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4 ROOF AND DECK INSULATION

4.1 GENERAL

4.1.1 Scope

1 This Part specifies requirements for types of roofing and deck insulation.

2 Related Sections are as follows:

This Section

Part 1..... General
Part 2..... Membrane Roofing
Part 3..... Metal and Plastic Roofing
Part 5..... Roof tiles and Shingles

Section 1 General
Section 15 Thermal Insulation of Buildings

4.1.2 References

1 The following standards are referred to in this Part:

BS 3379.....Flexible polyurethane cellular materials for load bearing applications
BS 3797.....Lightweight aggregates for concrete
BS 5075.....Concrete admixtures
BS 1105.....Wood wool cement slabs up to 125 mm thick
BS 3837.....Expanded polystyrene boards

EN 490 .....Concrete roofing tiles and fittings - Product specifications
EN 491 .....Concrete roofing tiles and fittings - Test methods

EN 197-1 .....Cement - Part 1: Composition, specifications and conformity criteria for common cements

4.1.3 Submittals

1 The contractor is to submit the following to the Engineer for approval before commencement of work in this section.

2 Manufacturers literature and samples of roofing, thermal insulation, vapor barrier, roof accessories, bitumen waterproof membranes, waterproofing materials, dampproof coursing and elastometric sealants, etc.

3 Primary roofing materials inclusive of insulation, barriers or membranes should be obtained from only one manufacturer if possible. Where secondary materials must be used, the primary manufacturer is to be provided with adequate literature and samples for concurrence that the secondary products are compatible for roofing warrantees. Concurrence will be provided by the Contractor in writing to the Engineer prior to commencement of work.

4.1.4 General Application

1 Expanded extruded polystyrene boards shall comply with BS 3837, Grade EHD, Type A, extruded board with skins.

2 Spray applied polyurethane or isocyanurate foam insulation is to be protected from deterioration due to ultra violet light by a covering approved by the manufacturer of the foam.

3 Where spray applied foam is used as an integral part of the roof waterproofing system it must be specifically included in the manufacturer's guarantee requirements.

4 Unless otherwise specified the insulation is to be at least equivalent to 50 mm thick material having an ultimate thermal conductivity of 0.032 W/mK at a mean temperature of 10°C and a compressive resistance of not less than 150 kN/m2.

4.2 RIGID BOARD INSULATION

4.2.1 General Requirements

1 Rigid insulation boards are to be installed as a single layer to the thickness specified.

2 All joints between rigid insulation boards are to be tight and no gaps should exist where the board meets rooflights, edge details and services penetrating the roof structure. End joints are to be staggered.

3 On corrugated surfaces all long edges are to be supported by the crown of the corrugations.

4.3 PROTECTION OF INVERTED ROOF SYSTEMS

4.3.1 General Requirements

1 Insulating material having a water absorption in excess of 1.5% by volume in seven (7) days at 20 ºC are not to be used in inverted roof systems.

2 The insulation is to be covered by a layer of permeable filter membrane, laid loose and lapped 200 mm at all intersections before the paving slabs or solar reflective chipping is laid.

3 Paving slab protection is to be loose laid with 6 mm open joints on 100 x 100 x 6 mm inorganic spacers positioned at the corner junctions of the slabs. The paving slabs will have a minimum thickness of 40 mm on insulation boards of up to 50 mm and for every 10 mm increase in the insulation thickness the slab thickness should be increased by 5 mm.

4 Aggregate protection is to consist of a 50 mm minimum layer of chippings on insulation boards of up to 50 mm. The thickness of the aggregate layer to be increased to a depth equal to the thickness of insulation boards over 50 mm.

4.4 POLYSTYRENE BOARD INSULATION

4.4.1 General Requirements

1 Polystyrene board insulation shall conform to BS 3837, and shall include the following requirements:

(a) water absorption shall not be more than 0.1 % by weight

(b) density shall not be less than 32 kg/m^3 for Type VI

2 Standard polystyrene boards shall conform to the following requirements:

(a) nominal size shall be approximately 600 by 1200 mm minimum

(b) they shall have a drainage channel on the bottom longitudinal edge of the board

(c) they are to have a flat top surface where gravel ballast in used or ribbed bottom pavers are used

(d) they are to have ribbed top surface where flat bottom paver is used

(e) they are to be tapered for roof slope where top surface is level

(f) the edges shall be square, except for drainage channels.

3 Mortar faced boards shall conform to the following requirements:

(a) boards shall be top surfaced with 10 mm thick facing of Portland cement latex mortar having the following physical properties:

(i) density 1240 kg/m^3

(ii) compressive strength (28 days) 25 MPa

(iii) bond strength to insulation 1 MPa

(iv) troweled finish with texture

(b) drainage channels on bottom longitudinal edges of board

(c) nominal size shall be approximately 600 by 1200 mm minimum

(d) they shall have tongue and grooved longitudinal edges

4.5 CEMENT-FIBRE ROOF DECK

4.5.1 General Description

1 This Clause covers the furnishing and installation of cement-fibre roof deck planks.

4.5.2 Cement-Fibre Roof Deck Planks

1 Cement-Fibre planks shall be manufactured from treated wood fibres and Portland cement, bonded under pressure to BS 1105. The length and width of planks to be shown on plans will comply with manufacturer's requirements to suit span and load. The long edges are to be tongue and grooved and the ends square. Zinc coated steel channels will be factory applied in the groove of the plank. A factory bonded layer of urethane foam insulation shall be applied to the top of the plank.

2 Examine planks before installation. Broken or cracked planks should not be used. Where exposed, repaint soiled planks with paint recommended by the plank manufacturer to match colour and texture of adjacent planks.

4.5.3 Accessories

1 Clips shall be as recommended by the cement-fiber plank manufacturer to suit the supporting members.

2 Nails shall be galvanized cork type with integral 25 mm washer, of length to penetrate wood support not less than 25 mm.

4.5.4 Installations

1 Planks shall be cut to fit tight at perimeters, vertical surfaces, projections and openings. All edges and ends of planks and perimeter of openings greater than 200 mm are to be supported by framing members and bearing walls.

2 Planks are to be laid progressively with side joints (edges) tightly butted and with end joints in adjacent rows staggered.

3 Clips or nails are to be installed progressively as each plank is installed. Clips or nails are to be installed in accordance with the manufacturer's instructions.

4 Install a barrier, full depth of the plank, over the top of sound rated partitions and at the perimeter of exterior walls.

4.6 INSULATING CONCRETE ROOF SCREEDS

4.6.1 General Description

1 This section covers insulating concrete placed on a prepared structural deck.

2 Insulating concrete placed on steel deck forms are to have underside venting through slotted holes formed in the metal deck, combined with edge venting or topside venting through roof relief vents.

3 Insulating concrete placed over cast-in-place concrete or precast concrete substrates, is to be vented through the use of topside roof relief vents combined with edge venting.

4.6.2 Materials

1 Refer to Section 5, Concrete, for specifications relating to sand, cement, aggregates and water.

2 Portland cement shall conform to EN 197-1.

3 Concrete roofing tiles shall conform to EN 490 and EN 491.

4 Light weight aggregates shall conform to BS 3797.

5 Chipping shall be approved, clean, crushed white or pale grey, size 15 to 30 mm and shall comply with BS 3379.

6 Air entraining agent refer to BS 5075 Prt 2 and shall be a type as recommended by aggregate suppliers. Admixtures with chloride salts or pre-generated foam types are not acceptable.

7 Permeable filter membrane shall be to Clause 2.9.1.

8 Control joint filler shall be glass fibre or similar highly compressible material, which will compress to half of its thickness under a load of 170 KPa or less.

9 Wire mesh reinforcing shall be used when roof deck slopes exceed 1:3 and for fire rated roof assemblies using metal decking. The wire mesh shall be 1 mm galvanized steel wire twisted to form 50 mm hexagons with 1.6 mm galvanised steel wire woven into mesh spaced 200 mm apart. Welded wire fabric of equivalent size may also be used an approval of the Engineer.

4.6.3 Execution of Work

1 The surface of the concrete base must be clean, firm and rough to ensure a good bond.

2 The base should be soaked with water for at least 12 hours and all surplus water removed before laying commences.

3 To obtain the required falls and thickness of screed, leveling battens are to be used, carefully fixed to line and level and fully bedded. There should be a minimum thickness of 40 mm of screed over the top of any conduit or duct.

4 Immediately prior to laying the screed, a thick brush coat of wet cement grout should be applied to the damp surface of the base concrete and be well scrubbed in. The brush coat must not be applied more than 10 minutes before it is covered with screed. Alternatively, the Engineer may required that surfaces which have been left for an excessive period of time before the screed is laid be treated with an approved bonding agent.

5 The screed is to consist of 1 part of cement to 5 parts of sand by weight. The mix shall only contain sufficient water that will allow full compaction and be evenly spread to a thickness approximately 10 mm greater than that required. The screed is to be thoroughly compacted by tamping and drawing off to the required level with a screed board.

6 The screed is to be laid in alternated bays, maximum 10 m², with plain butt joints to provide minimum falls of 1:80 and a minimum thickness of 50 mm. Movement and construction joints in the base should be carried through the screed.

7 The joints between bays and at junctions with all upstands are to be minimum 12 mm wide and be filled for the full depth of the joint with sealing strip or an approved polysulphide joint filler and sealing compounds.

8 A 75 x 75 mm triangular fillet is to be provided at the junction with all upstands.

9 The top surface is to be floated to smooth and even falls suitable for the waterproofing system to be employed and be free of low areas, lumps and projections. Care should be taken to avoid excessive trowelling which may cause crazing.

10 As soon as each bay is completed and has hardened sufficiently to prevent damage to its surface, it should be covered with polythene or similar sheets which should be adequately lapped and held down. The screed must not be allowed to dry out for a minimum period of seven (7) days and no traffic should be permitted on the surface during this time.

END OF PART