

**OMAN WASTEWATER  
SERVICES COMPANY S.A.O.C**



**الشركة العمانية  
لخدمات الصرف الصحي ش.م.ع.م**

**OMAN WASTEWATER SERVICES COMPANY**

**TECHNICAL STANDARD SPECIFICATION**

**CIVIL WORKS**

**SECTION 07 FINISHING WORKS**

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## SECTION 07 FINISHING WORKS

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## **Section 07 Finishing Works**

### **1 Brickwork**

#### **1.1 General**

All products supplied under this Section must be obtained from an approved source. The Contractor will not be permitted to change his source of supply without the permission of the Engineer.

#### **1.2 Reference Standards**

BS 476 Fire tests on building materials and structures  
 Bs 1006 Methods of test for colour fastness of textiles  
 BS 1202 Nails  
 BS 1230 Gypsum plasterboard  
 BS 1494 Fixing accessories for building purposes  
 BS 1706 Electroplated coatings of cadmium and zinc on iron and steel  
 BS 1199 Building sands from natural sources  
 BS 1200 Building sands from natural sources  
 BS 2592 Thermoplastic flooring tiles  
 BS 2874 Copper and copper alloys rod and sections (other than forging stock)  
 BS 3260 Semi-flexible PVC floor tiles  
 BS 3261 Unbacked flexible PVC flooring  
 BS 3416 Bitumen based coating for cold application, suitable for use in contact with potable water  
 BS 4131 Terrazzo tiles  
 BS 4223 Determination of constructional details of textile floor coverings with yarn pile  
 Bs 4682 Methods of test for dimensional stability of textile floor coverings  
 BS 5212 Code applied joint sealant systems for concrete pavements  
 BS 5224 Masonry cement  
 BS 5229 Code of practice for the installation of textile floor coverings  
 BS 5262 Code of practice for external rendering  
 BS 5390 Code of practice for stone masonry

BS 5808 Underlays for textile floor coverings  
 BS 5980 Adhesive for use with ceramic tiles and mosaics  
 Bs 5975 Code of practice for false work  
 BS 6073 Precast concrete masonry units  
 BS 6431 Ceramic floor and wall tiles  
 BS 8000 Workmanship on building sites  
 BS 8203 Code of practice for installation of sheet and tile flooring  
 BS 8204 In-situ flooring

### **1.3 Samples, Testing and Submittals**

#### **1.3.1 General**

Samples of each type of masonry unit to be used shall be submitted to the Engineer for approval before use. All subsequent units are to be up to the standard of the approved samples.

Initially, 6 units will be selected by the Engineer from the first batch of units manufactured or delivered. The units shall be delivered by the Contractor to an approved independent testing laboratory, or if the Engineer so directed, to the Government Materials

#### **1.3.2 Testing Laboratory**

A number of units to indicate colour range for exposed work to be submitted to the Engineer for approval prior to commencement of the Works.

Further samples will be selected and tested as directed by the Engineer. The Contractor shall submit details of his proposed methods for reinforcement to the Engineer for approval. The Contractor shall also submit details of his proposed methods for constructing lintels, anchors and anchor channels.

Before starting face brickwork, the Contractor shall lay up a sample panel 2 m long by 1 m high for the Engineer's approval. Random piles of brick as delivered to the Site shall be used. Brickwork to be incorporated in the Works is to match original sample brickwork panels as approved by Engineer. Sample panels must not be removed until directed by Engineer.

## 1.4 Workmanship

Tops of walls shall be covered with waterproof covering when the work is not in progress.

When starting or resuming work, loose mortar and foreign materials shall be cleaned from the top surface of the work. Newly laid blockwork and brickwork shall be protected from the harmful effects of sunshine, rain, drying wind, and surface water.

Blockwork shall be water cured for a minimum of three days.

Units that will be exposed to view in finished work shall be supplied in adequate quantities to permit selection and mixing of brick from several deliveries in advance of laying. Units shall be exposed to the atmosphere for minimum of two weeks before laying.

## 1.5 Mortar

The required class of mortar, together with the type of mix, shall be as described in the Project Documentation. The inclusion of mortar plasticizers will not be permitted without approval of the Engineer.

All mortar shall be conveyed fresh to the works as required for use. Mortar which has begun to set or which has been site-mixed for a period of more than one shall not be used. Plasticizing and set retarding mortar admixtures shall comply with BS 4887: Parts 1 and 2 respectively and shall be supplied with instructions for use.

## 2 Accessories

### 2.1 References

The following standards are referred to in this Part:

BS 1243 Specification for metal ties for cavity wall construction

BS 1449 Steel plate, sheet and strip

BS 2989 Hot-dip zinc coated steel sheet and coil

### 2.2 Anchor and Tie Systems

Cavity wall ties to comply with BS 1243 and be of one of the following types as directed by the Engineer or as noted in the Project Documentation:

- (a) butterfly wall tie fabricated from zinc coated or stainless steel wire
- (b) double triangle wall tie fabricated from zinc coated or stainless steel wire
- (c) vertical-twist tie fabricated from zinc coated or stainless steel strip. Ties fabricated from wire are not be used for cavities exceeding 75 mm.

### **3 Control Joints**

Movement joints to be 12 mm wide and formed where indicated or where continuous runs of block walling exceed 8 meters in length.

The joints are to be straight and vertically formed with uncut faces of the blocks to each side and filled with an approved compressible material manufactured specifically for building into movement joints.

External joints are to be sealed with a mastic compatible with the joint filling material when the block walling is thoroughly dry and the joint surfaces have been cleaned with a wire brush or mechanical tool.

A primer is to be applied to the joint surface if specified by the manufacturer of the mastic.

Mastic sealing to unfilled movement joints to be on an approved foam backing strip placed to ensure the correct depth of sealant.

### **4 Joint Reinforcement**

Expanded steel mesh joint reinforcement is to be fabricated from 0.5 mm nominal thickness light coat galvanized steel to BS 2989, Z2 grade, coating type C or stainless steel to BS 1449 as directed by the Engineer or as noted in the Project Documentation.

### **5 Lintels**

Precast or cast in-situ lintels to be manufactured in accordance with the relevant provisions of Section 03.

An open joint not less than 12 mm are to be left between the ends of precast or cast in-situ concrete lintels and the blocks adjacent to these ends. These open joints should be left as long as possible during construction and not be filled in until plastering or other works necessitate such filling. Lintels are to have a minimum end bearing of 200 mm.

## 6 Concrete Blocks

### 6.1 Material

- a) Blocks to be made with ordinary Portland cement unless used below ground floor at natural slab level in which case sulphate resisting cement is to be used.
- b) All blocks are to be manufactured, supplied and tested in accordance with BS 6073, Part 1.
- c) The use of blocks shall comply with Table 1; the minimum compressive strength of the average of 10 blocks shall be as given in 1 the associated mortar requirements for use with different applications for blocks is also provided in Table 7.1

Table 7.1

Minimum Compressive Strength (N/mm <sup>2</sup> )		Uses for which Blocks are Suitable
Average of 10 Blocks	Lowest Individual Block	
7.0	5.6	Protective skins to foundations External non-load bearing walls Load bearing walls Load bearing walls below ground Soakaways and manholes Internal non-load bearing walls Roof Block
7.0	5.6	
7.0	5.6	
10.5	8.4	
14.0	11.2	
2.5	2.00	
2.5	2.00	

The thickness of webs and walls should be no less than 30 mm minimum for load bearing and 15 mm minimum for non-load bearing and the volume of the cavities in the block should not exceed 50 % of the gross volume of the block. The overall dimensions to comply with Table 7.2

Table 7.2

Block Dimensions

Length x Height x Thickness (mm)
400 x 200 x 100
400 x 200 x 150
400 x 200 x 200

### 6.2 Block Tolerances

Length + 3 mm to - 5 mm

Height + 3 mm to - 5 mm

Thickness  $\pm$  2 mm for any measurement

$\pm$  1.5 mm for the average of 7 measurements in any one block.

### 6.3 Manufacture of Concrete Blocks

- Blocks are to be manufactured in a vibrated/pressure block making machine using cement and aggregate in the proportions required to produce the minimum strengths given in Table 7.1.
- The materials to be mixed in a mechanical mixer and placed in the block-making machine in layers not exceeding 100 mm, each layer being thoroughly vibrated and compacted before the addition of the next.
- Immediately after manufacture the blocks are to be stacked on clean, level, non-absorbent Pallets in honeycomb fashion. The pallets are to be marked with the date of production (in English and Arabic) and stored in a level curing and

- d) stacking area in such a manner that one day's production is separated from the next.
- e) Blocks manufactured from mobile machines are to be cast on to a clean concrete hardstanding. Each day's production shall be easily identifiable and kept separate from the next.
- f) All blocks, however manufactured, are to be immediately protected from the effects of the sun and wind by suitable moisture retaining coverings.

#### **6.4 Block Dimensions**

Block dimensions are to be measured in accordance with Appendix A of BS 6073, Part 1.

Blocks not exceeding 75 mm thick and blocks for use in the ground are to be solid unless otherwise directed. All other blockwork is to be hollow.

#### **7 Precast Concrete Bricks**

- a) Precast concrete bricks are to conform to the requirements of BS 6073.
- b) Precast concrete bricks are to be manufactured by compacting concrete under high pressure into a mould.
- c) The pressure employed is to be such that a high initial strength is achieved, enabling the brick to be removed immediately, by extrusion, from the mould.
- d) The cement used should be rapid hardening Portland cement and conform to the requirements of Section 03.
- e) The aggregate used to be sand or manufactured sand.

## 8 Laying

### 8.1 General

Work is to be performed by experienced workers under the direction of a qualified supervisor who is fully aware of the Project requirements. Final work is to be equal to any sample panels submitted to, and approved by, the Engineer.

### 8.2 Setting Out Of Blockwork

All blockwork is to be fully set out before laying commences to ensure:

- (a) correct bonding over all lengths of wall particularly at openings and piers
- (b) minimum cutting
- (c) compliance with Table 7.3

The average thickness of both vertical and horizontal mortar joints is to be 10 mm exclusive of any key in the joint surfaces of the unit.

#### Setting Out of Blockwork

Table 7.3

Item of Construction	Type of Dimensions	Permissible Deviation (mm)
Space between walls	At floor At Soffit	20 30
Size and shape of wall elements	Height up to 3,000 mm Straightness in 5,000 mm Verticality up to 2,000 mm Level of bed joints in 3,000 mm	40 8 15 15
Walls	Position in plan of any point or specified face in relation to nearest grid line on the same level	15

### **8.3 Wetting Blockwork Units**

All blocks are to be adequately wetted with water before they are laid and the tops of walls left off from the previous day's work are to be similarly wetted before the new work commences.

### **8.4 Laying Of Blockwork**

- a) Block walls are to be built from undamaged blocks in stretcher bond unless otherwise specified.
- b) All bed and vertical joints are to be spread with mortar to ensure complete and solid bedding and grouting through the full thickness of the wall. All keys in jointed surfaces must be completely filled.
- c) Mortar extending into the cavities of hollow blocks which are to be reinforced and filled shall be removed.
- d) Each block is to be adjusted to its final position in the wall whilst the mortar is still plastic. Any block which is moved after the mortar has stiffened shall be removed and relaid with fresh mortar.
- e) Half blocks and special blocks are to be used as required to ensure correct bonding.
- f) All perpend, quoins and joints are to be kept true and square, other angles are to be plumbed and bed joints levelled as the work proceeds.
- g) The work is to be carried out course by course not leaving any part more than 800 mm lower than another. Work, which is left at different levels, is to be raked (stepped) back to the approval of the Engineer.
- h) In cavity wall construction both leaves are to be carried up together, not leaving any leaf more than 400 mm below the other.
- i) Partitions shall be 100 mm thick unless otherwise noted. Partitions having lavatories or other plumbing fixtures secured to them back-to-back (or approximately so) are to be a minimum of 150 mm thick.

Solid concrete masonry units shall be built in where full units cannot be used or where needed for the fixing of accessories. Bells or hubs of pipes must be completely enclosed.

j) Reinforced masonry partitions are to fully extend to the underside of slabs.

k) When pipes or conduits or both occur in plastered partitions, at least one web of the hollow masonry units must be retained.

l) When new masonry partitions start on existing floors, the existing floor finish material is to be cut down to the concrete surface. New masonry partitions are not to abut any existing plastered surfaces, except suspended ceilings.

## 9 Brickwork

9.1 Unless otherwise specified elsewhere in the Project Documentation, bricks are to be laid in a running bond with each course of masonry bonded at the corners. The bond of facing bricks in existing buildings shall be matched. Before starting work, facing bricks shall be laid on the foundation wall and the bond adjusted as needed for openings, angles, corners, etc.

Exposed brickwork joints are to be symmetrical about centre lines of openings. No brick smaller than a half-brick shall be used at any angle, corner, break, or jamb. The bond pattern shall be maintained plumb throughout. Jumping of the bond is prohibited.

Brickwork shall be anchored to concrete columns, beams and walls, to steel stud construction and to masonry backup with ties and anchors in accordance with the relevant provisions of BS 5628.

9.2 Bricks shall be laid in a full bed of mortar. The mortar shall be spread over a few bricks at a time and shall not be furrowed. The mortar bed shall be slightly levelled to incline towards the cavity. The brick shall be placed before the mortar has had chance to stiffen.

Head joints in stretcher courses are to be completely filled with mortar. Bricks shall be pushed into place so that the mortar flows out at the top of the joints.

9.3 Before connecting new masonry with masonry previously laid masonry, loose bricks or mortar shall be removed, and the previously laid masonry shall be cleaned and wetted.

New work is to be toothed into unfinished work.

9.4 Brick headers are not to project into the grout space.

9.5 Cleaning holes are to be left in double cavity walls during construction by omitting units at the base of one side of the wall. In general, clean-out holes are to be provided at each location of vertical reinforcement.

9.6 Cavities shall be kept clean of mortar and debris. The cavity shall be cleaned every day using a high pressure jet stream of water, compressed air, industrial vacuum, or by laying wood strips on the metal ties as the wall is built. If wood strips are used, lift strips with wires or heavy string as the wall progresses and before placing each succeeding course of wall ties.

9.7 Exterior walls shall be built with 100 mm of facing brick, backed-up with inner leaf of brick or concrete masonry units. Solid brick jambs shall be constructed not less than 200 mm wide at exterior wall openings and at recesses.

9.8 Joints are not to be tooled until mortar has stiffened enough to retain a thumb print when the thumb is pressed against the mortar, however, mortar is to be soft enough to be compressed into joints. Joints in exterior face brick work shall be finished with a jointing tool to produce smooth, watertight concave joints. Exposed interior joints in finished work shall be tooled to a concave profile.

## **10 Reinforcement**

### **10.1 General Requirements**

Expanded stainless steel mesh joint reinforcement, if specified, will be embedded in the horizontal mortar joints not closer than 20 mm from the external face of the wall and, except at movement joints, is to be continuous and lapped at least 75 mm at all passing. Full lap joints are to be provided at angles.

Vertical bar reinforcement is to be properly positioned and secured against displacement.

The cavities containing the reinforcement are to be completely and solidly filled with the specified concrete. The whole surface of the reinforcement is to be in contact with the mortar or concrete. The minimum clear distance between the vertical bars and the block is to be 12 mm.

## **10.2 Placing Reinforcing**

10.2.1 At the time of placement, steel reinforcement is to be free from loose flaky rust, mud, oil, or other coatings that will destroy or reduce the bond.

10.2.2 Steel reinforcement is to be in place at the time of grouting. Horizontal reinforcement shall be placed as the masonry work progresses.

10.2.3 The minimum clear distance between reinforcing and masonry units shall be 12mm.

10.2.4 The minimum clear distance between parallel bars shall be one bar diameter.

10.2.5 Vertical steel reinforcement shall be held in place by centring clips, caging devices, or other approved methods.

10.2.6 Vertical bars shall be supported near each end, and at intermediate intervals not exceeding 80 bar diameters.

10.2.7 Horizontal reinforcement shall be set in a full bed of grout.

10.2.8 Reinforcement shall be spliced or attached to dowels by placing in contact and wiring together.

10.2.9 Splices shall be staggered in adjacent reinforcing bars. Reinforcing bars shall be lapped at splices at a minimum of 40 bar diameters.

## **11 Damp-Proof Courses**

11.1 Damp-proof courses shall comply with the relevant provisions of BS 743.

11.2 Damp-proof courses are to extend through the full thickness of the wall, including pointing, applied rendering or any other facing material.

11.3 The mortar bed upon which the damp-proof course is to be laid is to be even and free from projections liable to cause damage to the damp proof course.

11.4 Where the damp-proof course is situated in a hollow block wall, the blocks are to be filled solid in the course below the damp proof course.

11.5 All damp-proof courses are to be solidly bedded in mortar.

11.6 Joints of all damp-proof courses shall be lapped a minimum of 100 mm at all passings and sealed.

## 12 Tiles

### 12.1 Ceramic Tiling

#### 12.1.1 Wall Tiles

Tiles shall be to the sizes and colour shown on the schedules. Setting out on site shall be to the Engineer's approval.

Tiles shall conform to BS 1281 including all angles fillets, beads, etc. Tiles shall be obtained from a maker approved by the Engineer. Corner tiles shall be Round Edge type, mitred tiles are not acceptable.

Thin bed tile adhesives shall conform with BS 5980. Grout shall be to the approval of the Engineer.

Jointing mastic shall be a 2-pack polysulphide mastic conforming to BS 4254.

Wall tiling shall be carried out in compliance with BS 5385 for internal wall tiling in normal conditions.

Tiling shall be applied to rendered block or concrete walls, which have been allowed to thoroughly cure and dry initially for at least two weeks. Unless otherwise scheduled, glazed tiles shall be applied to a rendered surface.

Preparation for wall tiling shall be generally as for internal wall finishes for preparing the background.

Tiling requires true vertical and horizontal alignment of the tiling base. A render coat should be applied as a leveling course. Permitted deviation is 3mm over a 2m long straight edge.

After preparing the wall surface apply a scratch coat of 1:3 cement : sand (0-4mm) omitting any lime additive. This coat to be 3-4mm thick.

Following the scratch coat apply a render coat of 1:3 or 1:4 cement : sand (0-2mm) or a proprietary adhesive in accordance with BS 5980 to Engineer's approval.

Wall tiles shall be to the sizes and colour shown on the schedules. Setting out on site shall be to the Engineer's approval.

If a cement mortar method is used, fixing should comment within two hours of laying the scratch coat.

Care should be taken not to spread mortar or adhesive over too large a wall area in advance and it is important to check the bonding as the work proceeds by regularly detaching a tile to ensure that at least 65% of the tile back is covered by mortar or adhesive.

Wall tiles should be laid after floor tiles and butt against them neatly. In areas where the floor tile has a coved skirting, the skirting may be laid first.

Backs of mosaic sheets shall be pregrouted immediately prior to laying.

Corner tiles shall be accurately fixed to blend with the surrounding tile work. Joint shall be sharp and well defined.

Joints between tiles shall be grouted, not less than 12 hours nor more than 24 hours after the tiles have set with proprietary waterproof tile grout applied to manufacturer's instructions and to fill thoroughly all joints.

Tiles shall be cleaned, taking care to avoid damaging their surface, using one part muratic acid to 10 parts of water. Excess grout shall be removed before it has time to set.

### **12.1.2 Floors**

The areas of concrete substrata to be tiled are to be brushed clean and dampened until absorption ceases and the finished floor level is to be established by means of dots and rules.

The mortar for bedding the tiles is to be to the thickness shown elsewhere in the Project Documentation. The minimum thickness of bedding with this system of laying is to be 40 mm.

Dry tiles are then to be laid on the slurry and beaten firmly into position with a wooden beater to ensure a true surface and contact between the tiles and bedding is complete.

The tiles must be correctly positioned at the time they are placed and laid with joints of about 3 mm.

Grouting of the joints to be carried out within a period of 4 hours of the completion of the laying of the tiles so that the grout will attach itself firmly to the bedding. Care is to be taken to avoid disturbing the tiles and walking boards are to be used during the grouting operation.

The grouting mix is to either consist of 1 part cement to 1 part fine, dry sand by volume, or an approved proprietary grout may be used.

The tiles are to be neatly and accurately cut to a close fit where necessary at abutments and around outlets, pipes and the like.

Tiles are to be laid level or to 1% falls in “wet” areas, as may be required. Localised variations in level for a nominally flat floor are to be a maximum of  $\pm 3$  mm under a 3 m straightedge. Particular care is to be taken in “wet” areas to prevent low spots and the pooling of water.

Skirtings of the same tile size as the floor are to be fixed in such a manner that their vertical joints coincide with the horizontal joints of the floor tiles.

### **13 Terrazzo Tiles**

13.1. Portland cement and aggregates for the base layer and pigments used in the manufacture of the tiles are to comply with Part 5 where applicable and the manufacturer’s recommended standards. Aggregates for the facing layer are to consist of good quality, hard marble or other approved natural stone with similar characteristics. The marble aggregates are to be graded, but not to include a high fines or dust content and shall be sharp and angular.

13.2 The base layer is to consist of 3 to 3.5 parts of aggregate to 1 part of cement, proportioned by weight. The facing layer should be such as to provide a minimum wearing surface of 6mm after grinding and generally consist of 2.5 parts of aggregate to one part of coloured cement by volume.

13.3 During manufacture, the tiles are to be vibrated to an extent which allows the entrapped air to escape to the surface and compacts the aggregate at the wearing surface and hydraulically pressed sufficient to mould the facing to the base layer.

13.4 The surface of the facing layer is to be ground and slight imperfections to be filled by grouting with a neat cement paste coloured to match the original mix and well worked into the surface before it is re-ground to a fine grit finish.

13.5 Skirting tiles are to have square or bevelled, ground top edges. Cut floor tiles are not to be used for skirtings.

13.6 The tile facings are to be free from projections, depressions, flakes and crazes and the aggregate be evenly distributed. The tiles should be square and of rectangular cross section with sharp and true arises, and comply with the performance requirements of BS 4131.

## **14 Floor Screeds and Treatments**

### **14.1 Preparation and Procedures**

The surface of the concrete base must be clean, firm and rough to ensure a good bond. This is to be achieved by hacking thoroughly to remove all laitence and to expose the aggregate over the whole area, followed by sweeping clean and hosing down to remove all dust.

The base is to be soaked with water for at least 12 hours and any surplus water removed before laying commences.

Screeds to receive thin flexible finishes (i.e. of vinyl and rubber sheet or tile) are to consist of 1 part of cement of 3 parts of sand by weight to BS 8000, Part 9.

Screeds to receive strong rigid coverings (e.g. quarry and ceramic tile) are to consist of 1 part of cement to 4 parts of sand by weight to BS 8000, Part 9.

### **14.2 Installation**

To obtain the required thickness of screed, leveling battens are to be used, carefully fixed to line and level and fully bedded. There is to be a minimum thickness of screed of 20mm over the top of any conduit or duct.

The screed is to be laid in alternate bays with plain butt joints. The length of a bay is not to exceed 1.5 times the width. The maximum plan area of a bay shall not exceed 15 m<sup>2</sup>. Movement and construction joints in the base are to be carried through the screed.

Immediately prior to laying the screed a thick brush coat of wet cement grout is to 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.

The mix is only to contain sufficient water that will allow full compaction and shall be evenly spread to a thickness approximately 10mm greater than that required. The screed

should then be thoroughly compacted by tamping and drawing off to the required level with a screed board.

If a smooth surface is required, the final working up is to be done with a wood float, steel trowel, power float or other finish as specified elsewhere in the Project Documentation. Care is to be taken to avoid excessive trowelling which may cause crazing.

Screeds to receive thin flexible finishes or screeds which are finished as paving are to be laid to a tolerance such that localized variations do not exceed  $\pm 2$  mm under a 3 metre straightedge and  $\pm 10$  mm over large areas, measured from datum.

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

## **15 Joints in Tiled Floors**

### **15.1 Movement Joints**

15.1.1 Unless otherwise indicated in the Project Documentation, a 10 mm movement joint is to be formed at the perimeter of all tiled floors and where the tiling meets structural features such as columns, machine bases etc.

15.2.2 In clay floor tiling additional intermediate movement joints are to be provided where the flooring exceeds 6 m in any direction. In other tiled floor finishes additional intermediate movement joints are to be provided where the flooring exceeds 12 m in any direction.

15.2.3 Where a structural movement joint is provided in the base, a movement joint of the same width in the bedded finish is to be positioned immediately above.

15.2.4 The movement joint cavities are to extend through the combined thickness of the finish and the bedding mortar or compound and be completely filled and sealed after grouting of the normal joints takes place.

15.2.5 The requirements of this Part shall be implemented with additional compliance to BS 5212:

Part 2, BS 5390, BS 8203, and BS 8204 as applicable for the flooring system used.

15.2.6 Changes in colour or type of finish in doorways where movement joints occur are to be situated under the centreline of the door leaf.

15.2.7 Movement joint filler is to be approved impregnated fibreboard or cellular polyethylene which is compatible with the sealant being used and which does not excrete bituminous or oily products.

15.2.8 Sealants are to comply with the requirements recommended by the manufacturer for the situation in which they will be used.

## **16 Internal Walls Finishes**

### **16.1 General**

Before rendering, all openings, chases and other aperture required for services, should be formed. Fixings for pipes fixing pad and plugs should be fixed and all making good should be completed. Horizontal chasing in blockwork shall not be permitted. All background should be adequately true and level to achieve the specified tolerances, they should be adequately fixed, free from all contamination and loose areas and adequately prepared to give a good bond. All surfaces, prior to application of internal render shall be sealed with PVA bonding agent approved by the Engineer.

Joints shall be formed in the finishes wherever movement joints occur in the structure and at tops of blockwork wall as shown on the drawings or as directed by the Engineer. Plastering shall be carried out in accordance with BS 5492.

### **16.2 Materials**

All branded materials shall be delivered to the site in their original packages, bearing the trade names of the material concerned. Cement, hydrated lime and gypsum plasters shall be stored off the ground under cover and away from all possible sources of damp. Quicklime shall be run to putty as soon as possible after delivery. Sand should be stored under clean conditions to prevent its contamination with soil or other deleterious substances.

Access of water to gypsum plasterboard must be prevented. Insulating fibreboard shall be conditioned in accordance with the manufacturer's instructions before erection.

### **16.3 Dubbing Out**

Concrete and hollow tile ceilings, ceiling beams, columns and stanchions, except where require to be fair faced finish shall be dubbed out as necessary before plastering is commenced. The mix dubbing shall be similar to that used for first undercoating.

Wetting:

Surfaces of brickwork, hollow partitions, concrete, etc. shall be thoroughly wetted immediately before plastering is commenced.

After the initial set, cement renderings shall be kept wet by spraying or by other suitable methods for at east 7 days to delay evaporation. Under no circumstances shall water or membrane methods of curing be used for gypsum plaster.

### **16.4 Forming Key**

First undercoating shall be heavily scored and second undercoats well scratched to provide a proper key for the following coat.

### **16.5 In-Situ Concrete**

The surface shall be cleaned of all dust, loose particles and other matter and any laitance or efflorescence removed by dry methods. Any grease or oil shall be removed as completely as possible.

Before cleaning down, any ridges left by shuttering imperfections shall be removed, bearing in mind that the finished plaster thickness shall not exceed 9mm immediately following completion of curing of the concrete and after examination by the Engineer's representative, surfaces of insitu concrete which are to receive an applied finish shall be uniformly lightly bush-hammered to expose the aggregate. Immediately prior to application of the finish an approved bonding agent shall be applied to the keyed surface strictly in accordance with the manufacturer's recommendations.

Surfaces to receive lightweight plaster shall not normally be provided with a tooled finish, but where the background is limestone, brick or granite concrete or where concrete has exceptionally smooth surfaces, an approved bonding agent shall be applied in accordance with the manufacturer's instructions.

As far as is practical, plastering shall not be commenced until all mechanical and electrical services, conduits, pipes and fixtures have been installed and the installations tested. Expanded metal lath shall be provided over all electrical conduits and service pipes running within the walls.

## 16.6 Mixing

Except where hand mixing of small batches is approved by the Engineer, mechanical mixers of an approval type shall be used for mixing of plaster. Caked or lumped materials shall be cleaned after mixing each batch and kept free of plaster from previous mixes. Plaster shall be thoroughly mixed with the proper amount of water, uniform in colour and consistency. Re-tempering will not be permitted and all plaster, which has begun to stiffen, shall be discarded. All tools, implements, vessels and surfaces shall at all times be kept scrupulously clean and strict precautions shall be taken to prevent the plaster or other materials becoming contaminated by piece of partially set material, which tend to retard or accelerate the setting times.

Hand mixed plaster shall be first mixed in the dry state being turned over at least three times. The required amount of water should then be added and the mix again turned over three times or until such time as the mass is uniform in colour and homogenous. All ingredients entering the several mixes shall be proportioned and measured by means of calibrated boxes or containers of such nature that the quantities can be accurately checked at any time.

## 16.7 Workmanship

### 16.7.1 General

All plastering shall be executed in a neat and workmanlike manner and corner shall be true, straight and plumb.

All arrises shall have aluminium angle beads.

Plaster shall be rodded and straight-edged to a uniform thickness in true planes flush to the required surface and flush with outlet boxes and similar details steel trowelled smooth and level with sharp, straight arrises and true angles. Plaster shall be free from laps, cracks, trowel marks, or other structural defects or surface imperfections.

Beads, angle or stop shall be cut to the required lengths and secured with plaster dabs.

The dabs should be placed at least one near each end and further dabs spaced at not more than 600mm intervals. The beads should be fixed to form the finished plaster line, and no plaster should project in front of the beads.

### 16.7.2 Sand and Cement Plastering

Sand and cement render to be mixed to be mixed in a ration of 6 parts sand to 1 part cement with 1 part (by volume) lime or plasticiser to Engineer’s approval.

The thickness of two-coat work, exclusive of keys or dubbing out, shall be of the order of, but shall not normally exceed 12mm. For three-coat work the thickness shall be of the order of 15mm, but shall not normally exceed, 18mm. The thickness of two-coat applied to concrete ceilings and soffits, or plasterboard shall not exceed 9mm. The thickness of finishing coats shall be of the order of 3mm.

All mixes shall be used as soon as possible after water has been added.

All backgrounds shall be prepared as per the general clauses and then lightly wetted and splashed with a slurry coat. Newly finished work is to be kept damp for 18 hours by lightly spraying with fresh water.

Each coat shall be allowed to dry thoroughly before application of the next coat.

Where the plaster finish is flush with adjoining surfaces or where a tooled joint is indicated on the Drawings, the plaster shall be grooved back with the smallest available edging tool to control any cracking at these points.

At doors and frames and other openings, all plaster shall be keyed in, except that across the head of openings and 300mm down each side plaster shall be cut free of the frame or grounds with the edge of a trowel, after stiffening but before setting, to allow for expansion.

During the application of render all existing work should be adequately protected against spillage, staining and any other damage.

Run or form all necessary quirks, splays, arrises, etc., cut out and make good all cracks, blisters and other defects and complete plasterwork to the satisfaction of the Engineer.

All making good is to be cut out to rectangular shape, the edges undercut to form dovetail-key and finished flush with the face of surrounding plasterwork.

### 16.8 Gypsum Plastering

General preparation of surfaces to be plastered and all aspects of the work shall be carried out in accordance with the specification for sand/cement render except where the manufacturers directions differ in which case they shall take precedence.

Before rendering is commenced, all junctions between differing materials shall be reinforced in accordance with the manufacturers specific directions.

Gypsum plaster shall be applied in accordance with their specification for preparation and application.

Machine applied Gypsum Plaster shall be approved by the Engineer; hand applied Gypsum Plaster shall be carlite finish coat on undercoat suitable for the particular background to be plastered.

Generally all conditions in sections L.7.0 and L.8.0 apply to gypsum plastering except where it contradicts manufacturer's instructions.

Angles, Stops, Beads and Expanded Mesh

Reinforcement generally shall be fixed over junctions between block work and reinforced concrete and where crack are likely to develop as directed by the Engineer. It shall also be provided at exposed reveals and where necessary to provide good adhesion to an inferior-backing surface.

Before rendering is commenced, all junctions between differing material shall be reinforced with a 150mm wide strip of expanded metal which shall be plugged nailed or stapled as required at intervals not exceeding 300mm at both edges.

Where gypsum plaster is used all junction between differing materials shall be reinforced with fibreglass netting cut to the appropriate width as directed by the Engineer.

The expanded metal lathing shall be of the plain expanded type complying with B.S. 1369 Type (a) Figure 1 and weighing not less than 3lbs pr square yard (1.6kg/m<sup>2</sup>).

Angles stop beads and external render stops shall be sizes to suit the thickness of plaster/rendering and generally shall be provided at all external angles and as directed by the Engineer on site.

Generally galvanised angle beads or stop beads shall be used on all window and door reveals and external angles to walls internally and at the base of rendering at plinth level externally.

External render stops shall be used generally at the base of the render or where shown on the drawings or as directed by the Engineer on site.

All angles stop beads render stops etc shall be fixed using galvanised shall staples at not more than 100mm centres.

External render stops and angle beads and those to openings in external walls shall be given one coats of galvafruid prior to fixing.

All angles, stop beads, render stops etc shall be approved by the Engineer.

## **17 External Walls**

### **17.1 General**

Before rendering all openings, chases and other aperture required for services, should be formed. Fixings for pipes fixing pad and plugs should be fixed and all making good should be completed. Horizontal chasing in blockwork shall not be permitted.

All background should be adequately true and level to achieve the specified tolerances, they should be adequately fixed, free from all contamination and loose areas and adequately prepared to give a good bond.

All surfaces, prior to application of external render shall be sealed with a PVA bonding agent approved by the Engineer.

Joints shall be formed in the finishes wherever movement joints occur in the structure and at tops of blockwork wall as shown on the drawings or as directed by the Engineer.

### **17.2 Rendering**

External rendering two-coat work to be total finish not less than 15 mm, to be floated to a smooth finish.

The finish shall not be applied until all repairs and making good to the previous coats are completed. Pipes, fittings, ironmongery and the like shall first be fitted, then removed during the rendering process and refitted and jointed afterwards. Any render which adheres to pipes, doors, windows and the like shall be carefully removed before it has set. Finish shall be approved by the Engineer

Glass Reinforced Cement Products :

GRC work is to be supplied and installed by a specialist company capable of undertaking work of a complex nature

Screens, columns, column capitals and other details as shown on the drawings, shall be formed using CEM-Fil GRC fibres and be approved by the Engineer P.L.C.

specifications, as well as the G.R.C.A. specifications for spray up and pre-mix materials. The manufacturer shall be approved by the Engineer

#### **17.2.1 Propriety Suspended Ceilings**

Suspended ceilings shall comprise the following, in areas indicated on the drawings: -  
Gypsum Plasterboard:

Suspended plasterboard ceilings to be approved by the Engineer and conform to to BS 1230: Pt 1:1985.

### 17.2.2 Ceiling Tiles

Ceiling tiles and suspension system shall be approved by the Engineer

### 17.3.3 Metal ceiling Tiles:

Suspended ceiling to first floor gallery around atrium to be approved by the Engineer  
Each tile & perimeter trim 25mm thick x 45kg/m<sup>3</sup> density mineral wool acoustic liner, aluminium foil encased and faced on one side with black glass tissue

## 18 Painting & Decorating

### 18.1 Scope Of Works.

Work covered by this section includes all internal and external painting works.

Painting shall be carried out generally in accordance with BS 6150. None other than skilled workmen are to be employed, except in the case of apprentices and labourers. A properly qualified foreman is to be constantly on site whilst work is in progress.

All fittings and fastenings shall be removed before the preparatory processes are commenced and shall be cleaned and re-fixed in position after painting is completed.

### 18.2 Materials.

All materials shall be obtained from a manufacturer approved by the Engineer and shall be suitable generally be supplied in containers not exceeding 5 litres.

Paints other than spray paints, bituminous paint and imitation textured masonry paints shall generally be supplied in containers not exceeding 5 litres.

All paint, etc shall be delivered in sealed containers bearing the following information as applicable.

- Manufacturer's name, initials or recognised trade mark.
- The appropriate title and specification.
- Whether a primer, undercoat or finishing coat.
- Lead free, if required.
- Whether for internal or external use.
- The colour reference from BS 4800 or as specified.
- The method of application (i.e. brush, spray or roller).
- The batch number and date of manufacture or re-test.
- Detailed instructions for storage and use highly inflammable or toxic.

- Containers of materials other than paints listed shall bear as much of the above information as is appropriate.

Paint shall be stored in sealed containers in a suitable lock-up store where it is not exposed to extreme temperature sunlight or weather. Any special storage conditions recommended by the manufacturer shall be observed.

No paint shall be used beyond a period of 18 months from the date of dispatch or date of certificate of re-tested. If this period is exceeded, the paint shall be removed from the site until re-tested.

The primary coat, undercoats and finishing coat of paint in any one system shall all be obtained from the same manufacturer.

Coats of a paint system shall differ in shade or colour where practicable.

Colour and tints shall be chosen by the Engineer who will furnish the contractor with a schedule giving full details or colour required.

Priming paints for the respective purpose shall be as scheduled in Table 3201.

The separate base and acid components of the etching primer shall be mixed together in strict accordance with the manufacturer's printed directions. Only sufficient material shall be mixed for immediate use or as can be used within 8 hours after mixing.

Sealers shall be applied prior to decorating as scheduled in Table 3202.

Fire retardant paint shall be of approved manufacture giving appropriate resistance to surface spread of flame when applied to the surfaces concerned.

Limewash shall be composed of clean quicklime mixed with 10 percent by weight of tallow and clean water. The mixture shall be prepared by breaking up the quicklime into small lumps and placing the shredded tallow on top. Sufficient cold water shall then be added in order that the heat developed in slaking is just sufficient to melt the tallow and disperse it within the mass. When slaking is complete, water shall be added to produce a workable mix.

The finished coats of paint herein specified shall be of a type and manufacturer compatible with priming or base coats applied by other trades under this specification and it is the responsibility of the Contractor to use suitable paint for finish coats on the surface to be painted. Thinners and dries shall be as recommended by the various manufacturers for use in connection with their paint products.

### **18.3 Handling & Storage.**

Materials shall be stored in approved locations where they will not interfere with the work of others. Oil rags, waste and similar combustibles shall be removed from the building every night. Under no circumstances shall such combustibles be allowed to accumulate and every precautions shall be taken to eliminate conditions conducive to spontaneous combustion.

Observe fire safety precautions and provide suitable extinguishers adjacent to storage areas.

No paint shall be used beyond a period of 18 months from the date of dispatch or date of certificate of re-test. If this period is exceeded, the paint shall be removed from the site until re-tested.

### **18.4 Tests**

From time to time, at the contractor's expense, samples for testing shall be taken from the sealed containers, spray gun containers or from the workmen's kettles on the works. In addition the Engineer may require that unopened sealed containers be set aside for subsequent tests.

Where such tests show that, though the material taken from open containers is in accordance with the specification the material in spray gun containers or in workmen's kettles is unsatisfactory, any work coated with such unsatisfactory materials shall be re-executed. Likewise any work on which the paint is found to be unduly thin shall be prepared again and repainted, all to the satisfaction of the Engineer.

If any paint delivered is considered defective or unsatisfactory it shall be set aside and the manufacturers and the Engineer notified immediately.

**Preparation of Surface – Render/Plaster.**

Generally all surfaces shall be thoroughly prepared and shall be clean, free from loose and powdery material and sufficiently dry for the subsequent decoration treatment. Each coat of paint shall be thoroughly dry before the next coat is applied.

Rendered surfaces shall be brushed down thoroughly to remove all dust and loose material. Mortar droppings and nibs shall be removed and defects made good. Efflorescence shall be brushed off as it appears and all decoration deferred until it ceases.

The application of gloss or semi gloss paints or PVA emulsion (semi-gloss) paint shall be delayed until thorough or sufficient drying to the satisfaction of the Engineer has taken place.

### 18.5 Plastered Surfaces

Plastered surfaces shall be brushed down to remove loose material and dust and where directed washed with a minimum of warm water and detergent and allowed to dry. Minor defects, cracks and holes, after cutting out as necessary, shall be made good as appropriate and rubbed down flush with the surrounding surface. Efflorescence shall be brushed off as it appears and all decoration deferred until it ceases. The application of gloss or semi-gloss paints of PVA emulsion (semi-gloss) paint shall be delayed until thorough drying has taken place.

### 18.6 Preparation of Timber

All surfaces shall be rubbed down smooth with fine abrasive, and dusted off. Sound knots, resinous streaks and bluish sapwood shall be given two coats of knotting which shall extend at least 25mm around the affected area. Nails shall be punched well below the surface.

After priming, defects such as open joints or nail holes shall be stopped with hard stopping and surface imperfections faced up all as necessary. All such repairs shall be primed before undercoating is applied. Gaboon plywood and similar open-grained surfaces shall be face-filled over the whole surface after priming and rubbed down smooth. Hardwood containing an excess or natural oil shall be decreased with white spirit immediately prior to priming.

### 18.7 Preparation of Metalwork

Bare iron and steelwork including sheeting and pipes shall be thoroughly prepared by removing all dirt, rust and loose mill scale to the satisfaction of the Engineer. Preparation shall include the use of chipping hammers, scrapers, mechanical wire brushes and carborundum grinding discs. The use of mechanical chisels and other impact tools may exceptionally be ordered if in the opinion of the Engineer their use is necessary. All rivets, welds, angles, joints and openings shall be properly cleaned. All tools shall be operated in such a manner that no sharp ridges or burrs are let and no cuts made in the steel.

Dust and other loose material shall be removed after cleaning. Oil and grease shall be removed with white spirit.

The priming coat shall be applied before any contamination or rusting occurs. In positions inaccessible to manual cleaning and where steel scraping is insufficient, chemical rust remover shall be used, applied liberally. All surface treated with rust remover and surrounding areas which might have become contaminated are to be thoroughly washed with fresh water. Priming shall be carried out as soon as practical and in any case the same day.

Steelwork 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.

Steelwork which is supplied with the final finish applied shall be made good as necessary strictly in accordance with the manufacturer's recommendations and to the approval of the Engineer.

Zinc, including galvanized steel, shall be thoroughly degreased with white spirit before priming. All corrosion products shall be removed from weathered zinc before priming. Sprayed aluminum or zinc shall be primed before staining or corrosion of the coatings occurs.

Copper surfaces shall be degreased thoroughly with white spirit and primed with etching primer before normal priming. Small areas may be rubbed down with fine abrasive in lieu of etching primer.

All copper dust must be removed before painting. Lead surfaces shall be degreased thoroughly with white spirit and primed with one coat of etching primer before normal priming. Small areas may be rubbed down wet with fine abrasive in lieu of etching primer.

All fibre boards, plasterboards, wood wool slabs and sheets shall be dry and the surfaces well brushed down to remove loose material dirt and dust.

### **18.8 Preparation of Aluminum**

Smooth or polished aluminum shall be degreased with white spirit and given one coat of etching primer before the normal priming. Small areas may be rubbed down wet with fine abrasive in lieu of etching primer.

Cast aluminum shall be degreased with white spirit before priming.

Weathered aluminum shall have all corrosion products removed with fine abrasive and the surface shall be finally degreased with white spirit before priming.

### 18.9 Preparation of the Paint

All liquid paint shall be thoroughly stirred to a uniform consistency when containers are opened and before being transferred to paint kettles.

Thinning for oil paint shall be permitted only exceptionally when by agreement with the Engineer.

For special paints the thinners and quantities recommended by the manufacturer shall be used.

The paint and the like shall be kept well stirred and shall not be used when a thick sediment has settled.

Any paint or the like which develops a skin on the contents within the contract period shall be removed from the works.

Any residue left in a tin shall not under any circumstances be added to the contents of another tin.

The mixing of different paints together shall not be permitted.

### 18.10 Method of Application.

18.10.1 The Contractor shall submit to the Engineer duplicate copies of paint system sheets relating to each of the paints he proposes to use. These shall be accompanied by the manufacturer's paint data sheet which show the manufacturer's name, the brand name, reference number, colour and description of the paint, the surface preparation to which it is to be applied, the method and location of application, the minimum dry film thickness, the coverage per liter and the number of coats to be applied, all to the Engineer's requirements. Following the Engineer's written instruction the requirements of the paint system sheets shall be adopted for the works.

18.10.2 The Contractor shall ensure that the paint manufacturer's data sheets cover the conditions at works or at site, including temperature and humidity, under which the paint are to be applied. Paint shall be supplied from the contractor paint store to the painters

ready for application. Any addition of thinners must be made in the store under the supervision of the Engineer and only as allowed by the manufacturer's data sheet.

18.10.3 All brushes paint rollers, spraying equipment, kettles etc. used in carrying out the work shall be clean and shall be thoroughly re-cleaned before being used for a different type or class or material.

18.10.4 Brush painting. Paint shall be applied so that the finished surface is free from avoidable brush marks. Cutting in shall be neatly and accurately performed. All areas or part shall be laid off correctly. Before any new coat is applied over a preceding one, the Engineer shall be invited for checking and any dropping, runs or irregularities removed. A fresh coat may be applied only when the previous one is completely dry. Each coat, except the last, must be lightly rubbed down with fine glass paper before the next is applied.

18.10.5 Spray painting will be permitted with approved machines but only in the application of paints to which the Engineer has given approval for its use. Surfaces adjoining those being sprayed shall be carefully and closely masked. The coating shall be even and adequate and the finish shall be free from orange peel appearance, runs, sags, curtaining and other defects.

18.10.6 Roller painting shall be permitted with mohair or short pile sheepskin rollers but in no case shall it be allowed in application of the following:

- 1) External work
- 2) Priming coats
- 3) Work other than that of a straightforward plain charter.

18.10.7 Priming coats shall be applied by brush to give a coat of adequate thickness with no misses and to satisfy the porosity of the surface. The priming shall be well worked into the surface joints and angles.

18.10.8 Priming coats applied off site that have suffered from exposure on the site or in transit shall be touched up or reprimed as necessary before undercoating.

18.10.9 The work shall be effected only on absolutely dry surfaces in ventilated premises on surfaces free from dirt, dust, grease, stains, etc. Before and during its use, the paint must be kept fully homogenised by stirring and if necessary, filtering. Painting of exterior work shall not be allowed in damp weather or during rain or when dew is falling or likely to fall within a few hours.

18.10.9 The Contractor shall protect all areas in which he is working from paint splashes, drips etc. This may entail covering certain semi finished areas by tarpaulins. Plastic sheets and such like protecting other work is the responsibility of the contractor. Stains and Clear Preservatives.

### 18.11 Priming of Joinery

One coat of priming paint shall be applied before delivery to all surfaces of joiner after drying out as described. If the contractor wishes to use an alternative paint he shall satisfy the Engineer that it is not inferior.

### 18.12 External Walls & Ceilings:

Brush off any efflorescence and leave for a few days. If this reoccurs continue this treatment until the action ceases:-

Apply 1 coat permocryl primer sealer.

Apply 2 coats fine texture.

Apply 2 coats Silk to walls/matt to ceilings.

approved by the Engineer

### 18.13 Internal Walls:

Apply 1 coat sterlite primer

Apply 2 coats filler, sanding between coats as required.

Apply 1 coat undrcoat. approved by the Engineer

Apply 2 coats eggshell.

### 18.14 Internal Ceilings, Washrooms, Stores, Laundry:

Apply 1 coat sterlite primer

Apply 2 coats filler, sanding between coats as required. Approved by the Engineer

Apply 2 coat matt to ceilings/ silk to walls.

### 18.15 Internal Woodwork – Painting.

The following procedure should be followed for the painting of internal woodwork:-

Glass paper the woodwork thoroughly and clean down teak should be washed with white spirit.

Thoroughly wash down woodwork using one coat of Fungicidal wash.  
 Apply one coat of aluminium wood primer.  
 Fill all cracks, splits, open joints etc. with a flexible filler, rub down. Feather all edges and dust off.  
 Apply one coat of undercoat.  
 Apply a second coat of undercoat of a different shade.  
 Apply one gloss coat carefully to ensure a smooth, even finish to the architect's approval.

### 18.16 Internal Woodwork – Varnishing

The following procedure should be followed for varnishing woodwork and in strict accordance with the manufacturers technical recommendations for the products:-  
 Glass paper the woodwork thoroughly and clean down – teak should be washed down with solvent (degreaser).

Thoroughly wash down woodwork using 1 coat of Fungicidal Wash.  
 Apply one coat of varnish.  
 Fill all crack, splits, open joints etc. with a flexible filler tinted to the colour of the wood.  
 Rub down, feather all edges and dust off.  
 Apply a second coat of varnish.

### 18.17 External Woodwork – Varnishing

As for internal specification except that second coat procedure should be repeated to give a total of three coats.

### 18.18 External Steel.

The steel should be prepared in accordance with the relevant metalwork specification clauses:

Apply one coat of rust inhibiting Primer and exposed edges to have an additional coat.  
 Apply two coat of undercoat.  
 Apply two coats of gloss – colours to be specified by the Engineer.  
 The entire application to be carried out in accordance with the manufacturer's requirements.

## **19 Aluminum Doors and Windows**

External glazed aluminum windows, fixed lights, etc. shall be aluminum to BS 4873. Aluminum door casting to be LM5 or LM6 grade.

Aluminum windows extrusions shall be manufactured to the appropriate sizes and approved the Engineer for each opening. Windows shall be powder coated finish to Engineer's approval and are to be fabricated and installed by any approved company.

Full size samples should be submitted for approval complete with ironmongery for all window/door types.

All ironmongery is to match the window or door to which it is attached and to be of an identical specification and will be subject to the Engineer's approval.

The contractor shall be responsible for checking all dimensions on the drawings and site prior to commencing fabrication.

All units shall be provided with protective tape to the aluminum and protective film to the glass and this shall be kept in position until decoration is complete.

Additional protection shall be provided, as necessary to prevent marking of surfaces which will be visible in the finished work.

The units shall be transported, handled and stored in accordance with the manufacturer's recommendations and the contractor is responsible for ensuring that the installed units are not damaged.

Before fixing any metal work, which will be in direct contact, with concrete it should have 2 coats of bitumen solution or mastic impregnated tape to the surfaces of the components. Black bitumen-coating solution to be as for cold application, to BS 3416.

Fixing shall be in accordance with the manufacturer's recommendation; all jointing of window/door components shall be tightly fitting and executed in an inconspicuous manner with hairline joints.

All sub frames must be treated in accordance with the relevant section of the specification prior to fixing aluminum frames. Joints should be bedded in a butyl-based compound as recommended by the window manufacturer and approved by the Engineer

Upon completion check and adjust all moving parts of windows/doors and all ironmongery, lubricating as necessary to ensure correct functioning.

Externally all gaps between frames and openings shall be sealed with one part alkaline mastics approved by the Engineer.

All joints to be sealed should be dry, free of loose material dust and grease. Joints should be prepared in accordance with manufacturer's recommendation using recommended solvents and/or primers where necessary adjoining surfaces should be masked.

All gaps between window/door frames and the surrounding opening to be sealed with mastic should be less in depth than width and a polyethylene back up strip used if required).

Pointing should be carried out with a sealant in accordance with manufacturer's recommendations and tooled to form smooth beads or fillets as shown on drawings.

Excess sealant should be removed from adjoining surfaces using cleaning materials and methods recommended by sealant manufacturer. Installation screws shall be installed carefully to avoid scratching or gouging aluminum and shall match the sections in finish and colour. No copper based or corroding materials, which react with aluminum, shall be used.

Water bars to window frames shall be installed by the main contractor where necessary and to Engineer's requirements.

## 20 Timber Door Frames And Linings

Internal door frames, unless otherwise indicated, shall be as on drawings and shall be framed, rebated, rounded and grooved to dimensions stated on the drawings and shall be fixed in. All frames and linings are to be drilled, plugged and screwed to the block work or concrete at jambs through sub-frames.

Door sub-frames to be fixed with 25 x 3 mm galvanized steel cramps 275 mm girth, one end holed & screwed to back of frame, the other end ragged and built into block work joints. Where abutting concrete, frames and sub-frames shall be plugged and screwed at 700-mm centers to jambs and lintels.

When building in, brace and protect frames as necessary to prevent distortion and damage during erection of adjacent structure.

The floor of each door frame or lining is to be secured to the floor with 13 mm diameter galvanized steel dowels 75 mm long equally mortised into the frame and concrete floor.

## **20.1 Timber Doors**

Flush doors generally shall comply with the requirement of BS 459 Part 1 and 3 and/or be from an approved manufacturer. The door types shall be as shown on the Door Schedule and Detail Drawings and fixed accordingly. All timber and workmanship shall comply with relevant sections of this specification. Door to be constructed according to the Door

## **20.2 Schedule and Drawings**

All Timber for doors and frames shall be kiln dried with moisture content between 10% and 12% and must be treated and guaranteed against termite & fungus.

All Flush doors shall have solid wooden cores and 10 mm hardwood lipping to all edges and shall comply with BS 4787 doors shall be covered with 6 mm thickness of plywood on both sides. Internal doors shall be constructed using adhesive and Plywood, except in wet areas where plywood shall be used and adhesive for the assembly of the door. Openings for glass shall have glazing fillets in accordance with BS 459 part 2. All recommendations shall be approved by the Engineer.

Paneled doors to be fabricated in accordance with the drawings. Wood grain to be matched on adjacent panels to accordance with the appropriate clauses relating to workmanship.

Iron mongery and dust seals to be as specified on the schedule.

The Contractor will be required to provide detailed working drawings and certificates of all fire doors for approval prior to construction.

Single leaf doors shall be fitted with fire and smoke seals and intumescent plugs as approved by the Engineer

Double leaf fire doors and fire doors to CO2 protected areas shall be fitted with fire and smoke seals and intumescent as approved by the Engineer.

## **21 Glazing**

### **21.1 Standards**

All items and work relating to glazing shall conform to the following British Standards where applicable.

BS 952 : 1978/1980	Glass for glazing
BS 5713 : 1979	Specification for hermetically sealed flat double glazing units
BS 6262: 1982	Code of practice for glazing of buildings
BS 6375 : 1983/1987	Performance of Windows

Technical literature:

Submit detailed technical literature concerning the properties of the glass types being proposed, as well as samples with the tender submission, for the review and approval of the Engineer.

### **21.2 Guarantee:**

Provide a 10 year guarantee against leakage, failure of sealing and similar manufacturing defects.

### **21.3 Materials:**

#### **21.3.1 External Double Glazing**

The standard double glazed assembly specified in the schedules for external doors and windows shall be double glazing units with 6mm thick float glass external panes, 6mm thick low emissivity inner glass panes.

The assembly generally shall comprise 2 x 6mm thick panes with a 10mm airspace. The units shall incorporate a two part seal with continuous rolled aluminium spacer in natural colour with a dessicant to keep the air in the unit dry and free from organic vapours. The perimeter of the unit shall be hermetically sealed with a two part system made up of butyl and a silicone seal to BS 5713. Glass shall be annealed or toughened as recommended for specific applications by BS 6262.

The inner pane of windows to bathrooms shall have an inner pane of 6nun thick frosted glass. Double glazed panels in external doors shall be 6mm toughened safety glass.

## **21.4 Putty and Glazing Compound**

Linseed oil putty shall conform to BS 544: 1969.

Proprietary metal casement putty compound may be used in appropriate locations subject to the approval of the Engineer.

Flexible glazing compound, glazing sealant, glazing tape, springs, spacers, etc. May be used subject to the Engineer's approval. They shall be proprietary products suitable for the application proposed.

Any glazing compounds which are not to be painted should be submitted for approval of their colour prior to ordering.

Wash leather for internal glazing shall be supplied and fitted as recommended by the manufacturer.

Back bedding and pointing should be approved by the Engineer.

Sprigs:

Headless rustproof or non-ferrous nails.

## **21.5 Execution**

### **21.5.1 Measuring glass**

Before measuring check that surrounds, rebates and other surfaces are dimensionally true, without distortion and fit for glazing.

### **21.5.2 General**

All glass should be of an accurate size for the intended opening and have clean undamaged edges and surfaces, which are not disfigured.

Glass should be kept clean and dry during delivery and storage.

Any glazing compounds which are not to be painted should be submitted for approval of their prior to ordering.

Wash leather for internal glazing shall be supplied and fitted as recommended by the manufacturer. Back bedding and painting Shall be approved by the Engineer.

All proprietary products should be stored, handled and fixed in accordance with the manufacturer's instructions.

### 21.5.3 Workmanship

Manufacturer's recommendations should be strictly followed for all products and materials. All grooves and rebates should be clean, dry and unobstructed at the time of priming, sealing, glazing.

The contractor shall ensure that the first two coats of the specified finish have been applied to rebates of timber frames before glazing with metal casement putty, flexible or non-setting compound. Apply additional sealer if and as recommended by compound manufacturer. Timber beads are to be sealed to match surround. With metal surrounds the manufacturer's recommendations must be followed for applying primer (if required) and preparing surround and beads

### 21.6 Fixing Glass

The edge clearance should be not less than 3 mm for single glazing and should be equal all around each pane.

Edge cover and clearance for solar glazing to be as recommended by the manufacturers. Ensure that no voids or spaces are left in backing or bedding compounds and when stripping surplus off this should be flush with top and side edges and angled at the bottom to avoid water collection.

No pre-glazed units with be permitted.

Mirror where specified are to be fixed against a wall shall be fixed to a 12m plywood backing plate with a freely ventilated air space between the mirror and the wall using brass plated dome headed screws with spacing washers or spacing pieces.

### 21.7 Bead Fixing

Distance piece of P.V.C. should be used in all external bead fixing except where strips of channels are specified. They should give beads of regular thickness not less than 3 mm on each side of the glass.

Distance piece should be located opposite each other on each side of the glass not more than 30 mm apart, adjacent to fixing points of beads with the first pair on each edge not more than 75 mm from corner and so as not to coincide with setting and location blocks which should be of P.V.C.

Beads to external glazing should be bedded in a compound to be rebate.

Internal beads to be bedded dry to the rebate and to glazing tape the internal dry glazing tape to be passed around the edge and trimmed flush on both sides.

Timber beads are to be secured by countersunk screws and cups at centres predetermined by the surround manufacture.

Any Proprietary fixings should be secured in accordance with the manufacturer's specification.

## 21.8 Protection and Cleaning Of Finished Work

No painted or stuck on indicators should be used on solar control or coloured glass.

Remove all mortar, plaster or concrete spillage whilst wet.

Cleaning should remove all smears and excess compound and sealant. The glass should be left clean inside and out and free from scratches. All broken glass should be replaced before completion.

## 22 Ironmongery

### 22.1 General

Ironmongery shall be supplied in accordance with the schedule provided by the Engineer. Upon receipt of ironmongery the contractor shall check quantities and report any shortfall immediately to the Engineer.

The contractor shall fix all ironmongery including cutting oil necessary mortices, rebates and the like and forming bolt sockets and box-outs for the floor closers in floor slabs.

All ironmongery shall be removed prior to any finishing or painting and the contractor attention is specifically drawn to the requirements that any lacquered brass or lacquer finish must not be damaged any items so affected will be immediately rejected.

Suiting of locks to be in accordance with the schedule to be provided by the Engineer.

All items of ironmongery shall conform to the following standards where applicable.

BS 1227 : 1967	Specification for hinges.
BS 8621 : 1980	Specification for thief resistant locks.
BS 4951 : 1973	Specification for hardware, lock and latch furniture.
BS 5725 : 1981	Emergency Exit devices.
BS 5872 : 1980	Specification for locks and latches.
BS 6459 : 1984	Door Closers.

Ironmongery not specified by reference to a manufacturer's catalogue or to a BS or similar standard specification shall be the best quality available from an approved manufacturer.

All items of ironmongery with locking devices shall be provided with 3 nos. keys. These are to be handed over to the Engineer or Client on completion of the contract with named identification. Master keys details will be ascertained and advised during the course of the contract.

The contractor shall supply manufacturer's literature and if requested by the Engineer samples of ironmongery items proposed.

All items of ironmongery shall be installed in accordance with the manufacturer's instructions and generally in compliance with good practice.

All ironmongery shall be from the Ingersoll – Rand range, or Similar approved

## **23 Carpentry And Joinery**

### **23.1 Timber For Carcassing And Joinery**

Timber for carcassing shall be dark red hardwood approved by the Engineer.

Timber for joinery shall be approved by the Engineer

All timber for joinery is to be carefully selected and suitable for staining. Hardwood shall be well seasoned sound, bright, free from shakes, large, loose or dead knots, waney edges, warp, incipient decay, stained sapwood or other defects.

Structural timber roof joists, floor joists stud work etc. shall be of strength equivalent to BS CP 112, species group S2 and grade 50.

Samples from different batches shall be submitted to the Engineer for approval before constructions.

### **23.2 Moisture Content of Timber:**

Timber shall be properly and carefully air seasoned and if necessary kiln dried. The moisture content shall be suitable for the situation & location of the finished timber but shall be limited to 10% for internal work and 16% for external work. When fixed in position the timber shall remain stable and free from any expansion or contraction or other movement which will detract from the satisfactory performance or required appearance of the element. The timber shall be free from all drying defects whatsoever and there shall be no indication of shrinkage.

Immediately before manufacture the moisture content of timber should be ascertained using an electrical moisture meter to manufacturer's recommendations. Test 5% but not less than 10 lengths of each cross section in the centre of the specified range.

During delivery, storage fixing and thereafter to practical completion maintain conditions of temperature and humidity suitable for specified moisture content(s) of timber components. Seal all exposed end grains of joinery before general sealer or primer is applied and where possible before delivery to site, using proprietary pre-sealant.

**Storage And Protection :**

Do not deliver to site any joinery, which cannot be immediately unloaded into suitable conditions of storage.

Joinery is to be stacked on bearers on level dry floors under cover. When stacking stagger components or separate with spacers to prevent damage by and to projecting ironmongery, beads etc. Stack doors horizontally on not less than three level bearers at nor more than 1m centres.

The contractor should prevent distortion of joinery during transit, handling and storage. The contractor should prevent damage to arises and surfaces which will be exposed in completed work.

Keep joinery in conditions suitable for specified moisture content, avoid prolonged exposure to direct sunlight and ensure good ventilation.

Retain protective coverings in place for as long as practicable, but remove on completion.

### **23.3 Treatment Of Timber**

All carcassing and built in timber shall be vacuum treated against termite attack using proprietary products, to be approved by the Engineer and applied as recommended by the Supplier.

Timber shall be impregnated, to achieve an average loading of 40 litres preservative per m<sup>3</sup> as approved by the Engineer.

All cut ends, joint forming, planing and/or any on-site cutting shall be liberally treated with end grain preservative, approved by the Engineer.

**Internal Woodwork – Finishing :**

The following procedure should be followed for the factory finishing of the woodwork.

Step 1 Glass paper the woodwork thoroughly and clean down teak should be washed down with white spirit.

Step 2 Apply one coat of fungicidal fash or as approved by the Engineer.

Step 3 Apply one coat of timber preservative as approved by the Engineer.

Step 4 Apply one coat of Polyurethane Varnish as approved by the Engineer.

Step 5 Fill all cracks, splits, open joints etc. with flexible filler tinted to the colour of the wood. Rub down, feather all edges and dust off.

Step 6 Apply a second coat of Polyurethane Varnish as approved by the Engineer.

Step 7 The whole process to be carried out strictly in accordance with the manufacturer's technical information and to be the Engineer's approval.

External Woodwork – Varnishing :

As for internal specification except that in lieu of step 6 above apply 3 coats of varnish as approved by the Engineer.

### **23.4 Joinery Works**

Workshop for joinery shall comply with BS 1186 Part 2 except where further specified. Timber joinery shall be finished wrought to the exact sizes shown on the drawings with slightly rounded arises. No joinery shall be built in until inspected and approved by the Engineer. All relevant site dimensions should be checked prior to fabrication.

Timber shall be cut to size and shape and properly joined in accordance with accepted practice, including framing, glueing, doweling, screwing and mortising.

Hardwood to be put together with brass screws and cups. Cups for fixing hardwood joinery shall be cast brass cups.

All joinery is to be cut and framed together immediately on receipt of details and left unwedged in a dry store until required. Any work which warps, winds or develops shakes or other defects is to be replaces by new work before wedging up.

All nail heads should be punched below timber surfaces, which will be visible in completed work.

Screw heads should be countersunk not less than 2mm below timber surfaces, which will be visible in completed work.

For plugging locate specified plugs accurately. Use proprietary plugs in accordance with manufacturer's recommendations. When plugging through applied finishes ensure that plugs and fastenings have ample penetration into the structural backing.

For pelleting countersink screw heads 6mm below timber surfaces, which are to be clear, finished, Glue in grain matched pellets not less than 6mm thick cut from matching timber Finish off flush with face.

Where timber works or other items are screw fixed to plaster and blockwork appropriate sized plastic rawplugs are to be used.

If sanded, planed or cut during fixing edges should be resealed or reprimed as originally specified. Components and linings must not carry any structural loads unless specifically designed to do so.

### 23.5 Carcassing Work

Hardwood in carcassing work shall be put together with steel screws except where described as framed when it shall properly be joined and held together with glue and steel screws.

Nails, Screws And Timber Connections :

Nails shall conform to BS 1202 and screws shall conform to BS 1210.

All connectors shall be galvanized steel in accordance with BS 1597.

All screws should be brass.

Adhesives :

Adhesive for external joinery shall conform to BS 1203/1204 WBP.

Adhesive for internal joinery shall conform to BS 1203/1204 MR.

Plywood :

All plywood shall conform to BS 1455. Bonding between veneers shall be as defined in BS 1203.

Veneers shall be Grade-I where varnished, grade 2 where painted, grade 3 where hidden.

All plywood and blockboard shall be first grade and still be obtained from approved suppliers. Both faces of all plywood and blockboard shall have a fine sanded finish, free from knots and blemishes. All plywood shall in addition to the general timber specification be free from edge lifting, blistering, delamination, surface cracks, water damage etc. Plywood must be new and previously un-used at all times.

Bonding agents shall be as listed under adhesives.

Thickness shall be as indicated on the drawings.

Blockboard And Lamin Board :

All blockboard and lamin board shall conform to BS 3444 veneers and bonding agents shall be as specified for plywood.

### 23.6 Plastic Laminate

Plastic laminate approved by the Engineer and shall conform to BS 3794 and shall be standard 1.5-mm grade, full bonded with an approved adhesive to the background.

A suitable balancer shall be applied to the reverse face of timber, which is described as being faced on one side with plastic laminate.

Plastic laminates shall be of the colour shown on the drawings or schedules and in accordance with BS 4800 and the manufacturer's range.

Handrail And Balustrades :

Powder coated cast aluminum to be treated and fixed in accordance with appropriate clauses elsewhere in this specification. The contractor must ensure that when fixed the handrails and balustrade are plumb and rigid.

## **24.0 ROOF AND DECK INSULATION**

### **24.1 GENERAL**

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

### **24.2 References**

The following standards are referred to in this Part:

BS 12	Portland Cement
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
BS EN 490	Concrete roofing tiles and fittings - Product specifications
BS EN 491	Concrete roofing tiles and fittings - Test methods

### **24.3 Submittals**

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

- a) Manufacturers literature and samples of roofing, thermal insulation, vapor barrier, roof accessories, bitumen waterproof membranes, waterproofing materials, dampproof coursing and elastometric sealants, etc.
- b) 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 warranties. Concurrence will be provided by the Contractor in writing to the Engineer prior to commencement of work.

#### **24.4 General Application**

- a) Expanded extruded polystyrene boards shall comply with BS 3837, Grade EHD, Type A, extruded board with skins.
- b) 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.
- c) 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.
- d) 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/m<sup>2</sup>.

### **25.0 RIGID BOARD INSULATION**

#### **25.1 General Requirements**

- a) Rigid insulation boards are to be installed as a single layer to the thickness specified.
- b) 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.
- c) On corrugated surfaces all long edges are to be supported by the crown of the corrugations.

## **26.0 PROTECTION OF INVERTED ROOF SYSTEMS**

### **26.1 General Requirements**

- a) Insulating material having a water absorption in excess of 1.5% by volume in seven (7) days at 20 °C are not to be used in inverted roof systems.
- b) 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.
- c) 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.
- d) 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.

## **27.0 POLYSTYRENE BOARD INSULATION**

### **27.1 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<sup>3</sup> 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<sup>3</sup>
    - (ii) Compressive strength (28 days) 25 MPa
    - (iii) Bond strength to insulation 1 MPa
    - (iv) Toweled 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

## **28.0 CEMENT-FIBRE ROOF DECK**

### **28.1 General Description**

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

### **28.2 Cement-Fibre Roof Deck Planks**

- a) 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.

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

### **28.3 Accessories**

- a) Clips shall be as recommended by the cement-fiber plank manufacturer to suit the supporting members.
- b) Nails shall be galvanized cork type with integral 25 mm washer, of length to penetrate wood support not less than 25 mm.

### **28.4 Installations**

- a) 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.
- b) Planks are to be laid progressively with side joints (edges) tightly butted and with end joints in adjacent rows staggered.
- c) 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.
- d) Install a barrier, full depth of the plank, over the top of sound rated partitions and at the perimeter of exterior walls.

## 29.0 INSULATING CONCRETE ROOF SCREEDS

### 29.1 General Description

- a) This section covers insulating concrete placed on a prepared structural deck.
- b) 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.
- c) 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.

### 29.2 Materials

- a) Concrete roofing tiles shall conform to BS EN 490 and BS EN 491.
- b) Light weight aggregates shall conform to BS 3797.
- c) Chipping shall be approved, clean, crushed white or pale grey, size 15 to 30 mm and shall comply with BS 3379.
- d) 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.
- e) Permeable filter membrane shall be to Clause 2.9.1.
- f) 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.

- g) 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.

### **29.3 Execution of Work**

- a) The surface of the concrete base must be clean, firm and rough to ensure a good bond.
- b) The base should be soaked with water for at least 12 hours and all surplus water removed before laying commences.
- c) 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.
- d) 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.
- e) 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.
- f) The screed is to be laid in alternated bays, maximum 10 m<sup>2</sup>, 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.

- g) 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.
- h) 8A 75 x 75 mm triangular fillet is to be provided at the junction with all upstands.
- i) 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.
- j) 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.