibre composition or plastic plugs let into drilled holes shall be used for screw fixings to concrete, masonry and blockwork.

6.19.24 Masonry bolts shall adequately penetrate into masonry to provide a secured fixing. Resin anchors shall be used instead of expanding bolts near edges of masonry. Large washers shall be used to protect the timbers.

6.19.25 Where proposed by the *Contractor*, the *Contractor* shall submit to the *Contract Administrator* for approval, proposed types and locations of framing anchors in lieu of timber joints. This is a **Hold Point**.

6.19.26 Timbers shall bear in full contact on designed supports. The ends of timbers that are built into masonry shall be liberally coated with preservative. All timbers shall be protected from contact with potentially damp surfaces and structures. Any necessary packings shall use material that shall not rot or compress.

6.19.27 Straps and anchors shall be fixed at each timber contact point with a minimum of two galvanised screws. Straps shall span at least two members when strapping joists and rafters. Any gaps between timber members and masonry shall be blocked when strapping to masonry. Any strap taken into a cavity wall shall be turned down tight against the inner skin for an adequate distance.

6.19.28 Joist hangers shall be screw-to-wall type

6.19.29 Joists shall use regularised timber to ensure level supports for floors and linings, etc.

6.19.30 The trimmers at openings shall be aligned with upper and lower surfaces and shall be fitted tightly using joist hangers. Loads shall be transmitted to other solid structures.

6.19.31 Noggins/dwangs shall be plugged and screwed if end fixing is prevented by joist hangers.

6.19.32 Spring washers shall be used in locations in timber roofs which shall be hidden or inaccessible in the completed building.

Panels

6.19.33 Removable duct panels shall be of either blockboard, plywood or a proprietary laminated board. The edges shall be lipped with hardwood when specified.

6.19.34 Removable duct panels constructed from blockboard shall be veneered on both sides and along all edges with all arrises softened to a 45° angle when hardwood lipping is not specified. Irrespective of material, holes shall be drilled for screw fixings 70mm from the sheet edges and equally spaced at a maximum of 900mm centres.

6.19.35 Frameworks to receive laminated panels shall allow fixings 70mm from the edge of each panel and a gap of 5 mm between panels or between an end panel and wall finish. Framing for panelled duct covers in toilets or changing areas shall be made entirely of suitably preserved softwood, unwrought. The framework shall be constructed to present a true and accurate surface for receiving the panels.

6.20 Structural Steelwork

Clause 6.20 is deleted in its entirety and replaced by TS 3.10.12 Structural Steelwork and Aluminium.

6.21 Roofs

6.21.1 Clause 6.21.1 is deleted in its entirety.

6.21.2 The requirements for timber in roofs shall also comply with the relevant provisions in Clause 6.19, and the manufacturer's recommendations.

6.21.3 For material requirements refer to Clause 6.19 and TS 3.10.2 Section 2.156 Roof Fascias, Bargeboards and Soffits.

Trussed Rafters

6.21.4 Handling, storage and erection of trussed rafters shall comply with the requirements, recommendations and commentary of the manufacturer's recommendations, BS 8000: Part 5 and, where relevant, Part 0 and 'Technical Handbook' published by The Trussed Rafter Association unless otherwise stated below.

6.21.5 The Contractor shall carefully check each truss before erection to ensure compliance with shop drawings and the specification including:

- (i) Grades and sizes of members
- (ii) Types, sizes and positions of nail plates
- (iii) Gaps between ends of members at joints
- (iv) Full penetration of nails

6.21.6 The Contractor shall submit details of the method of erecting the trussed rafters for approval by the Contract Administrator. This is a **Hold Point**.

6.21.7 The Contractor shall check the positions of supporting walls and plates for accuracy of setting out and levels and report any inaccuracies and defects including proposed rectification to the Contract Administrator. This is a **Hold Point**.

6.21.8 Ceiling chords shall not be fixed to internal walls until the roofing is complete and any cisterns or water tanks are filled.

6.21.9 Wall plates shall comply with the provisions of BS 8000: Part 5.

6.21.10 Punched metal plate fasteners shall be galvanised plain sheet or coil.

6.21.11 Truss clips shall be galvanised mild steel.

6.21.12 Truss clips used for securing the trussed rafter to the wall plate shall be fixed with 32 x 3.5 mm square twisted nails in every hole.

6.21.13 Bracing and binders shall be fixed to every rafter, strut or tie with no less than two 75 x 3.35mm galvanised round wire nails with lap joints side by side extending over and nailed to at least two truss members. Any binder crossing a brace shall be interrupted and plated.

6.21.14 Tie-Down Straps shall be galvanised mild steel not less than 30mm x 2.5mm cross section with 100mm cranked end and 1000mm long. They shall be positioned at not more than 2.0m centres with not less than two nails/screws per strap.

6.21.15 Tie-down straps shall be fixed securely to the timber plate with 30 x 3.75mm nails, and to masonry with 50mm x 12 gauge sheradised screws evenly placed.

6.21.16 Lateral restraint straps shall be galvanised mild steel not less than 30 x 5mm cross section with 150mm cranked end and of sufficient length to pass over 3 no. joists or rafters. They shall be at maximum centres of 1.25m.

6.21.17 The cranked end of lateral restraint straps shall be in tight contact with the cavity face of the wall inner leaf and not pointing upwards. Noggins/dwangs and packs shall be fixed beneath such straps which span rafters/ties running parallel to the wall. The noggins and packs shall fit tightly and be not less than three quarters of the rafter/tie depth. Rafters/ties shall not be notched. Straps shall be fixed to rafters/ties with not less than four 50mm x 8 gauge sheradised countersunk screws, evenly spread.

6.21.18 Checking and inspections of completed sections of timberwork by the Contractor prior to being covered up shall be a **Hold Point**.

Ventilation to Roof Space

6.21.19 Ventilation shall be provided at eaves level equivalent to a 10mm unobstructed continuous air gap for roof pitches over 15° unless otherwise specified.

6.21.20 Where roof pitches are under 15° ventilation shall be provided at eaves level equivalent to a 25mm unobstructed continuous air gap or such greater figure equal to a total ventilation area of not less than 0.6% of the roof area.

6.21.21 Where insulation follows the pitch of the roof, ventilation shall additionally be provided at the ridge equivalent to a continuous 5mm strip.

6.21.22 Where a pitched roof has a single slope and abuts a wall, ventilation shall additionally be provided at high level equivalent to a continuous 5mm strip.

6.22 Timber Floors

6.22.3 The requirements for timber floors shall also comply with the relevant provisions in Clause 6.19.

6.22.4 Minimum 2mm thick flat steel plates, let in flush with top of joists, shall be fixed over services in notches under flooring to prevent nail damage.

6.23 Door Frames

6.23.3 For material requirements refer to TS 3.10.2 Section 2.32 Doors

6.23.4 Workmanship including fabrication and workmanship in relation to timber shall comply with the provisions of Clause 6.19.

6.23.5 All furniture shall be removed prior to carrying out any preparatory and decorating work.

6.23.6 All moving and closing parts of timber construction shall fit accurately with a regular visible gap of 1.5mm.

6.23.7 Submission of manufacturers' information for approval by the *Contract Administrator* is a **Hold Point**.

6.24 Windows

6.24.2 For material requirements refer to TS 3.10.2 Section 2.138 Windows

6.24.3 Windows shall also comply with the relevant requirements of Clause 6.23.

6.25 Glazing

6.25.1 Clause 6.25.1 is deleted in its entirety and replaced as follows:

Glazing shall comply with the relevant provisions, recommendations and commentary in BS 6262 and BS 8000: Part 7 and, where relevant, Part 0.

6.25.2 For material requirements refer to TS 3.10.2 Sections:

2.51 Glass for Glazing

2.53 Glazing materials.

6.25.2 Patterned glass in external locations shall be fixed with the smoother face outside.

6.25.3 Wired glass shall be cut square and parallel with the direction of the wires.

6.26 Painting

6.26.1 Clause 6.26.1 is deleted in its entirety and replaced as follows:

Painting of structural steelwork shall be in accordance with TS 3.10.12 Section 12.17 Protective Treatment for Steelwork.

6.26.2 Refer to TS 3.10.14 for maintenance painting requirements.

6.26.3 For material requirements refer to TS 3.10.2 Section 2.88 Paints and Painting Materials for Buildings.

6.26.4 Preparation of metallic components to receive paint shall be undertaken to comply with the provisions of Annex F in BS EN 1090: Part 2 and according to the recommendations of PD 6705: Part 2. Bare iron and secondary steelwork including galvanised finishes shall be thoroughly prepared by removing all dirt, rust and loose millscale to the satisfaction of the *Contract Administrator*. Tools shall be operated in such a manner to ensure that no sharp ridges or burrs are left and no cuts made in the steel. Surfaces exposed to an atmosphere polluted with chemicals shall be thoroughly washed with fresh water and allowed to dry before priming. Surfaces inaccessible to manual cleaning shall be treated with chemical rust remover applied liberally. All surfaces and surrounding areas which become contaminated shall be thoroughly washed with fresh water. Priming shall be carried out as soon as practical and in any case the same day. Steelwork or ironwork primed before delivery and damaged in transit shall have all damaged areas cleaned and patch primed immediately upon delivery. Areas damaged during erection shall be similarly dealt with. Priming coats shall be applied before any contamination or rusting occurs.

6.26.5 The painting of sample areas of each selected type shall be undertaken as a control for colour, texture and workmanship for each paint system to the approval of the *Contract Administrator*. This is a **Hold Point**.

6.26.6 Wall, door and window furniture shall be removed prior to painting and refixed on completion.

6.26.7 The methods of application of each type of paint shall be approved by the *Contract Administrator* before work starts. This is a **Hold Point**.

6.26.8 Paint shall be applied to the recommended minimum dry film thickness (DFT) which shall be the absolute minimum coverage at any point of measurement. Where DFT cannot be practically measured a coat shall be applied at the manufacturer's DFT equivalent spread rate with full allowance made for waste.

6.26.9 Excessive brushing out of aluminium paint shall be avoided.

6.26.10 Roller painting shall only be carried out with mohair or short pile sheepskin rollers. It shall not be allowed for application of priming coats or work other than of a straightforward plain character as agreed with the *Contract Administrator*.

6.26.11 No spray painting shall be undertaken in the application of priming paints, first coat of PVA emulsion paint, where soiling of adjacent surfaces cannot be prevented and with tar based paints.

6.26.12 The *Contractor* shall submit to the *Contract Administrator* for approval a full description of painting methods and procedures including inter alia:

- (i) Cleaning methods, materials and equipment, including positive methods of pollution control of solvents and blasting materials
- (ii) Paint application procedures, including paint manufacturer's recommended methods of application and equipment types and sizes; recommended drying times, control methods for overspray, masking and protection of equipment and the environment; surface temperature control of items prior to and during the painting process; scaffolding; mixing procedures and quantities; any proposed deviations from the manufacturer's recommendations which shall be explained in detail.

- (iii) Safety procedures, including storage methods, ventilation of areas during painting, waste material disposal, personnel protection, equipment cleaning methods and fire prevention methods and procedures.
- (iv) Equipment specifications and manufacturer's recommendations for the use thereof.
- (v) Testing procedures to show conformance to the Specification.
- (vi) Inspection procedures.

This is a **Hold Point**.

6.26.13 Commencement of surface preparation for each room or area and surface preparation of areas, which shall become inaccessible, shall be **Notification Points**.

6.27 Slating and Tiling

6.27.2 For material requirements refer to TS 3.10.2 Section 2.114 Roof Coverings.

6.27.3 Workmanship in relation to tiling and slating of roofs shall be undertaken to comply with the recommendations and commentary of the manufacturer and BS 8000: Part 6 and, where relevant, Part 0 unless otherwise stated below

6.27.4 Eaves' ventilators shall be fixed in accordance with the manufacturer's instructions. Refer to 6.21 for ventilation requirements.

6.27.5 Glass reinforced plastic (GRP) open valleys shall be fixed as follows:

(i) Fix valley troughs in accordance with manufacturer's instructions

(ii) Cut tiles on rake to overhang valley trough

(iii) Form 125mm wide valley

6.27.6 At separating walls, battens and tiles shall be bedded in mortar over the wall.

6.27.7 Ridge junctions with ridges, hips, valleys and abutments shall be treated as follows:

(i) Cut and fit or cut and mitre as appropriate ridge and hip tiles at junctions with ridges, hips, roof slopes and abutments

(ii) Fix lead saddle and dress down neatly over tiling

6.27.8 Tiling and slating shall be cut and fitted around pipes and other projections with lead sheet fixed and dressed down over the tiling and slating. Alternatively a proprietary flashing tile shall be used in accordance with the manufacturer's instructions.

6.27.9 For single lap tiles, sloping edge abutments with combined step and cover flashing shall be treated as follows:

(i) Cut tiles neatly as necessary to form close abutment with wall face

(ii) Fix cover flashing and dress down immediately after tiling is complete to the tile manufacturer's details

6.27.10 At tile intersections with single lap tiles, the last tile in each course at verges, hips, valleys and abutments shall be fixed with clips.

Underlay

6.27.11 Handling, storage and installation of roofing battens shall comply with the requirements, recommendations and commentary of BS 8000: Part 6 and, where relevant, Part 0.

6.27.12 A 900mm wide strip of underlay shall be placed to overlap the general underlay for hips, ridges and valleys

Roofing Battens

6.27.13 Battens for slating and tiling shall comply with the provisions of BS 5534 and shall be sawn.

6.27.14 Handling, storage and installation of roofing battens shall comply with the requirements, recommendations and commentary of BS 8000: Part 6 and, where relevant, Part 0.

6.27.15 Ungraded softwood for battens to plain tile roofing shall be in accordance with the following table:

COVERING	SPAN (mm)	SIZE (mm)
Plain Tiles		
a. pitched tiling	450	32 x 19
b. pitched tiling	600	32 x 25
c. vertical tiling	450	38 x 19
d. vertical tiling	600	38 x 25
Single Lap Tiles		

a. pitched tiling	450	38 x 22
b. pitched tiling	600	38 x 25

6.29 Asphalt Roofing

6.29.2 Refer to Section 6.44 for general requirements for built-up roofing systems.

6.29.3 For material requirements refer to TS 3.10.2 Section 2.77 Mastic Asphalt.

- 6.29.4 The installation of the asphalt roofing system shall be undertaken to comply with the recommendations and commentary of BS 8000: Part 4 where not covered by Clause 6.29.1.
- 6.29.5 Details of the specialist *Contractor* for installing the asphalt roofing system shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.29.6 Details of metal primers proposed by the *Contractor* for adhering asphalt to metal surfaces shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.29.7 The bonding compound for the vapour barrier to the base surface shall be applied at a rate of 1.5 kg/m² with minimum 100mm side laps and 150mm end laps.
- 6.29.8 Vapour barrier sheets shall be turned up a minimum 150mm at all parapets, pipe penetrations, and other vertical surfaces and abutted to roof outlet flanges to provide a seal.
- 6.29.9 The application of heat to bitumen or asphalt based products shall be controlled such that the maximum temperature recommended by the manufacturer shall not be exceeded.
- 6.29.10 Precautions shall be undertaken to ensure that no water or dampness can be in contact with any layer of the asphalt roofing system causing effects.
- 6.29.11 The insulant shall be laid with staggered butt joints during non-inclement weather.
- 6.29.12 If specified, a separating layer of building paper with minimum 7mm side and end laps shall be loosely laid before laying the isolating membrane. The isolating membrane shall be laid loose with minimum 50mm side and end laps.
- 6.29.13 Where expanded metal lathing or other approved reinforcement is specified on vertical or sloping surfaces, keying shall be fixed with the long way of the mesh horizontal and the strand intersections pointing upwards and outwards.
- 6.29.14 Fixings to concrete, masonry or brickwork shall be by means of pins and washers.
- 6.29.15 Expansion joints in concrete roofs of the twin kerb type shall have the asphalt returned along the top of the kerb to a distance of at least 40mm, and be capped with a metal capping held down by cleats fixed in the concrete kerbs.
- 6.29.16 The *Contractor* shall submit to the *Contract Administrator for approval*, details of the proposed size of bays to be used for laying the roofing. This is a **Hold Point**.
- 6.29.17 The coats of asphalt shall be laid with staggered joints with laps not less than 150mm width which shall be clean and neat. An additional width of 150mm shall be laid beyond the net dimensions to enable the joint to be picked up properly if the continuation of the asphalt is to be continued at a later date.
- 6.29.18 The coats of asphalt for vertical and sloping surfaces in excess of 300mm or sloping more than 10° to the horizontal shall be laid in three coats. The first coat shall be applied by a trowel in small dabs to ensure full adhesion and succeeding coats by float.
- 6.29.19 All internal angles in asphalt work shall be warmed and cleaned by the prior application of hot asphalt before forming angle fillets which shall be of two coats. Angle fillets in tanking shall have a width of not less than 50mm. Skirtings shall have a 25mm radius cove formed at the base.

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- 6.29.20 Asphalt work on all external angles on brickwork and concrete shall be rounded and the asphalt neatly dressed round the surface, whilst maintaining the full thickness.
 - 6.29.21 Asphalt to be keyed into grooves formed in the brick, masonry, concrete or other surface, shall be carefully worked into the grooves immediately in advance of the base coat so that no voids are left, and followed up with the base coat whilst the asphalt in the groove is still soft so that they can be worked together to form a proper bond.
 - 6.29.22 When asphalt at the top of the skirtings or upstands is turned into chases in brickwork, masonry or concrete, it shall be tucked into a chase not less than 25mm x 25mm formed in the structure, and the top of the asphalt shall be formed with a rounded arris to shed water, and afterwards pointed with sand and cement mortar.
 - 6.29.23 Solar reflective chippings shall be applied after the waterproofing asphalt has been inspected and approved. The surface of the asphalt shall be clean and dry before brushing on hot bonding compound, which shall be allowed to dry before applying dressing compound, the rate of application of both being sufficient to ensure adequate bonding of the chippings. The chippings shall be evenly spread over the surface immediately after the application of the dressing compound at a rate of not less than 20kg/m². The chippings shall be sufficiently free from surface moisture when they are laid to ensure that an adequate bond is achieved.
 - 6.29.24 The permitted deviation from a plane surface shall not exceed 5mm per 3m as measured from a straight-edge laid along the surface.

6.30 Bitumen Felt Roofing

- 6.30.2 Refer to Section 6.44 for general requirements for built-up roofing systems.
- 6.30.3 For material requirements refer to TS 3.10.2 Section 2.114 Roof Coverings.
- 6.30.4 Bitumen felt roofing shall be undertaken with hot bitumen using the pour and roll method. Lap lengths and staggering of joints between layers shall comply with BS 8000: Part 4.

6.31 Plumbing

- 6.31.2 For material requirements refer to TS 3.10.2 Section 2.135 Water Fittings and Appliances.
- 6.31.3 Details of proposed *Contractors*, who comply with the Water Supply (Water Fittings) Regulations and are proposed to undertake work on the installation of water services shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 6.31.4 The installation of internal sanitary drainage and water services shall be carried out by, or under the supervision of, personnel registered with the Chartered Institute of Plumbing and Heating Engineering with the relevant minimum technical competence enabling compliance with the Competent Person Scheme. The *Contractor* shall submit details of such personnel with details of their qualifications, registrations and dates of expiry to the *Contract Administrator*. This is a **Notification point**.
- 6.31.5 Appliances shall be fixed with chromium plated steel or brass screws and bedded as appropriate on 6:1 sand:cement mortar.
- 6.31.6 Basins (ablution and hand) shall be mounted using fishplates, wall hangers, bolts or cast iron brackets. Central leg supports shall be provided where light wall construction or heavy usage of basins is identified.
- 6.31.7 Washing sinks shall be finished in white nylon, vitreous enamel or other approved finish. Where the wall is of light construction, stainless steel leg and strap supports shall be provided.
- 6.31.8 The *Contractor* shall submit a statement to the *Contract Administrator* for approval detailing the joints for each type of pipe material to be used. This is a **Hold Point**.
- 6.31.9 Copper pipework less than 42mm bore shall be neatly bent in a manner which preserves an even bore throughout and allows pipes to be set either horizontally or vertically.
- 6.31.10 Copper pipes exceeding 67mm bore shall be bronze welded using filler rods and an oxyacetylene flame.
- 6.31.11 Copper pipes buried in floor screeds and wall chases shall be protected from contact with the plaster, concrete or mortar either by pre-coating with PVC or spirally wrapping in a mastic tape.
- 6.31.12 Plastic pipes and copper pipes exceeding 42mm bore shall be routed using straight pipes and standard bends.
- 6.31.13 Screwed joints to metal fittings shall be made using ptfe tape.
- 6.31.14 Connections between dissimilar pipe systems shall be by means of a purpose designed transition pieces approved by manufacturers of both systems.
- 6.31.15 All pipework, jointing and support systems shall be constructed from chemically and electrolytically compatible materials.
- 6.31.16 Hot and cold water service branches to a range of sanitary fittings, or branches to individual fittings, shall be provided with ball type isolating valves fitted as close as practicable to the fittings served.
- 6.31.17 All pipelines, valves and equipment shall be identified by the colour code or lettering as specified by the *Contract Administrator*.
- 6.31.18 Valves and controls not immediately adjoining the equipment served shall be clearly identified as to their function. Markings and labels shall be of a durable material and fixed in a secure and permanent manner.
- 6.31.19 In all cases the pipework manufacturer's recommendations shall be applied where these require closer spacing of fixings than those indicated in BS EN 806 and on all flexibly jointed pipe systems at least one support shall be provided for each unit length.
- 6.31.20 Unless otherwise stated, cold water services subject to condensation shall be insulated in accordance with BS 6700 BS 8558 and the relevant BS 806 parts.

6.31.21 Unless otherwise stated, hot water services shall be insulated with a minimum 25mm thick insulation similar to that above.

6.32 Openings in Walls, Floors and Ceilings

6.32.2 Lintels shall be installed in accordance with the recommendations contained in BS EN 845: Part 2 as well as BS 8000: Part 3.

6.32.3 Where lintels bear over penetrations not coinciding vertically and/or horizontally with incidental masonry courses, the masonry units forming the immediate bearings to the lintels shall be full size masonry units and not cut, unless otherwise specified.

6.32.4 Openings in walls shall be checked prior to installation of door and window frames to ensure that all preparatory work, fixings and damp proof membranes have been correctly installed. This is a **Notification Point**.

6.34 Electrical Installations

6.34.1 Clause 6.34 is deleted in its entirety and replaced by TS 3.010.13.

6.35 Profiled Steel Cladding

6.35.5 For material requirements refer to TS 3.10.2 Sections:

2.108 Steel Sheeting

2.41 Fixing accessories for building purposes

6.35.6 Prior to commencing installation, the *Contractor* shall inspect the framing to which the cladding is to be fixed to ensure that it has been erected correctly and within the tolerances specified. Any defects shall be corrected prior to the commencement of installation of cladding in the affected area. This is a **Notification Point**.

6.35.7 Samples of materials conforming to the systems to be used in the works shall be provided to the Contract Administrator for approval. This is a **Hold Point**.

6.35.8 Workmanship shall comply with the Steel Construction Institute's publication P346: 'Best practice for the specification and installation of metal cladding and secondary steelwork' and The Metal Cladding and Roofing Manufacturers Association Technical Papers 1 to 18.

6.35.9 Sheets shall be supplied to Site cut to the required length.

6.35.10 The cladding system shall be completely waterproof and air-tight. Side laps shall be arranged to face away from the direction of prevailing winds.

6.39.11 Facades and rainscreen systems shall be tested in accordance with the relevant provisions of Pr EN 1364: Parts 3 to 5.

6.35.12 Holes for fasteners shall be drilled to the size recommended by the fastener manufacturer. The use of punches for forming holes shall not be undertaken.

6.35.13 The permitted deviation of the cladding sheets and accessories shall not exceed the maximum to suit the cladding system, or, 1/250 of the distance between fixings or width of flat surface, whichever is less.

6.35.14 The following requirements shall apply for the decorative life of the cladding system:

(i) Differences in colour of adjacent panels or accessories visible to the naked eye shall not occur

(ii) The colour change and loss of gloss of the individual panels and accessories shall be minimal and the panels shall not be subject to severe chalking

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- 6.35.15 Sheet metal accessories shall be formed from the same material as the cladding sheets and be colour matched. Similarly fixings shall have integral heads colour matched. Flashings and fillers shall be purpose-made to suit the profile of the sheets.
- 6.35.16 The insulation material shall be in accordance with the relevant clause in this Specification.
- 6.35.17 All materials shall be resistant to fungal attack, infestation, vermin and other forms of biological attack.
- 6.35.18 The component parts of all joints and fastenings shall avoid bi-metallic corrosion.
- 6.35.19 Tape for insulating dissimilar metals shall be self adhesive PVC. The thickness shall not be less than 0.25mm.
- 6.35.20 The fragility classification shall be determined in accordance with ACR[M]001: 'Test for non-fragility of profiled sheet roof assemblies', published by Advisory Committee for Roofwork.
- 6.35.21 If specified in the Project Particular Specification, windows shall also comply with the requirements of LPS 1175: "Requirements and testing procedures for the LPCB approval and listing of intruder resistant building components, strongpoints, security enclosures and free-standing barriers" published by Loss Prevention Certification Board or similar approved certification.
- 6.35.22 Filler blocks shall be manufactured from EPDM and shall be of closed cell construction to ensure a weathertight seal.

6.38 Soil, Waste, Ventilation and Rainwater Pipework and Fittings

- 6.38.1 All soil, waste and rainwater shall be laid to a minimum fall of 1 in 60 unless otherwise stated.
- 6.38.2 Pipework and fittings shall be installed in accordance with the recommendations of BS 8000: Parts 13 and 14 and BS EN 12056: Part 5 as well as the manufacturers' instructions.
- 6.38.3 Pipes bridging building movement joints shall be installed with provision to accommodate the maximum movement anticipated.
- 6.38.4 Pipes passing through fire barriers, walls, slabs and beams shall be installed in a manner which prevents the passage of smoke and flame across the fire barrier and which allows thermal movement of the pipes.
- 6.38.5 Access covers for rodding shall be fitted as near as practicable to the top of the pipe or fitting and never on the invert.
- 6.38.6 Ventilation pipes passing through roofs shall be waterproofed to details shown on the Drawings and terminated with a copper or plastic balloon grating.
- 6.38.7 The junction between above ground pipes and below ground pipes shall be by means of a flexible joint, or as shown on the Drawings.
- 6.38.8 When mild steel pipework is specially fabricated, the *Contractor* shall submit a procedure detailing the jointing, installation and supports for the approval of the *Contract Administrator*. This is a **Hold Point**.
- 6.38.9 All bends shall be to the largest practicable radius and branches shall be swept in the direction of flow. Elbows shall not be used for drainage purposes.
- 6.38.10 Pipes with integral sockets shall be fixed with the socket at the upper end for vertical and inclined runs.
- 6.38.11 All pipe fixings shall be set straight and true with suspension rods plumb.
- 6.38.12 Guide brackets shall be used for intermediate supports between fixed brackets for all vertical pipework.
- 6.38.13 Pipe runs having integral sockets and mechanical ring seal joints to accommodate expansion shall have fixed brackets to secure the pipe socket collars.
- 6.38.14 Plain barrel pipes with double mechanical ring seal joint socket connectors shall have brackets fixed on the pipe barrel at the highest point of each pipe. They shall be located 150mm from the socket.

6.39 Conduits

- 6.39.1 Bending of conduits shall not reduce the bore of the conduit by more than 5%.
- 6.39.2 Bends in uPVC conduit shall be formed using bending springs.
- 6.39.3 Cold bending of steel conduit shall be carried out on a bending machine with a minimum radius (measured to the centre line) of 12 x diameter of tube.
- 6.39.4 Burrs at cut ends of conduits shall be removed.
- 6.39.5 Conduits shall be securely fixed with a minimum clearance of 50mm maintained from all other embedments and the finished surface.
- 6.39.6 After installation, conduits shall be cleared of debris.
- 6.39.7 Draw wires shall be installed in all conduits such that the wires extend 1000mm pass each end of the conduit. After installation of the draw wires, the conduits shall be plugged and the wires fastened at each end of the conduits
- 6.39.8 For galvanised steel conduits, threads and any other damaged areas of protective coatings shall be made good with galvanising paint.

6.40 Repairs to Plaster and Dry Lining

- 6.40.1 Any damage to plasterwork and/or dry lining shall be repaired by the *Contractor* by a method agreed with the *Contract Administrator*. This is a **Hold Point**.
- 6.40.2 Damage shall include:
- (i) Physical damage
 - (ii) Blistering efflorescence
 - (iii) Cracking due to background movement
- 6.40.3 Denting or scuffing of the finished surface shall be repaired by lightly rubbing down the surface and filling the void flush with joint filler in two applications.
- 6.40.4 Indentation of the finished surface resulting in fracture or disintegration of the core shall be repaired by removing all loose material. The paper edge around the hole shall be scored, cut back and sealed with polyvinyl acetate. The hole shall then be filled with joint filler in two applications.
- 6.40.5 For more extensive damage, the damaged hole shall be trimmed to form a neat, rectangular opening and a new wallboard cut to fit the opening. For stud partitions, the infill patch shall be fixed to a piece of wallboard 100mm longer and 3mm narrower than the opening. This wallboard shall be fixed to the back face of the broken board with joint filler. For walk-board lining defects, the patch shall be fixed to the wall with plaster dabs. When the patch adhesive has set, the joints shall be treated in a similar manner to cut edges during installation.

6.41 Suspended Ceilings

- 6.41.1 Suspended ceiling systems shall be installed to comply with the provisions and recommendations/guidance of BS EN 13964.
- 6.41.2 The suspension ceiling system shall be of the exposed grid type, and shall include all fixings such as rods, brackets, bracing, hangers, perimeters, connections and accessories designed to form an integrated and rigid framework in two horizontal directions.
- 6.41.3 All members shall be of galvanised steel.
- 6.41.4 Exposed flanges and trims shall be shop finished to the specified colour.
- 6.41.5 The main horizontal suspension members shall comprise channel sections in accordance with the ceiling manufacturer's recommendations. Joints between members shall comprise back to back channels with an overlap of approximately 400 mm and with a hanger support wire fixed at the mid-point of the junction. Metal tees for supporting the tiles shall be located immediately below the main horizontal support members.
- 6.41.6 Perimeter edge support shall be of steel or aluminium angle. Angle size shall be approximately 50mm (vertical edge) x 37mm (horizontal edge).
- 6.41.7 Hanger fixing centres shall not be greater than 1200mm.
- 6.41.8 Fixings for edge support angles shall be either:
- a) Fixed directly to softwood grounds approximately 50mm x 18mm, i.e. with the face approximately 5mm proud of the face of a plaster finish. The 5mm gap shall be caulked using a one part polysulphide based sealant.
 - b) Fixed directly to softwood grounds approximately 50mm x 50mm wide with the bottom face wrot and painted black.
- 6.41.9 Tile fixings shall facilitate full access.

- 6.41.10 Tiles in any room or space protected by an inert gas fire protection system shall be secured to prevent lifting of the panel by the pressure differential generated during inert gas discharge.
- 6.41.11 Mineral fibre tiles shall provide a level surface free from any bowing or sagging and with accurately aligned joints.
- 6.41.12 Calcium silicate tiles shall provide a uniform appearance.
- 6.41.13 Hold-down clips, connectors and fasteners shall be in accordance with the ceiling manufacturer's recommendations.
- 6.41.14 Provision for a minimum of 50mm horizontal seal around ventilation ducts, pipes and other openings within the ceiling void shall be made.
- 6.41.15 Any works which shall be concealed by the suspended ceiling system shall be completed, tested, inspected, deviations checked to be within the tolerances stated in BS EN 13964 and accepted before the suspended ceiling work is started. This is a **Notification Point**.
- 6.41.16 Surfaces abutting or supporting suspended ceiling membranes shall be inspected and accepted for completeness and adequacy to receive the ceiling membranes before the installation of the membranes begins. This is a **Notification Point**.
- 6.41.17 Cut edges of membranes shall be located behind the perimeter edge supports to the ceiling.
- 6.41.18 Cavity fire barriers shall be installed vertically in voids above ceilings at not more than 20 metres spacing in any direction unless agreed otherwise following consultation with the local Fire Authority.
- 6.41.19 Cavity fire barriers shall be fixed positively to the soffit of concrete floors by means of a sheradised steel angle. The blanket shall be of sufficient depth to provide minimum 50mm horizontal seal to the back of the ceiling tiles. End laps to the blanket shall be minimum 30mm.

6.42 Raised Access Floors

- 6.42.1 Raised access floors shall comply with the provisions and recommendations of 'Platform Floors (Raised Access Floors) Performance Specification', document no. PF2 PS/SPU, published by Property Services Agency. Where reference is made to 'The Authority' in the document, this shall mean the Contract Administrator.
- 6.42.2 The system shall be fully adjustable to cater for tolerances encountered in the level of the sub-floor.
- 6.42.3 The pedestal shall be a galvanised, mild steel, two part base unit comprising a male and female threaded section allowing a + 12mm adjustment. A galvanised mild steel tube shall be bonded into the base unit to provide the correct overall floor height and shall have a cast aluminium head component to the top of the said tube.
- 6.42.4 The first preference dimensional grid of the supporting pedestals shall be of a co-ordinating size of 600mm x 600mm.
- 6.42.5 Additional supplementary pedestals adjacent to the perimeter, around columns and under heavy loads etc. may be required and installed providing they are acceptable and that they do not interfere with any services installation.
- 6.42.6 The grid pattern shall be such that all joint locations co-ordinate with internal partitions and/or the raised access floor tiles or other such features as appropriate
- 6.42.7 Where cut panels occur at column positions or at the perimeter of rooms additional pedestals or continuous edge supports shall be provided. Continuous edge supports shall be used where perimeter panels are less than 150mm wide. All perimeter and cut panels shall be capable of withstanding the required loading as specified previously.

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- 6.42.8 Perimeter panels of 150mm width or more shall be provided with additional pedestals against the perimeter at the walls which may have their bases cut to enable them to be placed as close as possible to the edge of the floor provided. The reduced base area is not to be less than 70% of its original full area.
- 6.42.9 There shall be a mechanically produced recess at each of the four corners of the underside of the panel to provide a positive location at the support point of each pedestal head. The steel tray shall not be broken at this point, i.e. drilled holes will not be acceptable for the recess.
- 6.42.10 Unless specified otherwise, pedestals shall be bonded and mechanically fixed to the sub-floor using adhesive and two fixings per pedestal.
- 6.42.11 All concrete and brickwork within the floor void shall be sealed.
- 6.42.12 Cavity fire barriers shall be installed vertically in the floor void in accordance with the Building Regulations and/or as agreed with the Local Fire Authority.
- 6.42.13 The cavity barrier shall be a proprietary free standing fire stop system comprising sections of modified twin density mineral wool. The sections shall be supplied oversize to ensure a tight fit and shall be installed with all joints staggered. The system shall be designed to provide a certified fire stop with a minimum of 30 minutes fire resistance and shall be installed fully in accordance with the manufacturers written instructions.
- 6.42.14 Any work which shall be concealed by and/or support the raised access floors shall be completed, tested, inspected and accepted before raised access floor work is started. This is a **Notification Point**.
- 6.42.15 The floor system shall not be installed until wet trades have finished their work, services are complete below the level of the raised access floor and heating is on. The raised modular access flooring system shall be installed under normal dry internal conditions. The areas shall have a temperature of between 18°C and 21°C and a relative humidity of between 45% and 55%.
- 6.42.16 Carpet tiles shall commence from the centre of the room. The centre of a tile or a tile junction shall be located along the centre line of a room or principal wall, with all lines and joints straight and parallel to walls with cut tiles only at the edges. The tiles shall be secured using nylon inserts fitted to the four corners of the topside of the panel which locate with nylon lugs bonded to the underside of the carpet tiles. The system shall ensure that the carpet tiles remain on grid to provide access to the one floor panel it covers. The carpet tiles shall not be retained by tapes or adhesives of any kind. For vinyl floor finish factory applied 2mm vinyl shall be bonded to the top surface of the panel in accordance with the manufacturer's instructions.
- 6.42.17 Where cut panels occur, the cut edge of the panel shall be sealed with self adhesive heavy gauge aluminium foil tape to prevent the ingress of moisture and deterioration of the insulation core.
- 6.42.18 After installation of the access floor, panel lifting devices shall be used to gain access to the void for installation of services.
- 6.42.19 For installation of services, either only one complete row of panels shall be removed at one time, or every other panel in every run shall be removed.
- 6.42.20 Socket outlet boxes shall be cut centrally on the two control axes of a panel. Socket outlet boxes shall be of a design which shall maintain the integrity, insulation and stability of the access flooring system during a fire.
- 6.42.21 Socket outlet boxes shall only be cut centrally on the two control axes of a panel.
- 6.42.22 No cables may pass through the floor panels other than to socket outlet cut-outs.
- 6.42.23 Socket outlet boxes shall be of a design which will maintain the integrity, insulation and stability of the access flooring system during a fire.
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6.42.24 The Contractor shall provide evidential documentation to the Contract Administrator for approval in order to demonstrate compliance with the stated performance requirements, or, for performance requirements not specifically stated, the Contractor shall provide details of the performance proposed. Furthermore, the Contractor shall provide full design details. This is a **Hold Point**.

6.43 Mastic Asphalt Flooring

6.43.1 Mastic asphalt for flooring shall be to either BS 6925:1988, 'Specification for mastic asphalt for building and civil engineering (limestone aggregate)' or BS 6577:1985, 'Specification for mastic asphalt for building (natural rock asphalt aggregate)'

6.43.2 Mastic asphalt flooring, underlays and isolating membranes shall comply with the relevant provisions of BS 8204: Part 5.

6.43.3 Isolating membranes for asphalt floors shall be either:

a) resin-coated glass fibre tissue

b) bituminised sheathing felt to BS EN 13707:2004+A2:2009 'Flexible sheets for waterproofing. Reinforced bitumen sheets for roof waterproofing. Definitions and characteristics'

6.43.4 Concrete surfaces shall be clean, free from contamination and dry.

6.43.5 Where an isolating membrane is specified, the concrete shall have a slightly coarsened surface.

6.43.6 Metal surfaces shall receive one coat of cut-back bitumen primer and be allowed to dry.

6.43.7 Mastic asphalt shall not be laid at ambient temperatures below 10°C.

6.43.8 The use of heating cauldrons shall only be permitted with the *Contract Administrator's* approval. This is a **Hold Point**.

6.43.9 Asphalt shall be laid with clean and neat joints staggered not less than 150mm. The proposed layout of bays shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.

6.43.10 Where bays in mastic asphalt floors exceed 100 m² they shall be constructed alternately

6.43.11 A gap of 50mm shall be left between asphalt coats and abutting surfaces. The gap shall be filled within 12 hours with flooring asphalt when cooling shrinkage has taken place.

6.43.12 Skirting shall have a 25mm radius coved fillet.

6.43.13 All channels and outlets shall be formed to ensure watertight joints.

6.43.14 On completion of laying, an ambient temperature shall be maintained above 10°C for at least 3 days to allow curing of the floor.

6.43.15 The *Contractor* shall retain records of all stages of the installation including dates of laying, testing carried out and environment conditions for each area of floor finish.

6.44 Built-up Roofing Systems

6.44.1 The installation of built-up roofing systems shall comply with the recommendations and commentary of BS 8000: Part 4 unless otherwise stated in the Specification.

6.44.2 Where the built-up system is to replace an existing built-up system, the existing built-up system shall be completely removed from these areas without damage or distortion to the deck.

6.44.3 The vapour control layer shall be laid with the longitudinal joints parallel to and located on the flat upper parts of the deck troughing with a minimum side lap of 75mm. End joints of

adjacent rolls shall be staggered, and shall have a minimum lap of 100mm. Sufficient bonding compound shall be applied between rolls across laps to ensure a complete seal.

- 6.44.4 Where the vapour control layer is laid on flat metal surfaces forming gutters and similar details, joints shall be bonded in bitumen compound with a minimum lap of 100mm.
- 6.44.5 The minimum bearing of insulation boards on the ridges of the deck shall be the greater of 25mm or the manufacturer's recommendations. Joints shall not coincide with those formed in the underlying vapour control layer.
- 6.44.6 The insulation and first layer of waterproof membrane shall be mechanically fixed to the ridges of the deck through the vapour control layer at the rate stated from the design, but subject to the minimum rate of fixing of 5 nr. /m² and each insulation board secured with at least four fixings. A fixing shall always be located within 150mm of the corners of each board with the minimum distance between fixings and the edge of the board being 75mm.
- 6.44.7 For bitumen felt roofing, Clause 6.30 shall be complied with.

6.45 Flashings

General

6.45.1 For material requirements refer to TS 3.10.2 Section 2.43 Flashings

- 6.45.2 All work shall be carried out by skilled operatives.
- 6.45.3 All base surfaces shall be clean, dry, smooth and free from projections before the start of laying and fixing the covering materials.
- 6.45.4 All preparatory work shall be carried out prior to the fixing of the materials.
- 6.45.5 Direct contact with dissimilar metals shall be avoided by the use of a heavy coating of bituminous paint, isolating tape or felt as appropriate. Isolation shall be provided from copper lightning conductors.
- 6.45.6 Prior to the installation of any metalwork the *Contractor* shall examine the base surfaces to ensure that all surfaces are smooth, clean, dry and free from foreign matter and all provisions made to enable fixings to be made. This is a **Notification Point**.
- 6.45.7 Continuous stepped flashings shall be formed at junctions of pitched roofs with brickwork. The upstand shall be lapped by a minimum of 100mm and the bottom edge secured with tacks at 600 mm centres

Lead Flashing

- 6.45.8 Handling, storage and installation of lead flashing shall comply with the provisions of BS 6915 unless otherwise stated.
- 6.45.9 Lead slates, flashings, collars, ridge saddles at abutments and intersections shall be formed with Code 4 lead
- 6.45.10 The upstand of flashings shall be lapped by a minimum length equivalent to a vertical height of 100mm. A saddle shall be formed at the ridge.
- 6.45.11 Lead flashing shall be finished 50mm clear of flat roof coverings with a 150mm minimum depth of flashing. Maximum end laps shall be 100mm and lap upstands shall be not less than a length equivalent to a vertical height of 100mm. A saddle shall be formed at the ridge.
- 6.45.12 Lead slates, flashings and collars shall be installed as follows:
 - (i) Fit slates around pipes or obstruction penetrating the roof
 - (ii) Dress into roofing for full slate/tile lap
 - (iii) Lead burn collar to lead slate
- 6.45.13 Ridge saddles at abutments and intersections shall be installed as follows:

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- (i) Lap over adjacent abutment flashing at each side where applicable
 - (ii) Project a minimum of 150mm along the ridge and down the roof slope
 - (iii) Turn top edge a minimum 25mm into groove and lead wedge at 450mm centres, followed by pointing in mortar where applicable
- 6.45.14 Continuous stepped flashings shall be formed at junctions between pitched roofs and brickwork. The flashing shall be turned 25mm into chases, wedged at each step and pointed in mortar. The lap upstand shall be 100mm and the bottom edge tacked at 600mm centres.
- 6.45.15 Wide sheets of lead fixed to concrete or masonry shall be dressed into dished hollows 75mm diameter x 37mm deep, where shown on drawings. The lead shall be screwed to plugs in the concrete using brass or stainless steel screws with suitably protected washers approx 37mm diameter. The hollow shall be filled with a lead solder using a suitable flux to ensure adhesion to the lead.
- 6.45.16 Where lead burning is required, edges and faces of lead to be joined shall be shaved clean and shall not be handled thereafter. The weld shall penetrate fully but shall not burn through the material. The thickness of the lead burned seam shall be approximately one third thicker than the lead sheet being welded.
- 6.45.17 Lead retaining clips and tacks shall be 50mm wide and cut from lead sheet to match the flashing.

Aluminium Flashings

- 6.45.18 Installation of aluminium flashings shall comply with the provisions of CP 143: Part 15.
- 6.45.19 Aluminium sheet and strip shall be prevented from contact with dissimilar metals to prevent electrolytic action and corrosion.
- 6.45.20 Aluminium coverings shall be cut cold, formed and bent to the specified profiles in workshop conditions.
- 6.45.21 Waterproof washers shall be used where fasteners penetrate flashings.

6.46 Caulking and Sealing Joints

- 6.46.1 Workmanship for caulking and sealing shall comply with the provisions, recommendations and commentary in BS 8000: Part 16.
- 6.46.2 The *Contractor* shall provide evidence to the *Contract Administrator* of suitable training for personnel caulking and sealing joints. This is a **Hold Point**.
- 6.46.3 Sample joint lengths shall be carried out to demonstrate to the *Contract Administrator's* satisfaction that the proposed method of working complies with the manufacturer's recommendations. This is a **Hold Point**.
- 6.46.4 Joints in concrete shall not be sealed until the concrete is at least 28 days old.
- 6.46.5 The sealant/caulking compound face shall be tooled to a slightly concave surface recessed behind adjacent structural surfaces except in the case of poured sealants.
- 6.46.6 All installed caulks or seals shall be debonded over their back.
- 6.46.7 Filler material shall be detailed with a bond breaker as recommended by the manufacturer if the material used has no releasing property.
- 6.46.8 Multi-part, high performance sealants shall be used in joints with high movement joints.
- 6.46.9 In damp application conditions a cold applied two part elastomeric cement mortar shall be used
- 6.46.10 The depth of joints filled with caulking compound shall be half the joint width, with a minimum depth of 12mm.

- 6.46.11 The *Contractor* shall notify the *Contract Administrator* when cavities of joints have been prepared for filling and when the joints have been primed and the back up filler is in place. This is a **Notification Point**.

AMENDMENTS RECORD

Issue	Date	Summary of Changes / Reasons	Author(s)	Approved By (Inc. Job Title)
1	09/07/10	First issue. Document numbered to align with CESWI6 and replaces NGTS2.10	Andy Finn Jacobs	Ursula Bryan Asset Policy Manager
2	April 2017	Update to CESWI7 and Eurocodes	Gibson Bhunu Policy Development Engineer – Civil Engineering	Stewart Whyte Asset Policy Manager

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