

MATERIALS TS 3.10.02

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GENERIC TECHNICAL SPECIFICATION FOR CIVIL, STRUCTURAL AND BUILDING ENGINEERING

SECTION NO: 02 MATERIALS

TITLE: MATERIALS

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 and CESWI7.

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

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MATERIALS

2.0 Materials - General

- 2.0.1 Certificates of conformity tested by third parties for proprietary products used and material test certificates shall be supplied to demonstrate compliance with the *Contract*. This is a **Hold Point**.
- 2.0.2 The *Contractor* shall be responsible for the proper security, handling and correct storage of all materials.
- 2.0.3 In addition to any specific requirements of the *Contract*, materials shall be handled, stored and used in accordance with the manufacturer's recommendations and where applicable, European, British and International Standards.
- 2.0.4 Any conflicts between the manufacturer's instructions and standards shall be brought to the attention of the *Contract Administrator*. This is a **Hold Point**.
- 2.0.5 All manufacturers, suppliers and designers shall comply with the requirements of BS EN ISO 9001.
- 2.0.6 The design of electrical products shall comply with the requirements set out in the EMC Directive. The CE mark shall be affixed to products as required by the Directive.

Storage, Handling, Protection and Installation of Materials

- 2.0.7 All proprietary materials shall be stored, handled, protected, prepared and installed in accordance with the relevant manufacturer's recommendations/instructions. The *Contractor* shall provide the *Contract Administrator* for approval with a method statement for these activities. This is a **Hold Point**.

Manufacturers and Suppliers of Materials and Products

- 2.0.8 The *Contractor* shall make arrangements with manufacturers and suppliers of materials to afford all reasonable opportunity and facility for the *Contract Administrator* to inspect all aspects of the production and testing. This is a **Hold Point**.

2.1 Materials in Contact with Potable Water

- 2.1.3 The *Contractor* shall provide to the *Contract Administrator* certification to demonstrate compliance with Clauses 2.1.1 and 2.1.2. This is a **Hold Point**.

2.3 Admixtures for Concrete or Grout

- 2.3.3 If the *Contractor* wishes to use admixtures, details of the admixtures shall be submitted to the *Contract Administrator* for approval to demonstrate that the admixture is compatible with all other constituents in the mix and other materials embedded in the concrete or grout as well as their effectiveness. The *Contract Administrator* may require verification of the suitability of admixtures by trial mixes. This is a **Hold Point**.
- 2.3.4 Admixtures for sprayed concrete shall be in accordance with BS EN 934: Part 5.

2.9 Bitumen Road Emulsions

- 2.9.1 Clause 2.9.1 is deleted in its entirety and replaced as follows:
Bitumen road emulsions shall comply with the relevant provisions of Series 900 of the Highways Agency's 'Specification for Highway Works'. Refer to introduction to TS 3.10.08 Roadworks.

2.12 Boards for Panelling

2.12.1 Clause 2.12.1 is deleted in its entirety and replaced as follows:

Boards for panelling shall comply with the relevant provisions of the appropriate Standard, as set out in the following table:

Board type	Standard
Cement-bonded particleboards	BS EN 634
Expanded polystyrene boards - expandable boards	BS EN 13163
Expanded polystyrene boards - extruded boards	BS EN 13164
Fibre board - hardboard	BS EN 622: Parts 1 and 2
Fibre board - medium board	BS EN 622: Parts 1 and 3
Fibre board - softboards	BS EN 622: Parts 1 and 4
Fibre board - MDF	BS EN 622: Parts 1 and 5
Gypsum plasterboard	BS EN 520, BS EN 13950, BS EN 14190, BS EN 13915
Rigid polyurethane foam	BS EN 13165
Laminated plastics sheet veneered boards	BS 4965
Oriented strand board	BS EN 300
Resin-bonded unfaced particleboards (chipboard)	BS EN 312
Particle boards	BS EN 634

2.12.2 Joint fillers, finishes, tapes and similar shall be as recommended by the manufacturers of the gypsum plasterboards.

2.12.3 Gypsum plasterboards for use as base boards and drylining wall-boards shall be of the following types:

- (i) square or round edges baseboard
- (ii) fire resisting baseboard
- (iii) thermal baseboard with polystyrene layer to BS 3837-1:2004, 'Expanded polystyrene boards. Boards and blocks manufactured from expandable beads. Requirements and test methods'
- (iv) vapour check baseboard with metallised polyester foil
- (v) vapour check thermal baseboard with vapour resistant membrane

2.14 Bricks and Blocks

2.14.1 Clause 2.14.1 is deleted in its entirety and replaced as follows:

Bricks and blocks shall be in accordance with the relevant provisions of the appropriate Standard, as set out below:

Type of brick or block	Standard
Aggregate concrete masonry units (Dense and lightweight)	BS EN 771: Part 3

Autoclaved aerated concrete units	BS EN 771: Part 4
Calcium silicate masonry units	BS EN 771: Part 2
Clay bricks	BS EN 771: Part 1
Clay flue blocks	BS EN 1806
Clay flue liners	BS EN 1457: Parts 1 and 2
Clay flue terminals	BS EN 13502
Concrete flue blocks	BS EN 1858
Manufactured stone units	BS EN 771: Part 5
Natural stone masonry units	BS EN 771: Part 6

- 2.14.8 Clay brick slips shall not be less than 25 mm thick cut from facing bricks.
- 2.14.9 Facing bricks shall be sound well burnt bricks of uniform shape and colour with no chipped exposed edges.
- 2.14.10 Concrete bricks used in conjunction with concrete blockwork for infilling round jambs, openings or heads of walls shall be of similar composition and appearance to the blocks and shall be of a size compatible with the selected block.
- 2.14.11 Concrete masonry units shall be suitable for fair faced work unless otherwise shown on the Drawings.
- 2.14.12 The *Contractor* shall provide samples of all bricks and blocks proposed to be incorporated in the works for approval by the *Contract Administrator*. This is a **Hold Point**.

2.16 Cement

- 2.16.1 Clause 2.16.1 shall be applied with the following additions:

Pozzolanic pulverised-fuel ash cement shall comply with BS 6610 where not in contrast with BS EN 14216 for very low heat special cements

Sulphate-resisting Portland cement shall be low alkali with an equivalent sodium oxide (Na₂O eq) content of less than 0.6% defined by weight as % K₂O x 0.658 + % Na₂O and determined by the method and procedure in BS EN 196: Part 2.

2.17 Cement Grouts

- 2.17.4 Unless otherwise agreed, grout packing under metal bases shall be a proprietary, pre-packed, non-shrink cementitious or epoxy based grout. Cementitious grouts shall be non-metallic, chloride free and contain non-reactive aggregates. The *Contractor* shall provide details of the grout including product conformity certificate to the *Contract Administrator* for approval. This is a **Hold Point**.

Grout for Ducts with Post Tensioned Tendons

- 2.17.5 Grout for ducts with post tensioned tendons shall be as follows:

Diameter of duct, mm	Grout class (See Cl. 2.17.1)
< 150	G1
≥ 150	G2

2.17.6 Cement for grout shall be Portland (CEM I) cement to BS EN 197: Part 1, Class 42.5N.

2.17.7 Grout shall be produced in accordance with BS EN 447.

2.17.8 The grout mix shall ensure that there is no overall reduction in volume between the time of mixing and when the grout is no longer plastic.

2.17.9 The *Contractor* shall submit to the *Contract Administrator* for approval, details of any admixtures proposed to be used in the grout. This is a **Hold Point**.

2.19 Compressible Filler and Packing for Pipelines

2.19.1 Clause 2.19.1 is deleted in its entirety and replaced as follows:

Compressible board for interrupting concrete protection to pipelines shall be expanded polystyrene to BS EN 13164 or bitumen impregnated insulating board to BS EN 622-1 and BS EN 622-4. The minimum thickness of compressible filler shall be as follows:

Nominal Bore of Pipe (mm)	Thickness of Compressible Filler (mm)
Less than 450	18
450 - 1200	36
Exceeding 1200	54

2.20 Concrete - General

2.20.5 Clause 2.20.5 is deleted in its entirety and replaced as follows:

Where identity testing is specified as defined in BS 8500: Part 1, Annex B for strength, it shall be undertaken in accordance with BS EN 206: Part 1, Annex B as follows:

Type of Structure	Applies to:	Sample to Represent a Volume of (m ³)
Critical structures	Cantilevers, columns	10
Intermediate structures	Beams, slabs and walls	20
Heavy concrete construction	Solid rafts	50

Testing for strength shall be undertaken as follows:

Number of Cubes from Each Sample	Days after Casting
1	7
2	28
1	In reserve for further testing, if required

2.20.6 Unless otherwise stated, concrete shall be in accordance with the guidance given in BS8500: Part 1.

2.20.7 Where the reactive alkali content from sources other than cementitious material exceeds 0.2kg/m³ they shall be taken into account so that the reactive alkali content of the mix does not exceed 3kg/m³ of sodium oxide equivalent (Na₂O eq).

2.20.8 All testing shall be undertaken by a laboratory accredited for the relevant tests by NAMAS.

2.20.9 Curing agents shall not be detrimental to the concrete and shall be compatible with the applied finish.

2.21 Concrete Containing pfa or ggbs

2.21.3 The reactive alkali content of the concrete mix shall not exceed 3kg/m³ of sodium oxide equivalent (Na₂O eq) as determined by the method and procedure in BS EN 196: Part 2.

2.26 Concrete Pipes and Fittings

2.26.4 Each concrete jacking pipe shall incorporate three injection holes, spaced equally around the circumference. In addition, each pipe may incorporate lifting holes and fixing holes for securing temporary apparatus. All such holes shall be threaded to enable plugs to be screwed into the sockets to withstand external water pressures. Collars for jacking pipes shall be of the fixed collar type, cast integrally with the pipes but shall not be attached to reinforcement and associated spacers required to provide structural strength for in-situ loading conditions. Collars shall be fabricated from:

- (i) Stainless steel plate to BS EN 10095, or
- (ii) Weldable structural mild steel plate

2.29 Copper Pipes and Fittings

2.29.3 Fittings for copper pipes shall have capillary soldered brazed or compression joints to BS EN 1254: Parts 1 and 2.

2.31 Damp-Proof Course

2.31.1 Clause 2.31.1 is deleted in its entirety and replaced as follows:

Damp-proof course materials shall accord with BS 743 and shall comply with the relevant provisions of the appropriate Standard, as set out below:

Material	Standard
Bituminous	BS 6398
Clay masonry units (HD Type)	BS EN 771: Part 1
Lead	BS EN 12588
Mastic asphalt (limestone aggregate)	BS 6925
Polyethylene	BS 6515
Slate	BS 743

2.31.2 The *Contractor* shall provide samples of all damp-proof courses proposed to be incorporated in the works for approval by the *Contract Administrator*. This is a **Hold Point**.

2.32 Doors, Frames and Linings

2.32.4 Doors, frames, linings and fittings shall comply with the relevant provisions of the appropriate Standard, as set out below:

Element	Standard
Doors - steel framed and glazed	BS 6510
Doorsets - PVC-U	BS 7412
Doors - PVC-U Class S	BS EN 12608
Doorsets - wooden	BS 4787: Part 1
Door leaves and frames - timber and wood based - external	BS EN 14220
Door leaves and frames - timber and wood based - internal	BS EN 14221
Frames - metal	BS 1245
Locks and latches	BS EN 12209 and LPS 1242
Closing devices	BS EN 1154
Emergency exit devices	BS EN 1125 and BS EN 179

2.32.5 Special furniture including escutcheons, card holders and name plates shall be finished to match the remainder of the furniture.

2.32.6 The *Contractor* shall obtain the approval of the *Contract Administrator* for the proposed manufacturer of doors, frames and linings. This is a **Hold Point**.

2.32.7 Sample sections shall be submitted to the *Contract Administrator* for approval to demonstrate the standard of fabrication and finish to be provided. This is a **Hold Point**.

2.32.8 Fixings shall comply with the provisions included in Clauses elsewhere in this Specification as well as the following requirements:

Element	
Decorative wood work for wood stopping	Lost headed nails
Hardwood, acidic wood or where clear surfaces are specified	Brass cup screws, or, Stainless steel screws with pressed socket pattern

2.32.9 The performance requirements shall comply with the provisions of the following Standards:

Performance	Standard
Windows and pedestrian doorsets without resistance to fire and/or smoke leakage	BS EN 14351: Part 1, and BS 6375: Parts 1, 2 and 3
Internal pedestrian doorsets without resistance to fire and/or smoke leakage	prEN 14351: Part 2 and BS 6375: Parts 1, 2 and 3
Windows and pedestrian doorsets with resistance to fire and/or smoke leakage	BS EN 14600 and BS 6375: Parts 1, 2 and 3
Windows and doors - burglar resistance	BS EN 1627
Windows and doors - air permeability	BS EN 12207
Windows and doors - watertightness	BS EN 12208
Windows and doors - resistance to wind load	BS EN 12210
Windows and doors - explosion resistance	BS EN 13123: Parts 1 and 2
Windows and pedestrian doors - mechanical durability	BS EN 12400
Doors - strength	BS EN 1192
Doors - operating forces	BS EN 12217
Doors - climatic influences	BS EN 12219
Windows - soft and heavy body impact	BS EN 13049
Windows - mechanical properties	BS EN 13115

2.32.10 Fire resistance shall comply with the relevant provisions of BS EN 13501: Parts 1 and 5 or BS 476: Parts 20, 22 and 23 as appropriate.

2.32.11 Design shall be in accordance with the BS 6262, 'Glazing for buildings' document suite.

2.32.12 Weatherstrips shall be to BS EN 12365: Part 1.2.32.13 Weather stripping shall be either siliconised woven polypropylene pile or extruded flexible PVC to BS 2571:1990, 'Specification for general-purpose flexible PVC compounds for moulding and extrusion'

2.32.14 The requirements for wind resistance, watertightness and air permeability shall be to BS 6375-1:2009, 'Performance of windows and doors. Classification for weathertightness and guidance on selection and specification'. Fire resistance shall be to the appropriate parts of BS 476, 'Fire tests on building materials and structures'.

2.32.15 Wood door sets shall be:

Location	Type
External	Hardwood
Internal	Softwood

2.32.16 Approved intumescent seals shall be provided around fire doors.

2.32.17 Veneered doors in pairs shall have matching veneers.

2.32.18 All flush timber doors shall be flat and smooth, with lippings, glue bonded.

2.32.19 Minimum requirements for hanging shall comply with the following requirements:

Door specification	Hanging specification
Internal non-fire doors up to 45 kg in weight or up to 2150mm x 850mm in size	Two unwashed steel hinges (bright zinc plated) 100mm x 75mm each fixed to the door and frame by 8 steel countersunk screws.
Internal fire doors up to 45 kg in weight or up to 2150mm x 850mm in size	Three unwashed steel hinges (bright zinc plated) 100mm x 75mm each fixed to the door and frame by 8 steel countersunk screws.
Internal fire and non-fire doors up to 60 kg in weight or up to 2500mm x 1000mm in size	Three (fire) and two (non-fire) washed steel hinges (bright zinc plated) 100mm x 75mm each fixed to the door and frame by 8 stainless steel countersunk screws.
External doors up to 45 kg in weight or up to 2150mm x 850mm in size	Three stainless steel hinges 100mm x 75mm each fixed to the door and frame by 8 stainless steel countersunk screws.
External doors up to 60 kg in weight or up to 2500mm x 1000mm in size	Three stainless steel hinges 100mm x 75mm each fixed to the door and frame by 8 steel countersunk screws.
Internal non-fire doors opening 1800mm up to 45 kg in weight or up to 2150mm x 850mm in size	Two unwashed steel projecting hinges (bright zinc plated) 100mm x 100mm each fixed to the door and frame by 8 steel countersunk screws.
Internal fire doors opening 1800mm up to 60 kg in weight or up to 2500mm x 1000 mm in size	Three unwashed steel projecting hinges (bright zinc plated) 100mm x 100mm each fixed to the door and frame by 8 steel countersunk screws.
Internal doors opening 1800mm up to 60 kg in weight or up to 2500mm x 1000mm in size	Three (fire) and two (non-fire) unwashed steel projecting hinges (bright zinc plated) 100mm x 100mm each fixed to the door and frame by 8 steel countersunk screws.
External doors opening 1800mm up to 45 kg in weight or up to 2150mm x 850mm in size	Three stainless steel hinges 100mm x 100mm each fixed to the door and frame by 8 stainless steel countersunk screws.
External doors opening 1800mm up to 60 kg in weight or up to 2500mm x 1000 mm in size	Three steel hinges 100mm x 100mm each fixed to the door and frame by 8 stainless steel countersunk screws.

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- 2.32.20 Hinges shall be located 125mm from the top edge and 250mm from the bottom edge. Other hinges, when specified, shall be equally spaced between the top and bottom hinges.
- 2.32.21 Observation windows in doors shall be bedded in a soft packing or turned over wash leather or in neoprene gaskets as specified.
- 2.32.22 Unless otherwise stated, locks for doors shall be able to be operated using the substation key suite. Three keys shall be provided for each lock where non-substation key suite locks are applicable. Each key shall be attached to a Traffolyte label with black lettering on a white background in Arial font, 4mm high indicating the room/item name as provided by the *Contract Administrator*.
- 2.32.23 All mechanical fastenings shall be protected against corrosion. Metalwork, nails, screws shall be galvanised as a minimum requirement. In exposed, corrosive or high humidity areas consideration shall be given to other suitable protection such as plating.
- 2.32.24 The framework of windows, doors, rooflights etc shall be fixed to the surrounding structure by positive mechanical anchors.

2.34 Draw Cord

- 2.34.1 Clause 2.34.1 is deleted in its entirety and replaced as follows:
- Draw cords for pulling of cables through ducts shall be rot and vermin proof with a minimum breaking load of 5kN and be in accordance with BS EN ISO 9554 and BS EN ISO 1346.

2.36 Ductile Iron, Cast Iron and Steel Pipes, Flanges and Fittings

- 2.36.3 Clause 2.36.3 is deleted in its entirety and replaced as follows:
- Steel pipes, fittings and joints shall comply with the relevant provisions of BS EN 10224, BS EN 10216: Part 1 or BS EN 10217: Part 1 SAW Grade 430.
- 2.36.10 All exposed ferrous metal including pipes, valves and brackets shall be externally protected in accordance with the requirements of the *Contract Administrator*.

2.38 Expanded Metal Angle Beads

- 2.38.2 Fixings shall comply with the provisions of BS 8481.

2.43 Flashings

2.43.1 Clause 2.43.1 is deleted in its entirety and replaced as follows:

Flashings shall comprise one of the following materials in accordance with the relevant provisions of the appropriate Standard, as set out below:

Type	Standard
Sheet or strip aluminium	BS EN 485: Parts 1 to 3
Bituminous felt flashings	BS EN 13707
Sheet or strip copper	BS EN 1172
Milled lead strip	BS EN 12588
Sheet or strip zinc alloy	BS EN 988

2.43.2 The *Contractor* shall submit samples of the proposed flashings to be used for approval by the *Contract Administrator*. This is a **Hold Point**.

2.43.3 Thicknesses of lead flashings shall accord with the following table:

Location	Thickness Code to BS 6915 (Thickness, mm) Colour Code
Gutter linings	6 (2.65) Black
Skirts	4 (1.80) Blue
Wall coverings	5 (2.24) Red
Ridges and hip coverings	5 (2.24) Red
Valley	5 (2.24) Red
Cornice coverings	5 (2.24) Red
Flashings, collars, aprons and soakers	4 (1.80) Blue
Other weatherings	4 (1.80) Blue

2.43.4 Clips, fasteners, solder and other fixing accessories for lead flashings shall comply with the provisions of the specifications stated in BS 6915.

2.45 Floor Tiles

2.45.1 Clause 2.45.1 is deleted in its entirety and replaced as follows:

Floor tiles shall comply with the relevant provisions of the appropriate Standard, as set out in the following table:

Type	Standard
Ceramic	BS EN 14411
Thermoplastic	BS EN 649
Semi-flexible PVC	BS EN 654
Unbacked flexible PVC	BS EN 649
PVC with jute, polyester felt or polyester felt with PVC backing	BS EN 650
Terrazzo	BS EN 13748: Parts 1 and 2
Cast stone	BS 1217

2.45.2 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.

2.45.3 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.

2.46 Foamed Concrete

2.46.1 Foamed concrete produced using ash or similar re-cycled materials shall NOT be used. Where there is any doubt consultation shall be carried out with National Grid and the material supplier.

INFORMATIVE: In August 2009 two persons were injured by an explosion involving a foamed concrete mix which included incinerator bottom ash aggregate (IBAA). The subsequent HSE investigation determined that the cause of the explosion was the ignition of flammable hydrogen gas created by the reaction of aluminium, which IBAA is known to contain in significant proportions, with the cement/concrete mixtures. National Grid SHES Bulletin – SB 227 dated 4/09/09 refers.

2.49 Gaskets for Flanged Joints and push-fit joints

2.49.1 Clause 2.49.1 is deleted in its entirety and replaced as follows:

Gaskets for flanged pipe joints shall be of the inside-bolt-circle type for pipes of bore less than 300mm and full face type for bores equal to or greater than 300mm.

2.50 General Filling Materials

2.50.1 Clause 2.50.1 is deleted in its entirety and replaced as follows:

The following imported fill material shall accord with the requirements described below:

Class	Types of materials	Sieve size, mm	Percentage by mass passing
I	Crushed rock, clay-bound gravel, well burnt colliery, shale, sand and gravel	75	100
		63	85-90
		37.5	50 – 70
		20	20 - 40
		10	0 -15
II	Hardcore – shall consist of any combination of broken or crushed concrete, clean hard brick, coarse gravel or hard stone. It shall be free from dust, rubbish and any other deleterious matter.	125	100
		75	70 – 90
		37.5	30 – 50
		20	10 – 25
		10	0 - 10
III	Quarry stone, concrete or stone rubble	375	100
		150	Not exceeding 50
		75	Not exceeding 15
IV	Well graded crushed rock, crushed slag, crushed concrete or well burnt non-plastic shale.	75	100
		37.5	85 – 100
		10	40 -70
		5	25 – 45
		600 micron	8 – 22
		75 micron	0 -10

2.50.4 Notwithstanding the requirements in Clause 2.50.2, acceptable and unacceptable materials for capping layer, general fill including structures and foundations, gabion fill and geotextiles shall comply with the requirements of Series 600: Earthworks in the Highways Agency's 'Specification for Highway Works'.

2.51 Glass for Glazing

- 2.51.2 Notwithstanding the requirements of Clause 2.51.1, glass shall also comply with the relevant provisions of the appropriate Standard, as set out below:

Glass Type	Standard
Soda lime silicate glass	BS EN 572: Parts 2 to 7 & 9
Fire resistant glazed elements	BS EN 357
Impact requirements	BS 6206 or, where this is replaced, BS EN 12600

2.52 Glass Reinforced Plastics (GRP) Pipes and Fittings

- 2.52.2 Pipes shall have flexible joints unless otherwise stated.

2.53 Glass Reinforced Plastic Products

- 2.53.4 Cesspools shall be designed to BS 6297 and supplied by an approved manufacturer with accreditation to BS EN ISO 9001, and covered by a British Board of Agreement Certificate.

2.54 Glazing Materials

- 2.54.3 Glazing accessories, beads, tape, setting blocks, channels, gaskets and spacers shall be as recommended by the glazing manufacturers.
- 2.54.4 Setting blocks, distance pieces and location blocks in plasticised PVC shall be to BS 2571.

2.55 Granular sub-base material

- 2.55.1 Clauses 2.55.1 to 2.55.8 are deleted in their entirety and replaced by the following:

Sub-base material shall comply with the requirements of Series 800: Earthworks in the Highways Agency's 'Specification for Highway Works'. Refer to introduction to TS 3.10.08 Roadworks.

- 2.55.2 Type 4 sub-base material (asphalt arisings) shall not be used.

- 2.55.3 Wherever economically and environmentally viable and provided they are demonstrably fit for purpose and not explicitly excluded by this or any other National Grid Technical Specifications recycled or secondary aggregates shall be used. The specification of such materials shall take as their basis the AggRegain Specifier Tool (<http://www.aggregain.org.uk/specifier/>) and all other relevant parts of TS 3.010.xx.

- 2.55.4 The use of granulated blast furnace slag (GBFS), or similar materials having elevated concentrations of sulphate or chloride, as unbound fill material is prohibited on all National Grid electricity substation and similar operational sites where buried earth tape is, or may subsequently be, installed. This is to avoid the risk of copper corrosion.

2.56 Grass Seed

- 2.56.2 Grass seed shall be certified and comply with the provisions of BS 4428 and the following:
- (i) Freshness: Produced for the current growing season
 - (ii) Certification: Blue label certified varieties
 - (iii) Standard: EC purity and germination regulations

- 2.56.3 The *Contractor* shall submit samples of mixtures as well as the official seed testing station certificate of germination to the *Contract Administrator* for approval. This is a **Hold Point**.

2.58 Gullies and Gully Cover Slabs

- 2.58.3 Clause 2.57.3 is deleted in its entirety and replaced as follows:
PVC-U gullies shall comply with BS EN 13598: Part 1.
- 2.58.4 All gullies shall have water sealed traps.
- 2.58.5 Linear drainage channels and gratings shall be in accordance with BS EN 1433.

2.59 Gully Covers, Gratings and Frames

- 2.59.2 Slots in gratings shall be selected such that they shall not be parallel to the flow of traffic.

2.62 Imported Topsoil

- 2.62.3 Samples of the proposed topsoil shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.

2.63 Imported Turf

- 2.62.1 Clause 2.63.1 is deleted in its entirety and replaced as follows:
Imported turf shall comply with BS 3969 and be delivered to the Site within 24 hours of lifting (18 hours in spring and summer). Constituent grasses and their proportions shall comply with the provisions of BS 3969:1998+A1:2013, Clause 3.
- 2.62.2 Samples of the imported turves shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 2.62.3 Unless otherwise specified, turves shall be 'General Purpose Utility Turf with Rye Grass' with root mass 25 to 37mm thick. Broken turves shall not be used.

2.64 Industrial Flooring, Walkways and Stair Treads

- 2.64.2 Clause 2.63.2 is deleted in its entirety and replaced as follows:
Finishes specified by the *Contract Administrator* to steel flooring, walkways and stair treads shall comply with the relevant provisions as set out below:

Finish	Standard
Dipped in black bitumen	Type 1 of BS 3416
Hot dipped galvanised in single operation	BS EN ISO 1461
Sherardize	Class 1 of BS 4921

- 2.64.5 Assemblies shall be held in the galvanising bath until the temperature of the assembly is equal to the temperature of the bath. Galvanising procedures shall avoid distortion of the assemblies. Where distortion does occur, assemblies shall be straightened and a cold galvanising compound applied to the areas where galvanising has been damaged.
- 2.64.6 The *Contractor* shall submit fabrication details to the *Contract Administrator* for approval. This is a **Hold Point**.

- 2.64.7 The *Contractor* shall submit manufacturer's test and material certificates for each secondary steelwork assembly as appropriate. This is a **Hold Point**.

2.65 Joinery Timber

- 2.65.1 Section 2.65 is deleted in its entirety. Refer to Section 2.126 Timber and Preservation of Timber.

2.66 Joint Filler Board

- 2.66.6 Joint filler boards shall comply with the following types:

Ref	Description
F1	Compressible non-extruding bitumen impregnated fibreboard expansion joint filler
F2	Non absorbent closed cell, cross linked, semi-rigid polyethylene joint filler
F3	Non absorbent closed cell readily compressible polyethylene joint filler and back up strip
F4	Bonded granular cork expansion joint filler
F5	Expanding polyurethane foam gap filler
F6	Filling for caulking movement joints in fire barrier walls or slabs shall be with an approved proprietary fire blanket. It shall be non-alkaline, shall be chemically stable and contain no corrosion promoting agents.

2.67 Joint Sealing Compounds and Sealants

- 2.67.3 Clause 2.67.3 is deleted in its entirety and replaced as follows:
Cold poured polymer-based joint sealants shall comply with BS EN 14188: Part 2 or BS 5212: Part 2.
- 2.67.7 Sealants shall be specified in accordance with BS EN ISO 11600:2003, 'Building construction. Jointing products. Classification and requirements for sealants'.
- 2.67.8 Polysulphide sealants shall comply with BS EN ISO 11600.
- 2.67.9 Preformed joint seals shall comply with BS EN 14188: Part 3.
- 2.67.10 The *Contractor* shall submit to the *Contract Administrator* for approval, all manufacturers' technical literature, including directions for use, storage (including shelf life) and disposal, current test results to demonstrate compliance with the relevant standard above and health and safety information. This is a **Hold Point**.

2.74 Manhole Covers and Frames

- 2.74.1 Access covers shall be manufactured and supplied in accordance with Fabricated Access Covers Trade Association's (FACTA) 'Specification for Fabricated Access Covers'.
- 2.74.2 Unless specified otherwise access covers shall be rated in accordance with their locations as defined in TS 2.10.05 Access Covers / Ducts / Trenches.
- 2.74.3 Manhole covers and frames shall be of non-rocking design which do not rely on the use of cushion inserts. 2.74.4 The top of the cover shall have an anti skid surface such as chequer plate or other approved textured surface.
- 2.74.5 Frames shall have maintenance free, hidden hinges.

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- 2.74.6 Access covers not designated as 'lift assisted' shall be configured such that the maximum lifted weight does not exceed 20kg.
- 2.74.7 Where access covers are lift assisted, they shall comply with the following:
- (i) The vertical pull required to open the cover shall not exceed 10 kg with the mechanical assistance reducing as the cover is raised such that it is zero when the cover is in the fully open position.
 - (ii) They shall incorporate devices such as compression springs, gas rams or hydraulic struts to aid easy operation
 - (iii) The compression springs, gas rams, hydraulic struts or other assist systems shall be configured such that they are replaceable without detaching the cover from its frame.
- 2.74.8 The cover shall open through at least 90 degrees and lock in the open position.
- 2.74.9 Hand operated auto safety stays shall be provided to enable locking of the cover in the open position at or beyond the vertical. Operation of the stays shall be possible without the need to lean over or into the chamber.
- 2.74.10 The cover and frame shall incorporate an integral latch arrangement as follows:
- (i) The arrangement shall allow the cover to be pulled tight to the frame on closing to prevent any tripping hazards or rocking under traffic load.
 - (ii) The latch shall not protrude above the top surface of the cover.
 - (iii) The means of operating the latching device shall be contained within the cover and frame and no additional tools shall be required.
 - (iv) The latching device shall be capable of being locked using a National Grid issued padlock.
 - (v) The latching device shall incorporate an indicator showing when the cover is latched and when it is free to open.
- 2.74.11 A hinged safety grill shall be incorporated beneath the cover to prevent operatives from accidentally falling into the chamber, as follows:
- (i) In the closed position this shall allow the chamber to be visually inspected
 - (ii) In the open position it shall facilitate the removal of any equipment or the access/egress of a person wearing suitable personal protective equipment without snagging.
 - (iii) The maximum spacing between the bars of the grill and between the sides of the grill and the sides of the chamber in either the open or closed position shall be 150mm.
 - (iv) There shall be at least one opening of not less than 125mm to enable a suction hose to be inserted into the chamber without opening the grill.
- 2.74.12 Access covers and frames shall be waterproof.
- 2.74.13 The cover and frame shall be configured such that water will not pond on the exposed surfaces.
- 2.74.14 The frame design shall allow any water accumulating within the frame to drain into the chamber.
- 2.74.15 Access covers and frames shall be ventilated.
- 2.74.16 Frames shall have lugs to enable the bolting of the frames to the chambers.
- 2.74.17 The Contractor shall supply for approval by the Contract Administrator, details of the proposed access covers including specification, drawings and details of maintenance and operation requirements. This is a **Hold Point**.
- 2.74.18 The Contractor shall supply 2 No. sets of lifting keys for each type of access cover used in the contract.
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2.75 Manhole Steps 2.75.1 Section 2.74 is deleted in its entirety. Manhole steps shall not be provided to any manholes / access chambers.

INFORMATIVE: Fixed step irons or ladders are not required in any access chambers (e.g. manhole, catchpit, oil separator, 'Underground Oil Containment Facility' etc.) because;

a) They provide an unnecessarily easy means of access that could facilitate unplanned, unsafe or unauthorised access.

b) Without regular inspection they cannot be legally utilised.

2.75.2 Where specialist equipment is required to access manholes and access chambers for maintenance and inspection, such equipment shall be provided as part of the works.

2.76 Marker Tape and Marker Posts

2.76.5 Clause 2.76.5 is deleted in its entirety and replaced as follows:

Marker posts, where required shall be fitted with a 180 x 205mm indicator plate to indicate valve pit number, valve identification numbers and types (WO, SV, AV or FH, as appropriate) together with main size and distance from post in black lettering on a white background. Plates shall comply with BS 3521 unless stated otherwise and shall be fixed to the post with stainless steel fixings.

2.76.7 Marker posts shall be placed at each valve position, field boundaries and, in open country, marker posts shall be at intervals of not more than one kilometre.

2.77 Mastic Asphalt

2.77.2 Samples of all materials forming mastic asphalt roofing systems including vapour control layers, vapour barrier, isolating membranes and separating membranes proposed together with details of source quantity and performance, shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.

2.77.3 Mastic asphalt for waterproofing shall comply with the provisions of BS EN 12970.

2.77.4 Any materials forming mastic asphalt roofing systems not stated in the Civil Engineering Specification for Water Industry (CESWI7), this supplementary Specification or the Particular Specification, shall comply with the provisions of BS 8218.

2.77.5 Rubbing sand shall comply with the provisions of BS 8218 and BS 8204: Part 5.

2.77.6 The *Contractor* shall submit to the *Contract Administrator* two copies of certificates verifying that all materials comply with the Specification and the relevant British Standards including results of tests specified. This is a **Hold Point**. Certificates for raw materials shall be provided for each consignment.

Bitumen Primer and Bonding Compounds for Mastic Asphalt Roofing and Flooring

2.77.7 Bitumen priming coats for metal surfaces shall be bitumen cut-back with a viscosity Redwood No 2 of 25 secs maximum at 21°C and a maximum volatile solvent content of 60 per cent by weight.

2.77.8 High bond proprietary bitumen based primers for concrete and masonry surfaces shall be to the approval of the *Contract Administrator*. This is a **Hold Point**.

2.77.9 Bitumen bonding compounds for bonding vapour barriers, insulants and walkway tiles shall be oxidised bitumen to BS EN 1426, BS 2000-49 and BS EN 1426, BS 2000-58.

2.77.10 Hot-applied bitumen compounds for bedding mineral chippings to mastic asphalt shall be cut-back bitumen to BS EN 15322, Table 3.

2.77.11 Any other grade of dressing compound of equal quality and performance shall be approved by the *Contract Administrator*. This is a **Hold Point**.

Isolating Membranes to Mastic Asphalt Roofing

2.77.12 Isolating membranes for mastic asphalt roofing shall comply with the relevant provisions of BS 8218.

Separating Membranes to Mastic Asphalt Roofing and Flooring

2.77.13 Isolating membranes for mastic asphalt roofing and flooring shall comply with the relevant provisions of BS 8218 and BS 8204: Part 5 respectively except sheathing felt shall be to BS EN 13707.

Vapour Control Layers

2.77.14 Water vapour control layers shall comply with the relevant provisions of the appropriate Standard, as set out below:

Material	Standard
Bitumen sheets	BS EN 13707
Plastic	BS EN 13984
Rubber	BS EN 13984
Felt	BS EN 13707
Mastic asphalt	R988 to BS 6925

Vapour Barrier to Mastic Asphalt Roofing

2.77.15 Vapour barrier to mastic asphalt roofing shall comply with the relevant provisions of the appropriate Standard, as set out below:

Material	Standard
High performance roofing felt incorporating a bonded aluminium foil and polyester woven base	BS EN 13707
Mastic asphalt (minimum thickness 10 mm)	BS 8218

2.78 Mechanical Couplings for Pipelines and Fittings

- 2.78.6 The use of mechanical couplings at locations not specified in the Contract shall be approved by the *Contract Administrator*. This is a **Hold Point**.
- 2.78.7 Couplings, fittings and sealing rings for polypropylene/polyethylene pipes shall be compatible with the pipes supplied.

2.79 Metal Lathing

- 2.79.2 Bitumen coated galvanised expanded flat metal lath with short way mesh not less than 10mm to BS EN 13658: Part 2 shall be used, where required, on mastic asphalt roofing systems.
- 2.79.3 Fixings shall comply with the provisions of BS 8481.

2.80 Metal Ties

2.80.1 Clause 2.79.1 is deleted in its entirety and replaced as follows:

Wall ties, tension straps, hangers and brackets for masonry shall be in accordance with BS EN 845: Part 1.

2.80.2 The *Contractor* shall submit to the *Contract Administrator* for approval, details of wall ties with polypropylene insulation retaining clips for insulation in cavity walls. This is a **Hold Point**.

2.82 Mortar

- 2.82.5 Details of equipment proposed for gauging mix proportions on site shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**. The accuracy of the equipment shall be checked at intervals in accordance with the manufacturer's recommendations, and it shall not be used if it has an error of ± 2.5 per cent or more.
- 2.82.6 Mixing shall be carried out by machine in accordance with BS EN 1996: Part 2. Hand mixing shall only be permitted for small quantities and when approved by the *Contract Administrator*. This is a **Hold Point**.
- 2.82.7 The *Contractor* shall submit details of the proposed method of mixing including sequence for each mortar type to the *Contract Administrator* for approval. This is a **Hold Point**.
- 2.82.8 Hydrated lime powder shall be mixed with sand in the dry state before adding water and then left for 16 hours.

2.83 Nails

- 2.83.1 Clause 2.83.1 is deleted in its entirety and replaced as follows:

Nails shall comply with the relevant provisions of the appropriate Standard as set out below:

Type	Standard
Steel including galvanised	BS EN 10230: Part 1 or (for nails not included in this Standard) BS 1202: Part 1
Copper	BS 1202: Part 2
Aluminium	BS 1202: Part 3
Stainless steel	BS EN 10088: Part 3

- 2.83.2 Nails for carpentry and joinery shall be round wire, annular ringed shank or helical threaded shank to BS 1202-1:2002, 'Specification for nails. Steel nails'
- 2.83.3 Nails for use in roofing systems including battens, counter battens, boarding, roof underlays, clips, slates, tiles and shingles shall accord with the specifications in BS 5534.
- 2.83.4 Nails for fixing UPVC fascias and bargeboards shall be stainless steel 65mm long purpose-made with integral plastic caps of matching colour, all in accordance with the fascia/bargeboard manufacturer's requirements.
- 2.83.5 Screws for fixing UPVC fascias and bargeboards shall be stainless steel 65mm long rolled thread screws with plastic cover caps of matching colour, all in accordance with the fascia/bargeboard manufacturer's requirements.
- 2.83.6 Nails for fixing UPVC cladding soffits shall be stainless steel of nominal size 30mm x 2.5mm diameter of a type suitable for secret nailing.

2.86 Nuts, Screws, Washers and Bolts

Hexagon bolts and nuts

- 2.86.7 Holding down bolts, nuts (with locking nuts being thin nuts or proprietary locking nuts) and normal diameter black washers to BS 4320, shall be of the same strength grade and comply with the relevant provisions of the appropriate Standard, as set out below:

Type	Standard
Hexagon head bolts - Product Grades A and B	BS EN ISO 4014
Hexagon head bolts - Product Grade C	BS EN ISO 4016
Hexagon nuts Style 1 - Product Grades A and B	BS EN ISO 4032
Hexagon nuts - Product Grade C	BS EN ISO 4034

- 2.86.8 Hexagon bolts and nuts for timber/timber or for timber/metal connections shall be to BS EN ISO 4016 and BS EN ISO 4034, each supplied with two washers to BS 4320. Heads of bolts over 6mm diameter shall be embossed oil indented with the letters ISOM or M and the manufacturer's name.

Screws

- 2.86.9 The following screws shall be used:

Purpose of fixing	Type of screw head
Fixed hardwood excluding ironmongery	Countersunk and pelleted
Removable hardwood excluding ironmongery	Cupped
Removable panels	'Mirror' type with screw-on dome heads

- 2.84.11 Screws for fixing UPVC fascias and bargeboards shall be stainless steel 65mm long rolled thread screws with plastic cover caps of matching colour, all in accordance with the fascia/bargeboard manufacturer's requirements.

2.88 Paints and Painting Materials for Buildings

2.88.4 Clause 2.88.4 is deleted in its entirety and replaced as follows:

Stopping for timber shall be a proprietary ready mixed emulsion polymer or oil based type suitable for internal or external use as appropriate.

2.88.9 Details of the proposed paint and painting materials' manufacturers shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.

2.88.10 Mineral solvents for paint shall be Type A complying with the relevant provisions of BS 245.

2.91 Pipes for Ducts

2.91.5 Where the *Contractor* is responsible for the design of an electrical installation, the *Contractor* shall provide the *Contract Administrator* with relevant information to enable the *Contract Administrator* to determine the specification requirements for the ducts. This is a **Hold Point**.

2.91.6 All pipes for ducts shall be free from any internal undulations, roughness or projections and shall have smooth radiused internal edges at the joints.

2.91.7 Vitrified clay pipes to BS 65 shall be specifically for ducts with flexible and self-aligning sleeve joints. Grooved cable conduits shall be provided for splitting where split conduits are required for protection of existing services.

2.93 Plaster

2.93.3 Bonding agents shall comply with the provisions of BS 8481.

2.94 Plastic Chambers and Rings

2.94.2 Riser shafts shall be integral with the base unit.

2.94.3 Inlet and outlet pipes shall have spigots compatible with the continuing pipework and protrude 500mm from the face of the chamber. The pipes shall be continuously welded to both the inside and outside walls of the chamber.

2.94.4 Chambers shall be supplied by an approved manufacturer with accreditation to BS EN ISO 9001, and covered by a British Board of Agreement Certificate.

2.95 Plastic Sheeting

2.95.2 Plastic sheeting shall be at least 500 gauge.

2.96 Plywood

2.96.1 Clause 2.96.1 is deleted in its entirety and replaced as follows:

Plywood for general use shall comply with the relevant provisions of BS EN 315, BS EN 635: Parts 1 to 3 and BS EN 636. Marine grade plywood shall be in accordance with BS 1088-1.

2.97 Polyethylene Pipes and Fittings

2.97.5 All polyethylene pipes shall be coloured blue for potable water supply purposes and black for non-potable water applications.

2.95.6 All bends used shall be formed by injection moulding or fabricated segmental radius bends (long radius bends). Under no circumstances shall drawn bends be used.

2.99 Precast Concrete Flags and Paving Blocks

2.99.3 Clay pavers shall comply with the relevant provisions of BS EN 1344.

2.105 Precast Concrete Tanks

2.105.2 Clause 2.105.2 is deleted in its entirety and replaced as follows:

Seals between panels, floor slab, etc shall comply with BS EN 681: Parts 1 and 2, BS EN 682 and BS 7874.

2.106 Prestressed Concrete Pipes and Fittings

2.106.1 Clause 2.104.1 is deleted in its entirety and replaced as follows:

Prestressed concrete pressure pipes and fittings shall comply with the relevant provisions of BS EN 639 and BS EN 642. Prestressed concrete pipes and fittings for drainage and sewerage purposes shall comply with the relevant provisions of BS 5911: Part 1 and BS 5911: Part 5.

2.106.3 Pipes shall have flexible joints unless otherwise stated.

2.108 Profiled Steel Sheeting

2.108.1 Clause 2.108.1 is deleted in its entirety and replaced as follows:

Profiled sheeting for building shall comply with the relevant provisions of the appropriate Standard as set out below:

Element	Standard
Self supporting metal sheet for roofing, external cladding and internal lining	BS EN 14782
Fully supported metal sheet and strip for roofing, external cladding and internal lining	BS EN 14783
Zinc sheet roof and wall coverings	CP 143: Part 5
Galvanised corrugated steel roof and wall coverings	CP 143: Part 10
Aluminium roof and wall coverings	CP 143: Part 15
Fibre-cement profiled sheets and fittings	BS EN 494
Zinc sheet fully supported roofing products	BS EN 501
Stainless steel sheet fully supported roofing products	BS EN 502
Copper sheet fully supported roofing products	BS EN 504
Steel sheet fully supported roofing products	BS EN 505
Copper or zinc sheet self supporting roofing products	BS EN 506
Aluminium sheet fully supported roofing products	BS EN 507
Steel sheet self supporting roofing products	BS EN 508: Part 1
Aluminium sheet self supporting roofing products	BS EN 508: Part 2
Stainless steel sheet self supporting roofing products	BS EN 508: Part 3

2.108.2 Profiled sheeting for permanent shuttering shall be hot-dip coated steel complying with the provisions of BS EN 10346.

2.111 Pulverised Fuel Ash

2.111.4 Pfa for use as a fill material shall be obtained from an approved source and shall conform to one of the three following types:

- (i) Conditioned pfa shall be freshly produced fine grained material with water added
- (ii) Stockpiled pfa shall be either conditioned ash or recovered coarse material which has been temporarily stored.
- (iii) Lagoon pfa shall be material of variable grading recovered from lagoons.

The *Contractor* shall provide details to the *Contract Administrator* for approval. This is a **Hold Point**.

2.112 Rainwater Pipes and Gutters

2.112.1 Clause 2.112.1 is deleted in its entirety and replaced as follows:

Rainwater pipes, gutters, fixings and accessories shall comply with the relevant provisions of the appropriate Standard, as set out below:

Material	Standard
Cast iron	BS 460 Type A
Aluminium	BS EN 612
PVC-U	BS EN 607, BS EN 1462 and BS EN 12200: Part 1
Pressed steel	BS EN 612 and BS EN 1462
Galvanised steel	BS 3868

2.112.2 Brackets for gutters shall be of a type recommended by the manufacturer of the gutter. Notwithstanding the requirements of Clause 2.85, all nuts, bolts and washers shall be galvanised to BS EN ISO 1461.

2.112.3 Specific requirements for noise enclosure drainage are given in TS 2.10.07

2.113 Rolled Asphalt

2.113.1 Clause 2.113.1 is deleted in its entirety and replaced as follows:

Rolled asphalt shall comply with the relevant provisions of Series 900 of the Highways Agency's 'Specification for Highway Works'. Refer to introduction to TS 3.10.08 Roadworks.

2.114 Roof Coverings

2.114.1 Clause 2.114.1 is deleted in its entirety and replaced as follows:

Roof coverings shall comply with the relevant provisions of the appropriate Standard, as set out in the following table:

Material/Type	Standard
Clay tiles and fittings	BS EN 1304
Concrete tiles and fittings	BS EN 490 and BS EN 491
Slates - fibre cement	BS EN 492
Slates - natural	BS EN 12326: Part 1
Roofing felt	BS EN 13707
Underlays for discontinuous roofing	BS EN 13859: Part 1
Mortar for roof tiling	BS 5534

2.117 Sands

2.117.5 Sands for bedding of block paving shall comply with BS EN 12620 designation G_F85 0/4mm.

2.119 Soil, Waste and Ventilating Pipes

2.119.1 Clause 2.119.1 is deleted in its entirety and replaced as follows:

Soil, waste and ventilating pipes, fittings and accessories for above ground drainage systems shall comply with the relevant provisions of the appropriate Standard, as set out below:

Material	Standard
Cast iron	BS 416: Part 1 (for refurbishment works) BS EN 877 (new works)
PVC-U (soil and ventilating)	BS 4514
Polypropylene (waste)	BS 5254 and BS EN 1451: Part 1
Plastics (waste)	BS EN 1329: Part 1, BS EN 1451: Part 1, BS EN 1455: Part 1, BS EN 1519: Part 1, BS EN 1565: Part 1 and BS EN 1566: Part 1

2.119.3 Plastic waste traps shall comply with the relevant provisions of BS EN 274: Parts 1, 2 and 3.

2.120 Steel Reinforcement

2.120.1 Clause 2.120.1 is deleted in its entirety and replaced as follows:

Steel reinforcement shall comply with the relevant provisions of the appropriate Standard, as set out below:

Type	Standard	Description
Carbon steel bars	BS 4449/BS EN 10080	Grade B500B or B500C
Cold reduced steel wires	BS 4482/BS EN 10080	Ribbed Grade 500
Steel fabric	BS 4483/BS EN 10080	Grade B500A, B500B or B500C
Stainless steel	BS 6744	Ribbed Grade 500
Epoxy coated steel	BS ISO 14654	
Bed joint reinforcement for masonry	BS EN 845-3	

2.120.4 The *Contractor* shall obtain the manufacturer's certificates for each delivery of reinforcement which shall be retained as record documents. These certificates shall state that the reinforcement complies with and has been tested at the frequency specified in the appropriate Standard Specification.

2.123 Structural Steel

2.123.2 Section 2.123 is deleted in its entirety. Refer to TS 3.10.12 Structural Steelwork and Aluminium.

2.124 Surface Boxes and Guards

2.124.11 Two sets of lifting keys for surface boxes shall be supplied by the *Contractor* to the *Contract Administrator*.

2.125 Synthetic Resin Adhesives

2.125.2 Adhesives for non-critical applications shall comply with the provisions of BS EN 204.

2.125.3 The *Contractor* shall submit to the *Contract Administrator* for approval details of proposed adhesives. This is a **Hold Point**.

2.126 Timber and Preservation of Timber

2.126.4 The service life for timber treatment shall be 50 years.

2.126.5 The end grain shall be sealed before delivery to site.

2.126.6 The *Contractor* shall provide documentation to the *Contract Administrator* to demonstrate that timber for the works is being sourced from supplies complying with the requirements of the Forest Stewardship Council (FSC). This is a **Hold Point**.

2.126.7 All softwood shall be finished sawn. Sizes not in accordance with BS EN 1313-1:2010, 'Round and sawn timber. Permitted deviations and preferred sizes. Softwood sawn timber' shall be sawn from appropriate larger sizes.

2.126.8 Timber adhesives shall be in accordance with the recommendations in Tables 1 and 2 of BS 5442-3:1979, 'Classification of adhesives for construction. Adhesives for use with wood'

Joinery timber

2.126.9 Timber for joinery shall comply with the relevant provisions of BS EN 942.

Timber Trussed Rafters

2.126.10 Manufacturers of trussed rafters shall be certificated under the BM TRADA Trussed Rafter Scheme or under BS EN ISO 9001.

2.126.11 Timber for trussed rafters and punched metal plate fasteners shall comply with the provisions of BS EN 14250 (irrespective of type of fasteners and contrary to the scope of this Standard) or BS 5268: Part 3 BS EN 1995: Part 1-1 with the following exceptions:

(i) Moisture content at time of fabrication shall not exceed 22%

(ii) Bow: 6mm maximum per 2m length

(iii) Twist: 1mm maximum per 25mm width per 2m length

2.128 Tying Wire

2.128.1 Clause 2.128.1 is deleted in its entirety and replaced as follows:

Tying wire for steel reinforcement shall comply with the relevant provisions of the appropriate Standard, as set out below:

Reinforcement material	Tying wire	Standard
Uncoated mild steel	1.6mm dia annealed steel	BS 1052
Uncoated high yield steel	1.6mm dia annealed steel	BS 1052

Galvanised steel	1.6mm galvanised steel	
Stainless steel	1.2mm dia stainless steel	

2.130 Valves and Penstocks

- 2.130.5 The faces and seats of all valves shall be kept clean. They shall not be closed before being subjected to a visual examination of the seats.
- 2.130.6 Every stuffing box shall be examined when the pipeline is charged with water, and any leak repaired by adjustment or repacking.
- 2.130.7 Before erection, air valves shall not be stored in open sunlight or upside down, exposing the balls and air cavities. Air valves shall be checked before the pipeline is charged to ensure that the balls and faces are seating effectively.
- 2.130.8 Sluice valves and gate valves shall be stored with their gates partially open to avoid frost damage.
- 2.130.9 The *Contractor* shall supply a turn key for each valve/penstock, where a handwheel is not permanently fitted.
- 2.130.10 Extension spindles for remote operation of valves and penstocks shall be complete with guide brackets for bolting to walls at centres not greater than 2m. The extension spindles shall be fabricated from 50mm nominal diameter galvanised steel with tapered square ends to enter valve caps or muff couplings. Valve caps and couplings shall be secured by hexagonal headed set screws. The lengths of the extension spindles shall be such that the top of the caps are not more than 225mm below covers.
- 2.130.11 The 'Open' and 'Shut' directions, if applicable, shall be clearly marked on valves and penstocks.

2.132 Vitrified Clay Pipes and Pipeline Fittings

- 2.132.3 All pipes shall have flexible joints.

2.133 Wall Tiles

- 2.133.2 Tiles for external use shall be frost resistant and Group I water absorption capacity as defined in BS EN 14411.

2.134 Water

- 2.134.2 Water from other sources for use in concrete, grout or mortar may be used if it conforms with BS EN 1008.

2.135 Water Fittings and Appliances

- 2.135.2 The height of WC pans shall not exceed 405mm above finished floor level. Automatic flushing cisterns shall have a water control device to economise water usage.
- 2.135.3 Flushing pipes shall be white enamelled steel, plastics or copper, self finished, painted or chromium plated.
- 2.135.4 Drinking fountains shall be vitreous china, enamel or nylon, provided with a 19mm or 32mm waste outlet with chromium plated domed outlet grating and 13mm self-closing non-concussive lever or wheel action valve mounted with a cast iron supporting bracket.

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- 2.135.5 Waste plugs shall be 8mm thick comprising suitable, durable and serviceable plastic, sized and shaped to fulfil the criteria of the testing requirements of BS EN 274: Part 1. Each plug shall have a shackle attached to its upper surface for fitting of a chromium plated chain. The chain shall also be attached by a shackle to the chain stay or appliance's overflow front grid such that the complete assembly shall be able to withstand a load of 15kg without visible deformation.
- 2.135.6 The *Contractor* shall submit full details of water fittings and appliances to the *Contract Administrator* for approval including samples where necessary of sanitary ware. This is a **Hold Point**.
- 2.135.7 Copper direct cylinders for use with electric immersion heaters shall be in accordance with BS 1566: Part 1.
- 2.135.8 The *Contractor* shall submit full details of water fittings and appliances to the *Contract Administrator* for approval including samples where necessary of sanitary ware. This is a **Hold Point**.

2.136 Waterstops

2.136.1 Clause 2.135.1 is deleted in its entirety and replaced as follows:

Rubber waterstops shall have the following properties when tested in accordance with the provisions of the following Standards:

Standard	Property	Requirements
BS ISO 2781	Density	1100kg/m ³ (±5%)
BS ISO 48	Hardness	60 – 70 IRHD
BS ISO 37 and BS ISO 3384-1	Tensile strength	Not less than 17.5N/mm ²
BS ISO 37 and BS ISO 3384-1	Elongation at break point	Not less than 450%
BS ISO 1817	Water absorption (48 hours immersion)	Not exceeding 5%

2.136.4 Plasticised PVC waterstops for internal or external application complying with BS 2571, shall be extruded from high grade PVC, with the following performance characteristics tested to BS 2782:

Minimum tensile strength	14N/mm ²
Minimum elongation at break	300%
Hardness range (IRHD)	80-90

Unless otherwise stated, the waterstop shall have a minimum width of 250mm

2.136.5 Independent hydrophilic seals shall be based on pre-hydrated natural sodium bentonite, or equivalent.

2.136.6 Junction pieces shall be purpose made in the manufacturer's factory. Where jointing is required on site, they shall be welded butt joints between similar materials and sections.

2.136.7 Details of waterstops including manufacturer, type and proposed layout showing joint positions as well as the method statement for the jointing, shall be submitted by the Contractor to the Contract Administrator for approval. This is a **Hold Point**.

2.137 Wet-mix Macadam

Clause 2.137 is deleted in its entirety.

2.138 Windows

2.138.1 Clause 2.138.1 is deleted in its entirety and replaced as follows:

Windows, window surrounds and fixings shall comply with the relevant provisions of the appropriate Standard as set out in the following table:

Material/Type	Standard
Wood	BS 644
Steel	BS 6510
Steel window boards	BS 6510
Aluminium alloy	BS 4873
PVC-U Type A materials	BS EN 12608
PVC-U Type B materials	BS 7414
Plastic windows	BS 7412

2.138.2 The *Contractor* shall obtain the approval of the *Contract Administrator* for the proposed manufacturer of windows. This is a **Hold Point**.

2.138.3 Sample sections shall be submitted to the *Contract Administrator* for approval to demonstrate the standard of fabrication and finish to be provided. This is a **Hold Point**.

2.138.4 Windows shall also comply with the relevant requirements of 2.32.

2.138.5 All windows shall utilise the same key. Three keys shall be provided for each group of windows. Each key shall be attached to a Traffolyte label with black lettering on a white background in Arial font, 4mm high indicating the room/item name as provided by the *Contract Administrator*.

2.141 Wrought Aluminium and Aluminium Alloy

2.141.1 Clause 2.141.1 is deleted in its entirety and replaced as follows:

Wrought aluminium and aluminium alloys shall comply with the relevant provisions of the appropriate Standard, as set out below:

Type	Standard
Sections for structural purposes	BS 1161
Plate, sheet and strip	BS EN 485, BS EN 515 and BS EN 573
Drawn tube	BS EN 754: Parts 7 and 8
Bars, extruded round tubes and sections	BS EN 515, BS EN 573: Part 3, BS EN 755: Parts 1 to 9 and BS EN 12020: Parts 1 and 2
Ingots and castings	BS EN 1559: Parts 1 and 4, BS EN 1676 and BS EN 1706

2.143 Anchors and post-installed fixings

2.143.1 Resin Anchors shall be supplied by a member of and approved by the Construction Fixings Association.

2.143.2 Installation of anchors shall be in accordance with (in order of precedence) the recommendations of the manufacturer and 'Guidance Note: Anchor Installation' published by Construction Fixings Association.

2.143.3 Calculations and drawings with manufacturer's recommendations for proprietary anchor systems proposed by the Contractor, shall be submitted to the Contract Administrator for approval. This is a Hold Point.

2.143.4 Evidence shall be provided from the manufacturer to demonstrate the design parameters for the anchor systems have been complied with in accordance with the provisions of BS 5080: Parts 1 and 2. This is a Hold Point.

2.143.5 The Contractor shall provide evidence to the Contract Administrator of suitable training for personnel installing proprietary anchor systems. This is a Hold Point.

2.143.6 Drilling of holes to receive anchors shall require the approval of the Contract Administrator. This is a Hold Point. Holes shall be located to avoid reinforcement.

2.144 Asphalt Concrete

2.144.1 Asphalt concrete shall comply with the relevant provisions of Series 900 of the Highways Agency's 'Specification for Highway Works'. Refer to introduction to TS 3.10.08 Roadworks.

2.145 Backfill Material for Filter Drains

2.145.1 Backfill material for filter drains shall be in accordance with Table 5/5 of Series 500 of the Highways Agency's 'Specification for Highway Works' (Refer to introduction to TS 3.10.08 Roadworks) as follows:

General	Type A
Where the drain intercepts surface water	Type B

2.145.2 Backfill material within 450mm of the ground surface shall not be frost susceptible.

2.146 Concrete - Road Pavement

2.146.1 Materials for concrete road pavements shall comply with the relevant provisions of Series 1000 of the Highways Agency's 'Specification for Highway Works'. Refer to introduction to TS 3.10.08 Roadworks.

2.147 GRP Trench Covers

2.147.1 GRP trench covers shall be rated in accordance with their locations as defined in TS 2.10.05 Access Covers / Ducts / Trenches

2.147.2 Trench vehicle crossing points shall be labelled 'Medium' and 'Heavy' duty with their load capacity as appropriate in Arial font, 30mm high lettering.

2.147.3 GRP covers shall comply with the relevant provisions of the appropriate Standard, as set out below:

Type	Standard
Open grating	BS 4592: Part 4
Solid top grating	BS 4592: Part 6

2.147.4 The GRP covers shall be resistant to ultra violet radiation, with no loss of appearance after 10 years and no loss of load carrying capacity after 25 years. They shall also be resistant to uninhibited, naphthalic mineral oil conforming to BS 148 and BS EN 60296. The covers shall be non-rocking.

2.147.5 The top surface of GRP covers shall incorporate quartz grit bonded on with an epoxy resin adhesive.

2.147.6 The pitches of bearing bars and transverse bars in gratings shall be equal and not exceed 50mm. The maximum clear distance between bars shall not exceed 38mm. 2.147.7 GRP covers shall be the following colours to BS 4800:

Yellow RAL 1021 at vehicular crossing points

Grey RAL 7040 for light and medium duty at other locations

Grey RAL 7026 or green RAL 6017 for heavy duty at other locations

2.147.8 Provision shall be made for lifting purposes with four sets of key supplied to the Contract Administrator for each type of cover.

2.147.9 Demonstration of compliance with the Specification and samples of the covers shall be submitted to the Contract Administrator for approval. This is a **Hold Point**.

2.148 Insulation

2.148.1 Factory made materials for insulation of buildings shall comply with the relevant provisions of the appropriate Standard, as set out below:

Material	Standard
Mineral wool	BS EN 13162
Expanded polystyrene	BS EN 13163
Extruded polystyrene	BS EN 13164
Rigid polyisocyanurate foam	BS EN 13165
Rigid polyurethane foam	BS EN 13165
Phenolic foam	BS EN 13166
Cellular glass	BS EN 13167

Wood wool	BS EN 13168
Expanded perlite	BS EN 13169
Expanded cork	BS EN 13170
Wood fibre	BS EN 13171

- 2.148.2 A certification or declaration of conformity of the insulation type with samples shall be provided by the *Contractor* to the *Contract Administrator* for approval. This is a **Hold Point**.
- 2.148.3 Angle fillets, where required, shall be 50mm x 50mm formed from the same material as the insulation material.

2.149 Metal Partitions

- 2.149.1 Metal partition systems shall comply with the performance requirements of BS 5234: Part 2.
- 2.149.2 The *Contractor* shall submit to the *Contract Administrator* for approval, details of the metal partition system including fabrication/assembly drawings, manufacturer's technical supporting information, installation and dismantling procedure, tolerances and details of non-standard panels, intermediate stability supports and co-ordination of the mechanical and electrical service requirements. This is a **Hold Point**.

2.150 Petroleum Based Protective Wrapping Tapes and Fillers

- 2.150.1 Tapes for wrapping around iron and steel pipes, and/or joints for protection against corrosion, shall be non-woven synthetic fibre fabric, waterproofed by impregnation and coating both sides with a saturated neutral petroleum hydrocarbon compound containing inert mineral fillers. The tape shall be suitable for application in temperatures from -30°C up to +40°C.
- 2.150.2 The primer, for the preparation of metal surfaces before covering with the wrapping, shall be a compatible paste comprising saturated petroleum hydrocarbons, inert mineral fillers and passivating agents. Filler to provide an even contour around and over pipe joints and fittings shall be a mastic compound of saturated petroleum hydrocarbons, inert mineral fillers, temperature extenders and organic fibres. Primer shall be suitable for application in temperatures from 0°C up to 40°C, and filler suitable for use in temperatures from -30°C up to +40°C.

2.151 Pipe Insulation and Lagging

- 2.151.1 All pipework, including fittings, valves and flanges above ground level shall be fully insulated to prevent freezing down to an ambient temperature of minus 10°C and a wind speed of 10 m/s, all in accordance with BS 5970.
- 2.152.2 Pipe lagging shall be in accordance with BS 5970 of a mineral fibre (Glass or Rock) type material and shall be clad with aluminium sheeting.

2.152 Pipe Supports

- 2.152.1 The material, size and type of supports for pipes including hangers, brackets and clamps for pipes shall be compatible with the loading, environmental conditions and design life of the pipes. The supports and fixing system to the base material shall be approved by the *Contract Administrator*. This is a **Hold Point**.

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- 2.152.2 Ferrous pipe supports and fixings shall be hot-dipped galvanised to BS EN ISO 1461. Any associated exposed cut threads or other minor exposed ferrous metal surfaces shall be coated with a zinc-rich primer.
- 2.152.3 Insulating inserts shall be provided where necessary between the supports and pipes of dissimilar metals to prevent electrolytic action. They shall be of elastomeric or cork composition and shaped to ensure retention within the pipe clip, which shall be of sufficient diameter to accommodate the extra thickness.
- 2.152.4 Proprietary supports to plastic and copper pipes shall be made using purpose made nylon, plastic, copper or brass clips, brackets or hangers. Details including samples of the proposed supports shall be submitted to the *Contract Administrator* for approval. This is a **Hold Point**.
- 2.151.5 Fixings for pipe supports shall be non-corrodible and appropriate to the base material.
- 2.153 Polypropylene/Polyethylene Twin Wall Ribbed Pipes**
- 2.153.1 Polypropylene/polyethylene twin wall ribbed pipes shall be supplied by an approved manufacturer in accordance with Clause 518 of the Highways Agency's 'Specification for Highway Works'.

2.154 Precast Concrete Units

2.154.1 Precast concrete elements shall be in accordance with the following, appropriate standards:

Element	Standard
Linear structural elements	BS EN 13225
Precast concrete products	BS EN 13369
Foundations	BS EN 14991
Foundations - piles	BS EN 12794
Floors - hollow core slabs	BS EN 1168
Floors - ribbed floor elements	BS EN 13224
Floors - floor plates for floor elements	BS EN 13747
Walls	BS EN 14992
Stairs	BS EN 14843
Roof elements	BS EN 13693
Precast concrete garages	BS EN 13978: Part 1
Precast concrete slabs and cover frame seating rings	See 2.98
Precast concrete flags and paving blocks	See 2.99
Precast concrete kerbs, channels, edgings and quadrants	See 2.100
Precast concrete manholes and soakaways	See 2.101
Precast concrete box culverts	See 2.102
Precast concrete segments for tunnels and shafts	See 2.103
Precast concrete setting blocks for pipes	See 2.104
Precast concrete tanks	See 2.105
Prestressed precast concrete floors	See 2.107

2.154.2 Approval by the *Contract Administrator* of pre-cast concrete unit production facilities, both on and off Site, shall be required before production commences. This is a **Hold Point**.

2.154.3 The *Contractor* shall provide to the *Contract Administrator* for approval, two copies of the technical documentation described in the relevant standard for the manufacture of the precast concrete units. Notwithstanding this, the following permitted deviations shall also apply for bolt holes and cast-in-sockets:

- (1) Centre line of groups of holes for fixings, inserts and similar shall be within $\pm 3\text{mm}$ of the specified distance from the centre line of the member
- (2) Distance between centres of individual holes or inserts within a group shall be $\pm 2\text{mm}$ of the distance shown on the drawings

2.154.4 Transportation and handling of units shall be kept to a minimum and shall not cause stress or deformation for which they were not designed, or result in units being marked, soiled, chipped or broken.

2.154.5 Damaged units shall be repaired or replaced as approved by the Contract Administrator. Rejected units shall be marked as such and removed from Site forthwith.

2.154.6 The start of joint packing is a Notification Point.

2.154.7 The permitted deviation for erection of precast concrete units shall be in accordance with BS 5606, Table 1.

2.155 Prestressing Tendons

2.155.1 Prestressing tendons shall be to BS 4486 for bars and BS 5896 for wire or strand, as appropriate, as well as BS EN 1992: Part 1-1. Tendons supplied shall be covered by third party certification of product conformity in relation to the above relevant standards.

2.155.2 Prestressing tendons shall be protected from damage, surface deterioration or contamination of any kind.

2.155.3 Prestressing tendons shall be stored on drums of sufficient size to ensure that they come off straight at time of installation. Adjustments for straightness shall only be made under the supervision of the *Contract Administrator*.

2.155.4 Kinked or unravelled tendons shall not be used.

2.156 Roof Crawl Decking

2.156.1 Roof crawl decking shall be 18mm thick plywood in accordance with Clause 2.96.

2.157 Roof Fascias, Bargeboards and Soffits

2.157.1 Roof fascias shall be constructed using the following materials as specified by the *Contract Administrator*.

Material	Specification
Plywood Fascias	25mm thick in accordance with Clause 2.96
UPVC Fascias and Bargeboards	UPVC fascia boards and bargeboards shall be cellular UPVC round nose profile having a nominal thickness of 25mm with balancing horizontal rib. The manufacturer shall hold a relevant BBA certificate for the product used and also be certified to BS EN ISO 9001. Round nose fascia boards shall be grooved by the manufacturer to a depth of 10mm and to a width which conforms to the specified soffit board.
UPVC Soffits	UPVC soffits shall be open vee-joint/ship lap cladding nominally 19mm thick with 20mm overlap and 8mm interlock between planks.

2.158 Sheaths and Duct Formers

- 2.158.1 Sheaths and duct formers shall retain their profile and section in conjunction with the method of support and loading employed.

2.159 Steel Reinforcement for Masonry

- 2.159.1 Steel reinforcement for masonry shall comply with the relevant provisions of the appropriate Standard, as set out below:

Type	Standard
Ribbed weldable steel reinforcing bars	BS 4449
Ribbed and plain round steel wire reinforcement	BS 4482
Steel fabric reinforcement	BS 4483
Plain round steel bars	BS EN 10025: Part 2 or BS EN 13877: Part 3
Stainless steel reinforcing bars	BS 6744 Designations 1.4301, 1.4429 or 1.4436 conforming to BS EN 10088: Part 1
Bed joint reinforcement of welded wire meshwork	BS EN 845: Part 3
Expanded metal steel	BS 405

Where galvanised steel is specified, the galvanising shall be in accordance with BS EN ISO 1461.

2.160 Structural Aluminium

- 2.160.1 Refer to TS 3.10.12 Structural Steelwork and Aluminium.

2.161 Substation Surfacing

- 2.161.1 Site surfacing shall be free from deleterious material and shall consist of crushed rock to BS EN 13043 in accordance with the following requirements

Property	Requirement
Grading	10/20
Grading Category	GC 85/20
Fines Content	F1
Flakiness Index	FI20
Resistance to Fragmentation	LA30
Polish stone Value	PSVNR
Aggregate Abrasion Value	AAVNR
Shape Index	SINR
Water Absorption Category	WA242
Magnesium sulphate soundness	MS25 where Water Absorption >2%

2.162 Waterproofing Membranes

2.162.1 Liquid applied waterproofing shall be a water based bituminous latex emulsion. If the *Contractor* is specified as the 'specifier', details of the system shall be provided to the *Contract Administrator* for approval. This is a **Hold Point**.

2.162.2 Liquid waterproof membranes to roof membranes shall have Agrément Certificate product approval and be in accordance with the 'Code of Practice for the specification and use of liquid waterproofing membranes' published by European Liquid Roofing Association (ELRA) notwithstanding the requirements of the manufacturer. If the *Contractor* is specified as the 'specifier', the information detailed in the Code of Practice shall be provided to the *Contract Administrator* for approval. This is a **Hold Point**.

2.162.3 Powder or slurry form waterproofing shall be a cementitious multipart waterproofing system. If the *Contractor* is specified as the 'specifier', details of the system shall be provided to the *Contract Administrator* for approval. This is a **Hold Point**.

2.162.4 Sheet waterproofing membranes shall be one of the following:

- Cold-applied flexible self adhesive sheet 2mm thick manufactured from a modified rubber bitumen compound with central polyester core reinforcement.
- Class B1F waterproof building paper to BS 1521:1972, 'Specification for waterproof building papers'
- Impermeable plastic sheeting with a minimum thickness of 125 microns to BS 1763:1975, 'Specification for thin PVC sheeting (calendered, flexible, unsupported)'.

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	Alignment with CESWI7 and Eurocodes	Gibson Bhunu Policy Development Engineer – Civil Engineering	Stewart Whyte Asset Policy Manager

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