

Chapter 9: BUILDING WORKS

11.1 MATERIALS

11.1.1 Water

Water shall be clean, clear and free from injurious quantities of salt, traces of oil, acids, alkalis, organic matter and other deleterious materials. The sources of water shall be approved by the Engineer. The containers for conveyance, storage and handling shall be clean. If necessary, standard cement tests shall be conducted using the water intended to be used, in comparison with those adding distilled water to check the quality of water.

- a) Water used for mortars should have quality specified in latest revision of IS.456. It is the responsibility of the Contractor to arrange at his cost, water of required quality.
- b) Water found satisfactory for mixing is also suitable for curing. However, water used for curing shall not produce any objectionable stain or unsightly deposit on the surface. The presence of tannic acid or iron compounds in the water meant for curing is objectionable.
- c) Sea water shall not be used for mixing or curing.

11.1.2 Cement

The cement used shall be any one of the following, specified in the drawings, and the type selected should be appropriate for the intended use.

- a) 43 grade ordinary Portland cement conforming to IS: 8112.
- b) 53 grade ordinary Portland cement conforming to IS: 12269.

11.1.3 Compressive Strength:

Compressive strength requirement of each type of cement for various grades when tested in accordance with IS: 4031 (part 6) shall be as under:

TABLE 9.1: Compressive Strength Requirement for Cement

Sample	Strength in N/mm² not less than for	
Age at testing	Gr. 43	Gr. 53
72 \pm 1 hr	23	27
168 \pm 2 hrs	33	37
672 \pm 4 hrs	43	53

11.1.4 Setting time:

Setting time of cement of any type or any grade when tested by Vicat apparatus method described in IS: 4031 shall conform to the following requirement:

- a) Initial setting time : Not less than 30 minutes
- b) Final setting time : Not more than 600 minutes

Supply: The cement shall be packed in jute sacking bags conforming to IS: 2580-1982, or woven HDPE conforming to IS 11653: 1986, jute synthetic union conforming to IS: 12174: 1987, or any other approved composite bags, bearing the manufacturer's name or his registered trade mark if any, and grade and type of cement.

Every delivery of cement shall be accompanied by a producer's certificate confirming that the supplied cement conforms to relevant specifications. These certificates shall be endorsed to the Engineer-in-Charge for his record.

Every consignment of cement must have identification marks on packages indicating date of manufacture and grade and type of cement. Cement brought to works shall not be more than 6 weeks old from the date of manufacture.

Stacking and Storage: Cement in bags shall be stored and stacked in a shed which is dry, leakproof and as moisture proof as possible. Flooring of the shed shall consist of the two layers of dry bricks laid on well consolidated earth to avoid contact of cement bags with the floor. Stacking shall be done about 150 to 200 mm clear above the floor using wooden planks. Cement bags shall be stacked at least 450 mm clear off the walls and in rows of two bags leaving in a space of at least 600 mm between two consecutive rows. In each row the cement bags shall be kept close together so as to reduce air circulation. Stacking shall not be more than 10 bags high to avoid jumping under pressure. In stacks more than 8 bags high, the cement bags shall be arranged in header and stretcher fashion i.e. alternately lengthwise and crosswise so as to tie the stacks together and minimise the danger of toppling over.

Different types of cement shall be stacked and stored separately.

For extra safety during monsoon, or when cement is expected to be stored for an unusually long period, each stack shall be completely enclosed by a water proofing membrane, such as polyethylene, which shall cover the top of the stack. Care shall be taken to see that the water proofing membrane is not damaged at any time during use.

Storage of cement at the work site shall be at the Contractor's expense and risk. Any damage occurring to cement due to faulty storage in Contractor's shed or on account of negligence on his part shall be the liability of the Contractor.

11.1.5 FINE AGGREGATE/ SAND

Fine Aggregate: Sand for concrete work shall be clean, well graded and shall consist of strong, dense, durable gritty particles, free from veins injurious amounts of disintegrated pieces, alkali, vegetable matters and other deleterious substances and shall be approved by the Engineer. Maximum size of particle shall be restricted to 5 mm minimum being 0.15 mm.

Grading of sand for use in masonry mortar shall be conforming to IS: 2116-1980 (Table 9.2-below).

Grading of sand for use in Plaster shall be conforming to IS: 1542-1977 (Table 9.3-below):

TABLE 9.2: Grading of sand for use in masonry mortar as per IS: 2116-1980

IS Sieve Designation	Percentage passing by mass	Ref to method of test
4.75 mm	100	
2.36mm	90 to 100	IS: 2386(Part I) –1963
1.18mm	70 to 100	
600 micron	40 to 100	
300 micron	5 to 70	
150 micron	0 to 15	

TABLE 9.3: Grading of sand for use in Plaster as per IS: 1542-1977

IS Sieve Designation	Percentage passing
10 mm	100
4.75 mm	95 to 100
2.36 mm	95 to 100
1.18 mm	90 to 100
600 micron	80 to 100
300 micron	20 to 65
150 micron	0-50

Note: For crushed stone sands, the permissible limit on 150 micron IS Sieve is increased to 20%. This does not affect the 5% allowance IS-2386 (Part I-1963).

Bulking: Fine aggregate, when dry or saturated, has almost the same volume but dampness causes increase in volume. In case fine aggregate is damp at the time of proportioning the ingredients for mortar or concrete, its quantity shall be increased suitably to allow for bulkage, which shall be determined by the method prescribed in IS standards. Table 9.4 gives the relation between moisture content and percentage of bulking for guidance only.

TABLE 9.4: Relation between Moisture Content and Bulking Percentage

Moisture content (%)	Bulking % by volume
2	15
3	20
4	25
5	30

Stacking: Fine aggregate shall be so stacked as to prevent dust and foreign matter getting mixed up with it as far as practically possible.

Measurements: As the fine aggregate bulks to a substantial extent when partially wet, measurements shall be taken when the stacks are dry or appropriate allowance, based on laboratory tests, made for bulking.

PREPARATION OF MORTAR AND ITS GRADE

Cement Mortar

This shall be prepared by mixing cement and sand in specified proportions

Proportioning: Cement bag weighting 50 kg shall be taken as 0.035 cubic metre. Other ingredients in specified proportion shall be measured using boxes of size 40x35x25 cm. Sand shall be measured on the basis of its dry volume.

Mixing: The mixing of mortar shall be done in mechanical mixers operated manually or by power as decided by the Engineer-in-Charge. The Engineer-in-Charge may, however, permit hand mixing at his discretion taking into account the nature, magnitude and location of the work and practicability of the use of mechanical mixers or where item involving small quantities are to be done or if in his opinion the use of mechanical mixer is not feasible. In cases, where mechanical mixers are not to be used, the Contractor shall take permission of the Engineer-in-Charge in writing before the commencement of the work.

- a) **Mechanical Mixing:** Cement and sand in the specified proportions shall be mixed dry thoroughly in a mixer. Water shall then be added gradually and wet mixing continued for at least three minutes. Only the required quantity of water shall be added which will produce mortar of workable consistency but not stiff paste. Only the quantity of mortar, which can be used within 30 minutes of its mixing shall be prepared at a time. Mixer shall be cleaned with water each time before suspending the work.
- b) **Hand Mixing:** The measured quantity of sand shall be leveled on a clean masonry platform and cement bags emptied on top. The cement and sand shall be thoroughly mixed dry by being turned over and over, backwards and forwards, several times till the mixture is of a uniform colour. The quantity of dry mix which can be used within 30 minutes shall then be mixed in a masonry trough with just sufficient quantity of water to bring the mortar to a stiff paste of necessary working consistency.

Precautions: Mortar shall be used as soon as possible after mixing and before it begins to set, and in any case within half hour, after the water is added to the dry mixture.

11.1.6 STEEL WORK

DEFINITIONS

Bead : A single run of weld metal deposited on surface.

Butt weld : A weld in which the weld metal lies substantially within the extension of the planes are the surfaces of the parts joined.

Crater : A depression left in weld metal where the arc was broken or the flame was removed.

End crater : A crater at the end of a weld or at the end of a joint.

Fillet Weld : A weld of approximately triangular cross-section jointing two surfaces approximately at right angles to each other in a lap joint, tee joint or corner joint. It is of two types:

- 1) Continuous
- 2) Intermittent

Fusion Welding : Any welding process in which ; weld is made between metals in a state of fusion without hammering or pressure.

Non-fusion Welding : A term applied to the deposition, by the Oxy-Acetylene process of filler metal on parent metal without fusion of the latter.

Oxy-Acetylene Pressure Welding : Pressure welding in which any Oxy-Acetylene flame is used make the surface to be united plastic. No filler metal is used.

Run : The metal deposited during one passage of the electrode or blow pipe in the making of a joint.

Weld : A union between two pieces of metal at faces rendered plastic or liquid by heat or pressure, or both. Filler metal may be used to effect the union.

MATERIALS

NO re-rolled materials shall be accepted.

Contractor shall submit manufacturer's test certificate for the steel.

Steel: All finished steel shall be well and cleanly rolled to the dimensions and weight specified in BIS subject to permissible tolerances as per IS : 1852. The finished materials shall be reasonably free from cracks, surface flaws laminations, rough and imperfect edges and all other harmful defects.

Steel Sections, shall be free from excessive rust, scaling and pitting and shall be well protected. The decision of the Engineer-in-Charge regarding rejecting any steel section on account of any of the above defects shall be final and binding.

Rivets

Rivets shall be made from rivet bars of mild steel as per IS: 1148.

STEEL WORK IN SINGLE SECTION FIXED INDEPENDENTLY WITH CONNECTING PLATE

The steel work in single sections of R.S. joints, flats, Tees Angles fixed independently with or without connecting plate, is described in these clauses.

Fabrication

The steel sections as specified shall be straightened and cut square to correct lengths and measured with a steel tape. The cut ends exposed to view shall be finished smooth. No two pieces shall be welded or otherwise jointed to make up the required length of a member.

Painting

All surfaces which are to be painted, oiled or otherwise treated shall be dry and thoroughly cleaned to remove all loose scale and loose rust, surfaces not in contact but inaccessible after shop assembly, shall receive the full specified protective treatment before assembly. This does not apply to the interior of sealed hollow

sections. Part to be encased in concrete shall not be painted or oiled. A priming coat of approved steel prime i.e. Red Oxide Zinc chrome primer conforming to IS: 2074 shall be applied before any member of steel structure placed in position or taken out of workshop.

Erection

Steel work shall be hoisted and placed in position carefully without any damage to itself and other building work and injury to workmen. Necessary mechanical appliances such as tackle winch etc. shall be used. The suitability capacity of all plant and equipment used for shall be to the satisfaction of the Engineer-in-Charge.

Measurements

The work as fixed in place shall be measured in running metres correct to a millimetre and calculated on the basis of standard tables correct to the nearest kilogram.

Unless otherwise specified, weight of cleats, brackets packing pieces, bolts, nuts, washers, pieces, separators, diaphragm gussets (taking overall square dimensions) fish plates, etc. shall be added to the weight of respective items. In riveted work, allowance is to be made for weight of rivet heads. Unless otherwise specified an addition of 2.5% of the weight of structure shall be made for shop and site rivet heads in rivetted steel structures.

No deduction shall be made for rivet/or bolt holes (excluding holes for anchor or holding bolts)

Deduction in case of rivet/ or bolt holes however be made if its area exceeds 0.02 sq. m.

The weight of steel sheets, plates and strips shall be taken from relevant Indian Standards 7.85 Kg/m² for every millimetre sheet thickness. For rolled sections, steel rods and steel strips given in relevant Indian Standards shall be used.

Rate

Rate includes the cost of labour and required for all the operations described.

STEEL WORK IN BUILT UP SECTIONS (Rivetted and Bolted)

The steel work in built up sections (riveted /bolted) such as in trusses, framed work etc. is specified in this clause.

Laying Out

A figure of the steel structure to be fabricated shall be drawn on a level platform to full scale. This may be done in full or in parts, as shown on drawings or as directed by the Engineer-in-charge. Steel tape shall be used for measurements.

Fabrication

Fabrication shall generally be done as specified in IS: 800.

Painting

Before the members of the steel structure are placed in position or taken out of the workshop these shall be painted.

Measurements

The work as fixed in place shall be measured in running metres correct to a millimetre and their weight calculated on the basis of standard tables correct to the nearest kilogram.

Unless otherwise specified, weight of cleats, brackets, packing pieces, bolts nuts, washers, distance pieces, separators diaphragm gussets (taking overall square dimensions) fish plates etc. shall be added to the weight of respective items. No deductions shall be made for skew cuts. In rivetted work, allowances is to be made for weight of rivet heads. Unless otherwise specified an addition of 2.5% of the weight of structure shall be made for shop and site rivet heads in rivetted steel structures No deduction shall be made for rivet/or bolt holes (excluding holes for anchor or holding down bolts). Deduction in case of rivet or bolt hole shall, however, be made if its area exceeds 0.02 m².

The weight of steel sheet and strips shall be taken from relevant Indian Standards based on 7.85kg /m² steel rods and steel strips, weight given in Indian Standards shall be used.

Rate

The rate shall include the cost of all materials and labour involved in all the operations described above.

STEEL WORK IN BUILT UP SECTION (WELDED)

The steel work in built up sections (welded) such as in trusses, framed work etc. is specified in this clause.

Straightening, shaping to form, cutting and assembling, shall be as specified in the manual as far as applicable, except that the words "riveted or bolted" shall be read as "welded" and holes shall only be used for the bolts used for temporary fastening as shown in detailed drawings.

Welding

Welding shall generally be done, by electric arc process as per IS : 816 and IS : 823.

COLLAPSIBLE GATES

These shall be of approved manufacture and shall be fabricated from mild steel sections.

The gates shall consist of double or single collapsible gates depending on the size of the opening. These shall consists of vertical double channels each 20 x 10 x 2 mm. at 10 cm centres braced with flat iron diagonals 20 × 5 mm and top ,and bottom rails of T-iron 40 x 40 x 6 mm @ 3.5 kg/m with 40 mm dia. ball bearings in every fourth double channel, unless otherwise specified. Wherever collapsible gate is not provided within the opening and fixed along the outer surface, T - iron at the top may be replaced by flat iron 40 x 10 mm.

The collapsible gate shall be provided with necessary bolts and nuts, locking arrangement, stoppers and handles. Any special fittings like spring, catches and locks, shall be so specified in the description of item where so required. The gate shall open and close smoothly and easily.

Fixing

T - iron rails shall be fixed to the floor and to the lintel at top by means of anchor bolts embedded in cement concrete of floor and lintel. The anchor bolts shall be

placed approximately at 45 cm centres alternatively in the two flanges of the T - iron. The bottom runner (T- iron) shall be embedded in the floor and proper groove shall be formed along the runner for the purpose. The collapsible shutter shall be fixed at sides by fixing the end double channels with T - iron rails and also by hold - fasts bolted to the end double channel and fixed in masonry of the side walls on the other side. In case the collapsible shutter is not required to reach the lintel, beam or slab level, a Tee - section suitably designed may be fixed at the top, embedded in masonry and provided with necessary clamps and roller arrangement at the top. All the adjoining work damaged in fixing of gate shall be made good to match the existing work, without any extra cost.

Painting

All the members of the collapsible gate including T - iron shall be thoroughly cleaned off rust, scales, dust etc. and given a priming coat of approved steel primer i.e. red oxide zinc chrome primer conforming to IS : 2074 before fixing them in position.

Measurements

The height and breadth shall be measured correct to a cm. The height of the gate shall be measured as the length of the double channels and breadth from outside to outside of the end fixed double channels in open position, of the gate. The area shall be calculated in square metres, correct to two places of decimal.

Rate

The rate shall include the cost of materials and labour involved in all the operations described above.

M.S. SHEET SHUTTERS

These shall be manufactured as per drawing and specifications. These shall be fabricated from mild steel sheets and angle iron.

The doors shall be provided as double leaf shutters unless otherwise specified. The shutters shall be fabricated with frame of M.S. angle 40 x 10 x 6 mm @ 3.5 kg/metre and two diagonal braces of the same section unless otherwise specified. The frame shall be rivetted and/or welded at the junctions. Wherever rivetting shall be done 3 mm thick gusset plate shall be provided at the junctions, M.S. sheet of 1 mm thickness or as specified, shall be fixed to the frame with rivets or welds as approved by the Engineer-in-charge.

Alternatively the diagonal bracing may be replaced by one horizontal and two cross flats 30 x 6 mm unless otherwise specified.

The outer frame shall be provided with cleats made of section 40 x 10 mm and bent in the shape of angle cleats with one arm 150 mm long and the arm 50 mm long and fixed to the angle iron frame of the door with two 12 mm dia bolts and nuts. For doors upto 2.40 m height, two angles cleats per door shall be provided.

The cleat shall have a vertical leg of 150 mm which shall be fixed with frame and horizontal leg of about 50 mm which shall be provided with a hole of 24 mm dia and fixed in the projected pin of the pin clamp.

Fittings and Fixtures

The shutter shall be fixed to the wall masonry with four pin dampers (pintles) where the height of the shutter is upto 2.4 m. Each pin clamp shall consist of 50 x 6 mm flat iron

45 cm long bend and forked at one end and provided with 20 mm diameter M.S. pin on the other. The pin shall be firmly rivetted or welded to the pin damp, the other end of which shall be embedded in masonry by means of cement concrete block 40 x 20 x 20 cm of 1:3:6 mix (1 cement: 3 coarse sand : 6 graded stone aggregate 20 mm nominal size). It shall be so placed that bottom pin shall face upwards and top pin downward in order that the gate may not be removed by lifting over pins.

One hook with eye 45 cm long of 10 mm diameter shall be provided for each shutter to keep it fixed in open position. The hook shall be fixed in wall masonry with wooden block and the eye shall be fixed on 6 mm thick M.S. plate as staple and fixed in the shutter frame with rivet or weld.

A cement concrete block 15 x 10 x 20 cm in 1:2:4 (1 cement : 2 coarse sand : 4 grades stone aggregate of 20 mm nominal size) mix shall be embedded in the floor or at junction of two shutters so that door shutter open only on the outside and not on the inside.

The shutters shall also be provided with locking arrangement and two handles of the shape and as approved by the Engineer-in-Charge.

Painting

All the members of the door including angle iron shall be thoroughly cleaned off rust, scales, dust etc. given a priming coat of approved steel primer i.e. Red oxide Zinc chrome primer confirming to IS : 2074 before fixing them in position.

Measurements

The width and height of shutters shall be measured to the nearest cm. The area shall be calculated in square metre correct to two places of decimal.

Rate

The rate shall include the cost of materials and labour involved in all the operations described above. Nothing extra shall be paid for cement concrete blocks or wooden blocks nor anything deducted for these from the measurement of the masonry wall.

ROLLING SHUTTERS

Rolling shutters shall conform to IS : 6248. These shall include necessary locking arrangement handles etc. These shall be suitable for fixing in the position as specified i.e. outside or inside on or below lintel or between jambs of the opening. The door shall be either push and pull type or operated with mechanical device supplied by the firm. Shutters upto 10 sq metre shall be of push and pull type and shutters with an area of over 10 sq. metre shall generally be provided with reduction gear operated by mechanical device with chain or handle, if bearings are specified for each of operation, these shall be paid for separately.

Shutter

The shutter shall be built up of interlocking lath section formed from cold rolled steel strips. The thickness of the sheets from which the lath sections have been rolled shall be not less than 0.90 mm for the shutters upto 3.5 m width and not less than 1.20 mm for shutters above 3.5 m width. Shutters above 9 meters in width should be divided in 2 parts with provision of one middle fixed or movable guide channel or supported from the back side to resist wind pressure. The lath section shall be rolled so as to have interlocking curls at both edges and a deep corrugation at the centre with a

bridge depth of not less than 12 mm to provide sufficient curtain of stiffness for resisting manual pressures and normal wind pressure. Each lath section shall be continuous single piece without any welded joint. When interlocked, the lath sections shall have a distance of 75 mm rolling centers. Each alternate lath section shall be fitted with malleable cast iron or mild steel clips securely rivetted at either ends, thus locking the lath section at both ends and preventing lateral movement of the individual lath sections. The clips shall be so designed as to fit five contour of the lath sections.

Spring

The spring shall be of coiled type. The spring shall be manufactured from high tensile spring steel wire or strips of adequate strength conforming to IS: 4454-Part I.

Roller and Brackets

The suspension shaft of the roller shall be made of steel pipe conforming to heavy duty as per IS: 1161. For shutter up to 6 metre width and height not exceeding 5 metre, steel pipes of 50 mm nominal bore shall used. The shaft shall be supported on mild steel brackets of size 375 x 375 x 3.15 mm for shutters upto a clear height of 3.5 metre. The size of mild steel brackets shall be 500 x 500 x 10 mm for shutters of clear height above 3.5 m and upto 6.5 m. The suspension shaft clamped to the brackets shall be fitted with rotatable cast iron pulleys to which the shutter is attached. The pulleys and pipe shaft shall be connected by means of pretensioned helical springs to counter balance the weight of the shutter and to keep the shutter in equilibrium in any partly open position.

When the width of the opening is greater than 3.5 mtr. the cast iron pulleys shall be interconnected with a cage formed out of mild steel flats if at least 32 x 6 mm and mild steel dummy rings made of similar flats to distribute the torque uniformly. Self aligning two row ball bearing with special cast iron casings shall be provided at the extreme pulley and caging rings shall have a minimum spacing of 15 mm and at least 4 number flats running throughout length of roller shall be provided.

In case of shutters of large opening with mechanical device for opening the shutter the roller shall be fitted with a purion wheel at one end which in contact with a worm fitted to the bracket plate, caging and pully with two ball bearing shall be provided.

Guide Channel

The width of guide channel shall be 25 mm the minimum depth of guide channels shall be as follows:

TABLE 9.5 Details of Shutters and Guide Channel

Clear width of shutters	Depth of guide channel
Upto 3.5 m	65 mm
3.5 m upto 8 m	75 mm
8 m and above	100.mm

The gap between the two legs of the guide channels shall be sufficient to allow the free movement of the shutter and at the same time close enough to prevent rattling of the shutter due to wind.

Each guide channel shall be provided with a minimum of three fixing cleats or supports for attachment to the walls or column by means of bolts or screws. The

spacing of cleats shall not exceed 0.75 m. Alternatively, the guide channels may also be provided with suitable dowels, hooks or pins for embedding in the walls.

The guide channels shall be attached to the jambs, plumb and true either in the overlapping fashion or embedded in grooves, depending on the method of fixing.

Cover.

Top cover shall be of mild steel sheets not less than 0.90 mm thick and stiffened with angle or stiffeners at top and bottom edges to retain shape.

Lock plates with sliding bolts, and anchoring rods shall be as per IS : 6248.

Fixing

The arrangement for fixing in different situations in the opening shall be as per IS: 6248.

Brackets shall be fixed on the lintel or under the lintel as specified with rawl, plugs, and screws bolts etc. The shaft along with the spring shall then be fixed on the brackets.

The lath portion (shutter) shall be laid on ground and the side guide channels shall be bound with ropes etc. The shutter shall then be placed in position and top fixed with pipe shaft with bolts and nuts. The side guide channels and cover frames shall then be fixed to the walls through the plates welded to the guides. These plates and bracket shall, be fixed by means of steel screws bolts, and raw plugs concealed in plaster to make their location invisible. Fixing shall be done accurately in a workmen like manner that the operation of the shutter is easy and smooth.

Measurements

Clear width and clear height of the opening for rolling shutter shall be measured correct to a mm. The clear distance between the two jambs of the opening shall be clear width and the clear distance between the sill and the soffit (bottom of lintel) of the opening shall be the clear height.

The area shall be calculated in square metres correct to two places of decimal.

Rate

The rate shall include the cost of materials and labour involved in all the operations described above including cost of top cover and spring except ball bearing and mechanical device of chain and crank operation, which shall be paid for separately.

STEEL DOOR, WINDOWS, VENTILATORS AND COMPOSITE UNITS

Hot rolled steel sections for fabrication of steel doors, windows, ventilators and fixed lights shall conform to IS: 7452. Shapes weights and designations of hot rolled sections shall be as per IS: 7452.

Door

The hinges shall be of 50 mm projecting type, Non projecting type hinges may also be used if approved by the Engineer-in-Charge. The hinge pin shall be of electro-galvanized steel or aluminium alloy of suitable thickness and size. Door handles shall be approved by the Engineer-in-Charge. A suitable latch lock for door openable both from inside and outside shall be provided.

In the case of double doors, the first closing leaf shall be the left hand leaf locking at the door from the push side. The first closing shutter shall have a concealed steel bolt at top and bottom. The bolts shall be so constructed as not to work loose or drop by its own weight.

Single and double shutter door may be provided with a three way bolting device. Where the device is provided in the case of double shutters, concealed brass or steel bolts shall not be provided.

Windows

a) For fixed windows, the frames shall be fabricated as per relevant standard

b) Side hung windows

For fixing steel hinges, slots shall be cut in the fixed frame and hinges inserted inside and welded to the frame at the back. The hinges shall be of projecting type with thickness not less than 3.15 mm and length not less than 65 mm and width not more than 25 mm. Non-projecting type hinges may also be allowed if approved by the Engineer-in-charge. The diameter of hinge pins shall not be less than 6 mm. The hinge pin and washer shall be of galvanised steel or aluminium alloy of suitable thickness.

For fixing hinges to inside frame, the method described above may be adopted but the weld shall be cleaned, or the holes made in the inside frame and hinge rivetted.

Ventilators

a) Top Hung Ventilators

The steel butt hinges for top hung ventilators shall be rivetted to the fixed frame or welded to it at the back after cutting a slot in it. Hinges to the opening frame shall be rivetted or welded.

Top hung ventilators shall be provided with a peg stay with three holes which when closed shall be held tightly by the locking bracket. The locking bracket shall either be fitted to the fixed frames or to the window.

b) Centre Hung Ventilators

Central hung ventilators shall be hung on two pairs of brass or aluminium cup pivots as specified, rivetted to the inner and outer frames of ventilators to permit the ventilator shutter to swing to an angle of approx 85°. The opening portion of the ventilators shall be so balanced that it remains open at any desired angle under normal weather conditions.

Fixing in Masonry Openings

a) Fixing with Lugs

i) Doors, windows and ventilators unit, shall not be “built in” as the work proceeds but opening shall be left out and frames fitted afterwards so that the minimum specified clearance between opening and unit frame is left around. The size of the opening shall first be checked and cleared of obstruction, if any. The position of the unit and fixing holes shall be marked on the jamb. Necessary holes shall be made in the masonry and lugs not less than 10 cm long 15 × 3 mm size fixed in cement concrete blocks 15 x 10 x 10 cm size of 1:3: 6 mix (1 cement: 3 coarse sand 6 graded stone aggregate 20 mm nominal size) frames of units shall be set in the opening by

using wooden wedges at the jamb, head and sill, (wedges shall preferably be placed near the points where glazing bar meets the frames and be plumbed in position).

ii) After it, the frame shall be fixed with the lugs with 20mm long and 6.3 mm dia. G.I. counter sunk machine screws and nuts. In case of flush opening which are rendered smooth, wedges shall be removed and gap between unit and the jambs shall be filled with cement mortar.

iii) In case of flush jamb with external “fair faced” finish the gap between the opening and frame shall be filled with mastic from inside till it oozes out on external face. The oozing mastic shall be cleaned and flush pointed. The internal gap shall be filled with mastic to about 1/3rd depth and the rest with cement mortar.

iv) In case of rebated jambs and jambs finished “fair faced” externally, the mastic shall be freely applied to the inside channel of frame, jamb and sill, so as to ensure a watertight joint. After the unit is firmly fixed in position surplus mastic shall be cleaned and flush pointed, as shown

b) Fixing with screws and plugs

In R.C.C. work where lugs cannot be embedded due to reinforcement bars etc. rawl plugs or other approved metallic fasteners may be fixed in proper position and frame fixed to them with 60 mm galvanised wood screws of designation 10.

Fixing in Wood Work Opening

Opening in wood work are normally rebated and approved mastic or rubber linings shall be applied to jambs, sill and channel before fixing in position. The frame shall be set in opening using wooden wedges and fixed to the opening with 60 mm galvanised wood screws of designation 10. Extra timber fillets of hard wood to match the adjoining work shall also be provided around the frame to close the extra gap between opening and frame

Fixing in Steel Work Opening

Before placing the unit frame in position approved mastic shall be applied and a mild steel or hard wood fillet shall be provided around the frame to close the extra gap between opening and frame. The unit shall then be fixed to the opening with fixing clips or with nuts and bolts as shown in the drawings or as directed by the Engineer-in-charge.

Fixing Procedure

Fixing Procedure for T iron doors, windows and ventilator frames in masonry opening shall be as relevant standards as given in the general specifications in this volume.

Measurements

T iron door, windows and ventilator frames shall be measured in running metre, along the centre line of the frame correct to a 1 mm and weight calculated on the basis of standard tables. No deduction or extra payment shall be made for making holes and making arrangements for fixing fittings including packing wherever necessary. No deduction will be made for not providing tie bars in case of windows and ventilators.

Rate

The rate includes cost of materials and labour involved in all the operations described above. It shall include the necessary butt hinges and screws for fixing the same with

frame or as specified. But it does not include the cost of other door, window and ventilator fittings.

M.S. BARS AND M. S. GRILLS IN WOODEN OR STEEL FRAMES

M.S. round or square bars, with or without M.S. flats M.S. grills of different patterns with flats with M. S. or without M. S. bars, round or square, fixed in wooden or steel windows or clerestory windows etc. are described in this clause.

Fixing

When MS round or square bars are to be fixed to wooden frames the bars shall be passed in to the wooden frame, from the end having a through hole and fixed flush with that end while at the other end it will be 5 cm deep in the hole drilled in the frame. In case of steel frames, the bars will be welded to the steel frame by fillet weld all along the circumference of the bars in an approved workshop and not at site.

In case of grill of bars welded to M.S. Flat forming the required pattern, the outer frame of M.S. flats shall be fixed to the wooden frame with wood screws in the counter sunk holes drilled in M.S. flats ensuring that screws are driven with some screw driver (not hammered) till the screws are embedded fully inside flush with the M.S. flats.

In case of fixing to steel frames, M.S. flats of required pattern with or without M.S. round or square bars, the method of fixing will be similar to what is described above.

Any kind of welding at site shall be permitted only under written orders of the Engineer-in-Charge.

Measurements

The different types of M.S. grills will be measured separately and paid for. The length of bars and flats used in grills will be measured correct to a cm and then weights calculated in kg by using standard tables.

Rate

The rate shall include the cost of materials and labour required for all the operations described above. Grill of different types shall be paid for separately.

Following are the mandatory tests to be conducted at appropriate stages of the work

TABLE 9.6 LISTS OF MANDATORY TESTS

Material	Test	Field/ laboratory Test	Test Procedure	Minimum Qty. of material for carrying out test	Frequency of testing
Steel if arranged by the contractor	(a) Tensile Strength (b) Bend test	Laboratory	IS : 1599	20 Tonne	Every 20 Tonne or part thereof

11.1.7 FLOORING

CEMENT CONCRETE FLOORING

Cement Concrete

Cement concrete of specified mix shall be used and it shall generally conform to the specifications.

Laying

Panels

Flooring of specified thickness shall be laid in the pattern including the border/or as given in the drawings or as directed by the Engineer-in-Charge. The border panels shall not exceed 450 mm in width, and the joints in the border in line with panel joints. The panels shall be of uniform size and no dimension of a panel shall exceed 2 m and the area of a panel shall not be more than 2 sqm.

Laying of flooring with strips: Normally cement concrete flooring shall be laid in one operation using glass/plain asbestos/aluminium/PVC/brass strips or any other strips as required as per drawing or instructions of the Engineer-in-Charge, at the junction of two panels. This method ensures uniformity in colour of all the panels and straightness at the junction of the panels. 4 mm thick glass strips or 5 mm thick plain asbestos sheet, 2mm PVC strips or 2 mm aluminium or brass strips shall be fixed with their tops at proper level, giving required slopes. Cost of providing and fixing strips shall be paid for separately.

Concreting: Cement concrete shall be placed in the panels and be levelled with the help of straight edge and trowel and beaten with a wooden 'Thapy' or mason's trowel. The blows shall be fairly heavy in the beginning but as consolidation takes place, light rapid strokes shall be given. Beating shall cease as soon as the surface is found covered with a thin layer of cream of mortar. The evenness of the surface shall be tested with straight edge and made true to required slopes. While laying concrete, care shall be taken to see that the strips are not damaged/ disturbed by the labourers. The tops of strips shall be visible clearly after finishing with cement slurry.

Laying of flooring without Strips: Laying of cement concrete flooring in alternate may be allowed by the Engineer-in-Charge in case strips are not to be provided.

Shuttering: The panels shall be bounded by angle iron or flats. The angle iron/flat shall have the same depth as the concrete flooring. These shall be fixed in position, with their top at proper level giving /required slopes. The surface of the angle iron or flats, to come in contact with concrete shall be smeared with soap solution or non-sticking oil (Form oil or raw linseed oil) before concreting. The flooring shall butt against the unplastered masonry wall.

The angle iron/ flats used for shuttering, shall be removed on the next /day of the laying of cement concrete. The ends thus exposed shall be repaired, if damaged with cement mortar 1:2 (1 cement: 2 coarse sand) and allowed to set for minimum period of 24 hours. The alternate panels shall then be cleaned of dust, mortar, droppings etc. and concrete laid. While laying concrete, care shall be taken to see that the edges of the previously laid panels are not damaged and fresh mortar is not splashed over them. The joints between the panels should come out as fine straight lines.

Finishing

The finishing of the surface shall follow immediately after the cessation of beating. The surface shall be left for some time, till moisture disappears from it or surplus water can be mopped up. Use of dry cement or cement and sand mixture sprinkled on the surface to stiffen the concrete or absorb excessive moisture shall not be permitted. Excessive trowelling shall be avoided.

Fresh cement shall be mixed with water to form a thick slurry and spread at the rate of 2 kg of cement over an area of one sqm of flooring while the flooring concrete is still green. The cement slurry shall then be properly processed and finished smooth.

The edges of sunk floors shall be finished and rounded with cement mortar 1:2 (1 cement: 2 coarse sand) and finished with a floating coat of neat cement.

The junctions of floor with wall plaster, dado or skirting shall be rounded off where so specified.

The men engaged on finishing operations shall be provided with raised wooden platform to sit on so as to prevent damage to new work.

Curing

The curing shall be done for a minimum period of ten days. Curing shall not be commenced until the top layer has hardened. Covering with empty gunnies shall be avoided as the colour of the flooring is likely to be bleached due to the remnants of cement dust from the bags.

Measurement

Length and breadth shall be measured before laying skirting dado or wall plaster. No deduction shall be made nor extra paid for voids not exceeding 0.20 sqm. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 sqm.

The flooring done either with strips (in one operation) or without strips (in alternate panels) shall be treated as same and measured together.

Rate

The rate shall include the cost of all materials and labour involved in all the operations described above including application of cement slurry on RCC slab or on base concrete including roughening and cleaning the surface but excluding the cost of strips which shall be paid separately under relevant item. Nosing of steps where provided shall be paid for separately in running metre. Nothing extra shall be paid for laying the floor at different levels in the same room or courtyard and rounding off edges of sunk floors. In case the flooring is laid in alternate panels, nothing extra shall be paid towards the cost of shuttering used for this purpose.

11.1.8 ROOFING**TERMINOLOGY**

Accessories : Purpose made fittings, such as apron flashing pieces, barge boards, bottom glazing flashing, corner piece (corner flashing), eaves filler pieces, expansion joints, hip capping, hip tile or cap, ridge capping, ridge finials, roof lights, ventilators, with which the roof is furnished.

Eaves: The lower edge of the inclined roof.

Finial: A decorative fitting used at the junction or ridges and hips to form a water proof covering and at the top of conical, pyramidal, or dome roofs.

Flashing: A strip of impervious material, usually metal used to exclude water from the junction between a roof covering and another part of the structure.

Gable: Part of wall above the general eaves level at tie end of ridged or partially hipped roof.

Gutter: Any form of roof water channel.

Hip: The outer angle (more than 180 degree) formed by the inclined ridge between two intersecting roof slopes.

Pitch

The angle of inclination with the horizontal of the rafters or substructure surface on which the roof coverings are laid.

In patent glazing, the angle at which the plane of a stretch of glazing is inclined to the horizontal.

Pitched Roof: A roof the pitch of which is greater than 10 degree to the horizontal.

Ridge: The horizontal inter-section at the apex of the two rising roof surfaces inclined in opposite directions.

Valley: The re-entrant angle formed by the inter-section of two inclined roof surfaces.

Verge free edge of a roof surface ending at a gable.

CORRUGATED GALVANISED STEEL SHEET ROOFING

C.G.S. Sheets: These shall be of the thickness specified in the description of the item and shall conform to IS:277. The sheets shall be of grade of coating unless otherwise specified in the description of

The sheets shall be free from cracks, split twists, surface flaws etc. They shall be clean, and smooth. The galvanising shall be non-in and in perfect condition. The sheets shall not signs of rust or white powdry deposits on the surface. The corrugations shall be uniform in depth pitch and parallel with the side.

Purlins: Purlins of the specified material or M.S. rolled sections of requisite size shall be over the principal rafters. These shall not be at more than the following distances.

TABLE 9.7

Thickness of C.G.S. sheet	Maximum spacing of purlins
1.60mm	2.80 metre
1.25 mm	2.40 metre
1.00 mm	2.00 metre
0.80 mm	1.80 metre
0.63 mm	1.60 metre

The top surfaces of the purlins shall be uniform and plane. They shall be painted before fixing top. Embedded portions of wooden purlins shall be painted before fixing on top. Embedded portions of wooden purlins shall be coal tarred with two coats.

Slope: Roof shall not be pitched at a flatter slope than 1 vertical to 5 horizontal. The normal pitch adopted shall usually be 1 vertical to 3 horizontal.

Laying and fixing

The sheets shall be laid and fixed in manner described below, unless otherwise shown in the working drawings or directed by the Engineer-in-Charge.

The sheets shall be laid on the purlins true plane, with the lines of corrugations parallel or normal to the sides of the area to be covered unless otherwise required as in special shaped roofs.

The sheets shall be laid with a minimum lap of 15 cm at the ends and 2 ridges of corrugations at each side. The above minimum end lap of 15 shall apply to slopes of 1 vertical to 2 horizontal and steeper slopes. For flatter slopes the minimum permissible end lap shall be 20 cm. The minimum lap of sheets with ridge, hip and valley shall be 20 cm measured at right angles to the line of the ridge, hip and valley respectively. These sheets shall be cut to suit the dimensions or shapes of the roof, either along their length or their width or in a slants across their lines of corrugations at hips and valleys. They shall be cut carefully with a straight edge chisel to give a smooth and straight finish.

Lapping in C.G.S sheets shall be painted with a coat of approved steel primer and two coats of painting with approved paint suitable for G.S sheet, before the sheets are fixed in place.

Sheets shall not generally be built into gables and parapets. They shall be bent up along their side edges close to the wall and the junction shall be protected by suitable flashing or by a projecting drip course, the later to cover the junction by at least 7.5 cm.

The laying operation shall include all scaffolding work involved.

Sheets shall be fixed to the purlins or other roof members such as hip or valley rafters etc. with galvanised J or L hook bolts and nuts, 8 mm diameter, with bitumen and G.I. limpet washers or with a limpet washer filled with white lead as directed by the Engineer-in-Charge. While J hooks are used for fixing sheets on angle iron purlins, and L hooks are used for fixing to R.S. joists, timber or precast concrete purlins. The length of the hook bolt shall be varied to suit the particular requirements. The bolts shall be sufficiently long so that after fixing they project above the top of the nuts by not less than 10 mm. The grip of J or L hook bolt on the side of the purlin shall not be less than 25 mm. There shall be a minimum of three hook bolts placed at the ridges of corrugations in each sheet on every purlin and their spacing shall not exceed 30 cm. Coach screws shall not be used for fixing sheets to purlins.

The galvanised coating on J or L hooks, and bolts shall be continuous and free from defects such as blisters, flux stains, drops, excessive projections or other imperfections which would impair serviceability.

The galvanised coating should conform to IS : 1367

Where slopes of roofs are less than 21.5 degrees (1 vertical to 2.5 horizontal) sheets shall be joined together at the side laps by galvanised iron bolts and nuts 25 x 6 mm size, each bolt provided with a bitumen and a G.I. limpet washer or a G.I. limpet washer filled with white lead. As the overlap at the sides extends to two corrugations, these bolts shall be placed zig zag over the two overlapping corrugations, so that the

ends of the overlapping sheets shall be drawn tightly to each other. The spacing of these seam bolts shall not exceed 60 cm along each of the staggered rows. Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from the underside, while the sheets are on the ground.

Wind Tie: Wind ties shall be of 40 x 6 mm flat iron section or of other size as specified. These shall be fixed at the eaves of the sheets. The fixing shall be done with the same hook bolts which secure the sheets to the purlins. The ties shall be paid for separately unless described in the item of roofing.

Finish: The roof when completed shall be true to lines, and slopes and shall be leak proof.

Measurements

The length and breadth shall be measured correct to a cm Area shall be worked out in sqm correct to two places of decimal.

The superficial area of roof covering shall be measured on the flat without allowance for laps and corrugations. Portion of roof covering overlapping the ridge or hip etc. shall be included in the measurements of the roof.

Roof with curved sheets shall be measured and paid for separately. Measurements shall be taken on the flat and not girthed

No deduction in measurement shall be made for opening upto 0.4 sqm and nothing extra shall be allowed for forming such openings. For any opening exceeding 0.4 sqm in area, deduction in measurements for the full opening shall be made and in such cases the labour involved in making these openings shall be paid for separately. Cutting across corrugation shall be measured on the flat and not girthed. No additions shall be made for laps cut through.

Rate: The rate shall include the cost of all the materials and labour involved in all the operations described above including a coat of approved steel primer and two coats of approved steel paint on overlapping of C.G.S. sheets. This includes the cost of roof sheets, galvanised iron J or L hooks, bolts and nuts, galvanised iron seam bolts and nuts, bitumenous and galvanised iron limpet washers etc.

RIDGES AND HIPS OF PLAIN GALVANISED STEEL SHEETS

Ridges and Hips: Ridges and hips of C.G.S. roof shall be covered with ridge and hip sections of plain G.S. sheet with a minimum lap of 20 cm on either side over the C.G.S. sheets. The end laps of ridges and hips and between ridges and hips shall also be not less than 20 cm. The ridges and hips shall be of 60 cm overall width plain G.S. sheet, 0.6 mm or 0.8 mm thick as given in the description of the item and shall be properly bent in shape.

Fixing

Ridges shall be fixed to the purlins below the same 8 mm dia G.I hook bolts and nuts and bitumen and G.I. limpet washers which fix the Sheets to the purlins.

Similarly, hips shall be fixed to the roof members below such as purlins, hip and valley rafters with the same 8 mm dia G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fix the sheets to those roof members. At least one of the fixing bolts shall pass through the end laps of ridges and hips, on either side. If this is not possible extra hook bolts shall be provided.

The end laps of ridges and hips shall be joined together by galvanised iron seam bolts 25 x 6 size each with a bitumen and G.I. washer or white lead as directed by the Engineer-in-Charge. There shall be at least two such bolts in each end lap.

Surface of C.G.I. sheets of ridge and hip sections and the roofing sheets which overlap shall be painted with a coat of approved primer and two coats of approved paint suitable for painting G.S. Sheets before they are fixed in place.

Finish: The edges of the ridges and hips shall be straight from end to end and their surfaces should be plane and parallel to the general plane of the roof. The ridges and hips shall fit in squarely on the sheets.

Measurement: The measurements shall be taken for the finished work in length along the centre line of ridge or hip, as the case may be, correct to a cm. The laps in ridges and hips and between ridges and hips shall not be measured.

Rate: The rate shall include the cost of all labour and materials specified above, including painting, cost of seam bolts and any extra G.I. hook bolts, nuts and washers, required.

VALLEY AND FLASHING OF PLAIN GALVANISED STEEL SHEETS

Valley and flashing: Valley shall be 90 cm wide overall plain G.S. sheet 1.6 mm thick or other size as specified in the item bent to shape and fixed. They shall lap with the C.G.S. sheets not less than 25 cm width on other side. The end laps of valley shall also be not less than 25 cm.

Valley sheets shall be laid over 25 mm thick wooden boarding if so required.

Flashing shall be of plain G.S. sheet of 40 cm overall width 1.25 mm thick or 1.00 mm thick as **specified** in the item bend to shape and fixed. They shall lap not less than 15 cm over the roofing sheets. The end laps between flashing pieces shall not be less than 25cm.

Laying and Fixing: Flashing and valley sheets shall be fixed to the roof members below, such as purlins and valley rafters with the same 8 mm dia G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fix the sheets to those roof members.

At least one of the fixing bolts shall pass through the end laps of the valley pieces on other side. If this is not possible extra hook bolts shall be provided. The free end of flashing shall be fixed at least 5 cm inside masonry with the mortar of mix 1: 3 (1 cement : 3 coarse sand).

Surface of G.S. sheets under overlaps shall be painted with a coat of approved primer and two coats. of approved paint suitable for painting G.S. sheets.

Finish: The edges of valley and flashing should be straight from end to end. The surfaces should be true and without bulges and and depressions.

Measurements: The length of the valleys and flashing shall be measured for the finished work correct to a cm. The laps along the length of the valley or flashing pieces, including the portion embedded in masonry shall not be measured.

Rates: The rate for valleys, shall be for all the labour and materials specified above, including painting, cost of seam bolts and the cost of requisited G.I. hook bolts, nuts and washers required over and above those needed for connecting the roof sheets to the roof members. The rate for valleys shall exclude the cost of boarding underneath which shall be paid for separately. The rate for flashing shall be for all the labour and

materials specified above, and shall include the cost of painting and mortar for fixing in wall.

GUTTERS OF PLAIN GALVANISED STEEL SHEETS

Gutters: Gutter shall be fabricated from plain .G. S. Sheets 1.25 mm thick or other size as specified the item.

Eaves gutters shall be of the shape and section specified in the description of the item. The overall width of the sheet referred to therein shall mean the peripheral width of the gutter including the rounded edges. The longitudinal edges shall be turned back to the extent of 12 mm and beaten to form a rounded edge. The ends of the sheets at junctions of pieces shall be hooked into each other and beaten flush to avoid leakage.

Slope: Gutter shall be laid with a minimum of 1 in 120.

Laying and Fixing

Gutter shall be supported on and fixed to M.S flat iron brackets bent to shape and fixed to the requisite slope. The maximum spacing of brackets shall be 1.20 metres.

Where these brackets are to be fixed to the sides of rafters, they shall be of 40 x 3 mm section and to shape and fixed rigidly to the sides of rafters with 3 Nos. 10 mm dia bolts, nuts and washers. The brackets shall overlap the rafter not less than 30 cm and the connecting bolts shall be at 12 cm centres.

Where the brackets are to be fixed to the purlins, the brackets shall consist of 50 x 3 mm M.S. flat iron bent to shape with one end turned at right angle and fixed to the purlin face with 2 Nos. of 10 mm dia bolts nuts and washers. The bracket will be stiffened by provision of 50 x 3 mm. M.S. flat whose over hung portion bent to right angle shape with its longer leg connected to the bracket with 2 Nos. 6 mm dia M.S. bolts, nuts and washers and its shorter leg fixed to face of parlin with 1 No. 10 mm dia, bolt, nut and washer. The over hang of the vertical portion of the bracket from the face of the purlin shall not exceed 22.5 cm with this arrangement. The spacing of the brackets shall not exceed 1.20 metres.

The gutter shall be fixed to the brackets with 2 Nos. G.I. bolts and nuts 6 mm dia, each fitted with a pair of G.I. and bitumen washers. The connecting bolts shall be above the water line of the gutters.

For connection to down take pipes, a proper drop end or funnel shaped connecting piece shall be made out of G.S. sheet of the same thickness as gutter and riverted to the gutter, the other end tailing into the socket of the rain-water pipe. Wherever necessary stop ends, angles etc., should be provided.

Finish: The gutters when fixed shall be true to line and slope and shall be leak proof.

Measurements: Measurements shall be taken for the finished work along the centre line of the top width of the gutter connection to a cm. The hooked lap portion in the junctions and gutter lengths shall not be measured. The number of brackets which are fixed to purlins with stiffener flats should be measured.

Rate: The rate shall include the cost of all labour and materials specified above, including all specials such as angles, junctions, drop ends or funnel shaped connecting pieces, stop ends etc., flat iron brackets and bolts and nuts required for fixing the latter

to the roof members. Brackets of 50 x 3 mm flats fixed to purlins with surrener flats will be paid extra.

INSULATION FOR GALVALUME

This shall be as per the item no. 12.30.2 page no 353 of updated 2003, CPWD standards and corresponding sub items.

FALSE ROOFING

This shall be as per the item no. 12.22 and 12.23 page no. 344 and 355 of updated CPWD standards and corresponding sub items.

CLADING

This shall be as per the item no. 12.22 and 12.23 page no. 344 and 355 of updated CPWD standards and corresponding sub items.

GLAZED TILE DADDOING

White Glazed Tiles

The tiles shall be of approved make and shall generally conform to IS: 777. They shall be flat, and true to shape and free from blisters crazing, chips, welts, crawling or other imperfections detracting from their appearance. The tiles shall be tested as indicated in Appendix of IS: 777.

The tiles shall be square or rectangular of nominal size such as 150x150 mm, 100 x 100 mm, 100 x 200 mm or as directed by the Engineer-in-Charge. The thickness of the tiles shall be 5 mm, or 6 mm as specified. The length of all four sides shall be measured correct to 0.1 mm and average length breadth shall not vary more than ± 0.8 mm from specified dimension. The variation of individual dimension from average value of length/breadth shall not exceed ± 0.5 mm. Tolerance in thickness shall be ± 0.4 mm.

Note 1: Where tiles of nominal sizes of 150 x 150 mm or 100 x 100 mm are not available tiles of nominal sizes 152 mm x 152 mm or 108 mm x 108 mm may be allowed to be used with prior approval of the Engineer-in-Charge.

Note 2: The actual size of tiles supplied shall be 1 mm less so that with 1 mm joint, the tile when laid shall conform to the nominal size.

The top surface of the tiles shall be glazed and glaze shall be either glossy or matt as specified. The underside of the tiles shall not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be preferably free from glaze. However, any glaze if unavoidable, shall be permissible on only upto 50 per cent of the surface area of the edges.

Coloured Tiles

Only the glaze shall be coloured as specified. The sizes and specifications shall be the same as for the white glazed tiles.

Decorative Tiles

The type and size of the decorative tiles shall be as follows:

- i) Decorated white back ground tiles

The size of these tiles shall be 152 x 152 x 6 mm and/or 108 x 108 x 6 mm.

ii) Decorated and having coloured background

The sizes of the tiles shall be 152 x 152 x 6 mm and/or 108 x 108 x 6 mm.

Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:3 (1 cement : 3 coarse sand) or as specified. The average thickness of the bedding shall be 10 mm while the thickness under any portion of the tiles shall not be less than 5 mm.

Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tilt to be set and to enable the mason to place wooden plank across and squat on it.

Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square metre over such an area as would accommodate about twenty tiles. Tiles shall be soaked in water washed clean and shall be fixed in this grout on after another, each tile gently being tapped with wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.

The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope.

Where full size tiles cannot be fix these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints.

Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado.

After tiles have been laid surplus cen slurry shall be cleaned off.

Pointing and Finishing

The joints shall be cleaned off the grey cement slurry with wire/coir brush or trowel to a depth 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment if required match the colour of tiles. The floor shall then be kept wet for 7 days. After curing, the surface shall kept be washed and finished clean. The finished floor shall not sound hollow when tapped with a wooden mallet.

Measurements

Length and breadth shall be measured correct to a cm before laying skirting, dado or wall plaster and the area calculated in square metre correct to two places of decimal. Where coves are used at the functions, the length and breadth shall be measured between the lower edges of the coves.

No deduction shall be made nor extra paid for voids not exceeding 0.20 square metre. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 square metre.

Areas, where glazed tiles or different types of decorative tiles are used will be measured separately.

Rate

The rate for flooring shall include the cost of all materials and labour involved in all the operations described above. Nothing extra shall be paid for the use of cut (sawn) tiles in the work.

Extra over and above the normal rate for white shall be paid where coloured or any other type of decorative tiles have been used.

11.1.9 FINISHING

CEMENT PLASTERING

The cement plaster shall be 12 mm, 15 mm or 20 mm thick as specified in the item.

Scaffolding and preparation of surface shall be as specified in the specifications.

Mortar: The mortar of the specified mix using the type of sand described in the item shall be used. It shall be as specified in 3.5. For external work and under coat work, the fine aggregate shall conform to grading IV. For finishing coat work the fine aggregate conforming to grading zone V shall be used.

Thickness: Where the thickness required as per description of the item is 20 mm the average thickness of the plaster shall not be less than 20 mm whether the wall treated is of brick or stone. In the case of brick work, the minimum thickness over any portion of the surface shall be not less than 15 mm while in case of stone work the minimum thickness over the bushings shall be not less than 12 mm.

Curing: Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered.

The plaster shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages at the contractor's expense by such means as the Engineer-in-charge may approve. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched.

CEMENT PLASTER WITH A FLOATING COAT OF NEAT CEMENT

The cement plaster shall be 12, 15 or 20 cm thick, finished with a floating coat of neat described in the item.

Specifications for this item of work shall be as same as described in the manual except for the additional floating coat, which shall be carried out as below

When the plaster has been brought to a true surface with the wooden straight edge it shall be uniformly treated over its entire area with a paste of neat cement and rubbed smooth, so that the whole surface is covered with neat cement coating. The quantity of cement applied for floating coat shall be 1 kg per sqm. Smooth finishing completed with trowel immediately and in no case later than half an hour of adding water to the plaster mix.

18 mm CEMENT PLASTER (TWO COAT WORK)

The specification for scaffolding preparation of surface shall be as described.

Mortar: The mix and type of fine aggregate specified in the description of the item shall for the respective coats. It shall be as specified in 3.2.2. Generally the mix of the finishing coat shall not be richer than the under coat unless otherwise described in item.

Generally coarse sand shall be used for t coat and fine sand for the finishing coat otherwise specified for external work and coat work, the fine aggregate shall conform

to zone IV. For finishing coat work the fine a conforming to grading zone V shall be used.

Application

The plaster shall be applied in two 12 mm under coat and then 6 mm finishing shall have an average total thickness of not 18 mm.

12 mm Under Coat : This shall be as specified except that when the, has been brought to a true surface a wooden edge and the surface shall be left rough and furrowed 2mm deep with a scratching tool diagonally both ways, to form key for the finishing coat. The surface shall be kept wet till the finishing coat is applied

6 mm finishing coat: The finishing coat shall be applied after the under coat has sufficiently, set but not dried and in any case within 48 hours and finished in the manner specified.

6 mm CEMENT PLASTER ON CEMENT CONCRETE AND REINFORCED CEMENT CONCRETE WORK.

Scaffolding Stage scaffolding shall be provided for the work. This shall be independent of the walls.

Preparation of Surface: Projecting burrs of mortar formed due to the gaps at joints in shuttering shall be removed. The surface shall be scrubbed clean with wire brushes. In addition concrete surfaces to be plastered shall be pock marked with a pointed tool, at spacing of not more than 5 cm. centres, the pock being made not less than 3 mm deep. This is to ensure a proper key for the plaster. The mortar shall be washed off and surface, cleaned of all oil, grease etc. and well wetted before the plaster is applied.

Mortars: Mortar of the specified mix using types of sand described in the item shall be used.

Application: To ensure even thickness and a true surface, gauges of plaster 15 x 15 cm. shall be first applied at not more than 1.5 m intervals in both directions to serve as guides for the plastering. Surface of these gauged areas shall be truly in the plane of the finished plaster surface. The plaster shall be then applied in a uniform surface to a thickness slightly more than the specified thickness and shall then be brought to true and even surface by working a wooden straight edge reaching across the gauges. Finally the surface shall be finished true with a trowel or with wooden float to give a smooth or sandy granular texture as required. Excess troweling or over working of the floats shall be avoided. The plastering and finishing shall be completed within half an hour of adding water to the dry mortar.

Plastering of ceiling shall not be commenced until the slab above has been finished and centering has been removed. In the case of ceiling of roof slabs, plaster shall not be commenced until the terrace work has been completed. These precautions are necessary in order that the ceiling plaster is not disturbed by the vibrations set up in the above operations.

Finish: The plaster shall be finished to a true and plumb surface and to the proper degree of smoothness as required. The work shall be tested as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as work proceeds.

Thickness: The average thickness of plaster shall not be less than 6 mm. The minimum thickness over any portion of the surface shall not be less than 5 mm.

Curing: The specifications shall be as detailed in the manual.

Measurements

Length and breadth shall be measured correct a cm. and its area shall be calculated in sqm. correct to two places of decimal. Dimensions before plastering shall be taken.

Thickness of plaster shall be exclusive of the thickness of the key i.e. depth or rock marks and hacking.

Plastering on ceiling at height greater than 5 m above the corresponding floor level shall be so described and shall be measured separately stating the height in stages of 1 m or part thereof.

Plastering on the sides and soffits of the projected beams of ceiling at a height greater than 5 m above the corresponding floor level shall be measured and added to the quantity measured.

Plastering on spherical and groined ceiling and circular work not exceeding 6 m in radius, shall be measured and paid for separately.

Flowing soffits (viz. portion under spiral stair case etc.) shall be measured and paid for separately

Ribs and mouldings on ceiling shall be measured as for cornices, deductions being made from the plastering on ceiling in case the width of the moulding exceed 15 cm.

Exterior plastering at a height greater than 10 m from average ground level shall be measured separately in each storey height. Patch plastering (in repairs) shall be measured as plastering new work, where the patch exceed 2.5 sqm. extra payment being made for preparing old wall, such as dismantling old plaster, raking out the joints and cleaning the surface. Where the patch does not exceed 2.5 sqm in area it shall be measured under the appropriate item under sub head 'Repairs to Buildings.

Deduction shall not be made for openings or for ends of columns, or columns caps of 0.5 sqm and in area and under. No additions will be made either for the plastering of the sides of such openings. For openings etc. of areas exceeding 0.5 sqm deduction will be made for the full opening but the sides of such openings shall be measured for payment.

Rate: The rate shall include the cost of all labour and materials involved in all the operations described above.

6 mm CEMENT PLASTER FOR SLAB BEARING

Cement plaster shall be 6 mm thick finished with a floating coat of neat cement and thick coat of lime wash on top of walls for bearing of slabs.

Application: The plaster shall be applied over the cleaned and wetted surface of the wall. When the plaster has been brought to a true surface with the wooden straight edge it shall be uniformly treated over its entire area with a paste of neat cement and rubbed smooth, so that the whole surface is covered with neat cement coating. The quantity of cement applied for floating coat shall be 1 kg per sqm. Smooth finishing shall be completed with trowel immediately and in no case later than half an hour of adding water to the plaster mix.

Lime wash: This shall be applied in a thick coat after curing the plaster for three days.

Measurements: Length and breadth shall be measured correct to a cm and area worked out in sq.m correct to two places of decimal.

Rate: The rate shall include the cost of all labour and materials involved in all the operations described above.

COLOURWASHING

The mineral colours, not affected by lime, shall be added to white, wash. Indigo (Neel) shall however, not be added. No colour wash shall be done until a sample of the colour wash of the required tint or shade has been got approved from the Engineer-in-charge. The colour shall be of even tint or shade over the whole surface. If it is blotchy or otherwise badly applied, it shall be redone by the contractor.

For new work, the priming coat shall be of white ash with lime or with whiting as specified in the description of the item. Two or more coats, shall then be applied on the entire surface till it represents a smooth and uniform finish.

For old work, after the surface has been prepared a coat of colour wash, shall be applied over the patches and repairs. Then a single coat, or two or more coats of color wash stipulated in the description of the item shall applied over the entire surface. The colour wash surface shall present a uniform finish.

The finished dry surface shall not and shall not readily come off on the rubbed.

DRY DISTEMPERING

Materials: Dry distemper of required colour (IS: 427) and of approved brand and manufacture shall be used. The shade shall be got approved from the Engineer-in-charge before application of distemper. The dry distemper colour as required shall be stirred slowly in clean water using 6 decilitres (0.6 litre) of water per kg of distemper as specified by the makers. Warm water shall preferably be used. It shall be allowed to stand at least 30 minutes (or if practicable overnight) before use. The mixture shall be well stirred before and during use to maintain an even consistency.

Distemper shall not be mixed in larger quantity than is actually required for one day's work.

Preparation of Surface

Before new work is distempered, the surface shall be thoroughly brushed free from mortar droppings and other foreign matter and sand papered smooth.

New plastered surfaces shall be allowed to dry for at least two months, before applying distemper.

In the case of old work, all those pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt, etc.

Pitting in plaster shall be made good plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

Priming Coat: A priming coat of whiting shall be applied over the prepared surface in case of new work, if so stipulated in the description of the item. No white washing coat shall be used as a priming coat for distemper.

The **treated surface be allowed to dry before distemper coat is given.**

Application

In the case of new work, the treatment shall consist of a priming coat, of whiting followed by the application of two or more coats of distemper till the surface shows an even colour.

The application of each coat shall be as follows:

The entire surface shall be coated with the mixture uniformly, with proper distemper brushes ordinary white wash brushed shall not be allowed) in horizontal strokes followed immediately by vertical ones which together shall constitute one coat.

The subsequent coats shall be applied only after the previous coat has dried.

The finished surface shall be even and uniform and shall show no brush marks.

Enough distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room, which cannot be completed the same day.

After each day's work, the brushes shall be washed in hot water and hung down to dry. Old brushes which are dirty or caked with distemper shall not be used.

OIL EMULSION (OIL BOUND) WASHABLE DISTEMPERING

Materials: Oil emulsion (Oil Bound) washable distemper (IS-428) of approved brand and manufacture shall be used. The primer where used as on new work shall be cement primer or distemper primer as described in the item. These shall be of the same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for day's work shall be prepared.

The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of the contractor, and the Engineer-in-charge. The empty tins shall not be removed from the site of work till this item of work has been completed and passed by the Engineer-in-charge.

Preparation of the Surface

For new work the surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of Paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

In the case of old work, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease dirt etc.

Pitting in plaster shall be made good with plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched

surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

Application

Priming Coat: The priming coat shall be with distemper primer or cement primer, as required in the description of the item. The application of the distemper primer shall be as described in General Specifications.

Note: If the wall surface plaster has not dried completely, cement primer shall be applied before distempering the walls. But if distempering is done after the wall surface is dried completely, distemper primer shall be applied.

Oil bound distemper is not recommended to be applied, within six months of completion of wall plaster. However, newly plastered surface if required to be distempered before a period of six months shall be given a coat of alkali resistant priming paint conforming to IS: 109 and allowed to dry for at least 48 hours before distempering is commenced.

Distemper Coat: For new work, after the primer coat has dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. One coat of distemper properly diluted with thinner (water or other liquid as stipulated by the manufacturer) shall be applied with brushes in horizontal strokes followed immediately by vertical ones which together constitutes one coat.

The subsequent coats shall be applied in the same way. Two or more coats of distemper as are found necessary shall be applied over the primer coat to obtain an even shade.

A time interval of at least 24 hours shall be allowed between successive coats to permit proper drying of the preceding coat.

Rate: The rate shall include the cost of all labour and materials involved in all the above operations (including priming coat) described above.

CEMENT PRIMER COAT

Cement primer coat is used as a base coat on wall finish of cement surfaces before oil emulsion distemper paints are applied on them. The cement primer is composed of a medium and pigment which are resistant to the alkalies present in the cement lime or lime cement in wall finish and provides a barrier for the protection of subsequent coats of oil emulsion distemper paints.

Primer coat shall be preferably applied by brushing and not by spraying. Hurried priming shall be avoided particularly on absorbent surfaces. New plaster patches in old work should also be treated with cement primer before applying oil emulsion paints etc.

Preparation of the Surface: The surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of Paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

Application: The cement primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly possible leaving no brush marks. It shall be allowed to dry for at least 48 hours, before oil emulsion paint is applied.

CEMENT PAINT

Material: The cement paint shall be (conforming to IS: 5410) of approved brand and manufacturer.

The cement paint shall be brought to site work by the contractor in its original containers sealed condition. The material shall be brought in a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the Contractor and the Engineer-in-charge. The empties shall be removed from the site of work till the work till the relevant item of the work has been completed and permission obtained from the Engineer-in-charge.

Preparation of Surface: For New York, the surface shall be thoroughly cleaned of all mortar dropping, dirt dust, alge, grease and other foreign matter by brushing and washing. Pitting in plaster shall be made good and a coat of water proof cement paint shall be applied over patches after wetting them thoroughly.

Preparation of mix : Cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish. Cement paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instruction shall be followed meticulously.

The lids of cement paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement paint rapidly becomes air set due to its hygroscopic qualities.

In case of cement paint brought in gunny bags, once the bag is opened, the contents should be consumed in full on the day of its opening. If the is not likely to be consumed in full, the balance quantity should be transferred and preserved in an airtight container to avoid its exposure to atmosphere.

Application

The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application of cement paint shall be as per manufacturer's specification. The completed surface shall be watered after the day's work.

The second coat shall be applied after the coat has been set for at least 24 hours. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.

For new work the shall be treated with three or more coats of water proof cement paint as found necessary to get a uniform shade.

For old work, the treatment shall be with one or more coats as found necessary, to get a uniform shade.

Precaution : Water proof cement paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound, varnishes, paints etc. It shall not be applied on gypsums, wood and metal surfaces.

If Water Proof Cement Paint is required to be applied on existing surfaces previously treated with white wash, colour wash etc, the surface shall be thoroughly cleaned by scrapping off all the white wash, colour wash etc., completely. Thereafter a coat of cement primer shall be applied followed by two or more coats of water proof cement paint.

PAINTING

Materials: Paints, oils, varnishes etc. of approved brand and manufacture shall be used. Only ready mixed paint (Exterior grade) as received from the manufacturer without any admixture shall be used.

If for any reason, thinning is necessary in case of ready mixed paint, the brand of thinner recommended by the manufacturer or as instructed by the Engineer-in-charge shall be used.

Approved paints, oil or varnishes shall be brought to the site of work by the contractor in their original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-charge. The empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from the Engineer-in-charge.

Commencing Work: Painting shall not be started until the Engineer-in-charge has inspected the items of work to be painted, satisfied himself about their proper quality and given his approval to commence the painting work. Painting of external surface should not be done in adverse weather condition like hail storm and dust storm.

Painting, except the priming coat, shall generally be taken in hand after practically finishing all building work.

The rooms should be thoroughly swept out and the entire building cleaned up, at least one day in advance of the paint work being started.

Preparation of Surface: The surface shall be thoroughly cleaned and dusted off. All rust, dirt, scales, smoke splashes, mortar droppings and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Engineer-in-charge after inspection, before painting is commenced.

Application

Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its containers, when applying also, the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform.

The painting shall be laid on evenly and smoothly by means of crossing and laying off, the latter in the direction of the grains of wood. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first

time over and then brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat.

Where so stipulated, the painting shall be done by spraying. Spray machine used may be (a) high pressure (small air aperture) type, or (b) a low pressure (large air gap) type, depending on the nature and location of work to be carried out. Skilled and experienced workmen shall be employed for this class of work. Paints used shall be brought to the requisite consistency by adding a suitable thinner.

Spraying should be done, only, when dry condition prevails. Each coat shall be allowed to dry out thoroughly and rubbed smooth before, the next coat is applied. This should be facilitated by thorough ventilation. Each coat except the last coat, shall be lightly rubbed down with sand paper or fine pumice stone and cleaned off dust before the next coat is laid.

No left over paint shall be put back into the stock tins. When not in use, the containers shall be kept properly closed.

No hair marks from the brush or clogging of paint puddles in the corners of panels, angles mouldings etc. shall be left on the work.

In painting doors and windows, the putty round the glass panes must also be painted but care must be taken to see that no paint stains etc. are left on the glass. Tops of shutters and surfaces in similar hidden locations shall not be left out in painting. However, bottom edge of the shutters where the painting is not practically possible, need not be done nor any deduction on this account will be done but two coats of primer of approved make shall be done on the bottom edge before fixing the shutters.

On painting steel work, special care shall be taken while painting over bolts, nuts, rivets overlaps etc.

The additional specifications for primer and other coats of paints shall be as according to the detailed specifications under the respective headings.

Brushes and containers: After work, the brushes shall be completely cleaned of paint and linseed oil by rinsing with turpentine. A brush in which paint has dried up is ruined and shall on no account be used for painting work. The containers when not in use, shall be kept dosed and free from air so that paint does not thicken and also shall be kept safe from dust. When the paint has been used, the containers shall be washed with turpentine and wiped dry with soft clean cloth, so that they are clean, and can be used again.

Measurements

The length and breadth shall be measured correct to a cm. The area shall be calculated in sqm(correct to two places of decimal), except otherwise stated.

Small articles not exceeding 10 sq. decimeter (0.1 sqm) of painted surfaces where not in conjunction with similar painted work shall be enumerated.

Painting upto 10 cm in width or in girth and not in conjunction with similar painted work shall be given in running metres and shall include cutting to line where so required.

Note: Components of trusses, compound girders, stanchions, lattices and similar work shall, however, be given in sq. metres irrespective of the size or girth of members. Priming coat of painting shall be included in the work of fabrication.

In measuring painting, varnishing, oiling etc. of joinery and steel work etc. The coefficients as indicated in following tables shall be used to obtain the area payable. The coefficients shall be applied to the areas measured flat and not girthed.

TABLE 9.8 EQUIVALENT PLAIN AREAS OF UNEVEN SURFACE

S. No	Description of work	How measured	Multiplying coefficients
I	WOOD WORK DOORS, WINDOWS ETC		
1.	Panelled or framed and braced doors, windows etc.	Measured flat (not girthed including)	1.30 (for each side)
2.	Ledged and battened or ledged, battened and braced doors, windows etc.	Chowkhat or frame, Edges chocks, cleats, etc. shall be deemed to be included in the item.	
3.	Flush doors etc.	-do-	1.20 (for each side)
4.	Part panelled and part glazed or gauzed doors, window etc. (Excluding painting of wire gauze portion)	-do-	1.00 (for each side)
5.	Fully glazed or gauzed doors, windows etc. (Excluding painting of wire gauze portion)	-do-	0.80 (for each side)
6.	Fully venationed or louvered doors, windows etc.	-do-	1.80 (for each side)
7.	Trellis (or Jaffri) work one way or two way	Measured flat overall, no deduction shall be made for open spaces, supporting members shall not be measured separately	2 (for painting all over)
8.	Carved or enriched work	Measured flat	2 (for each side)
9.	Weather boarding	Measured flat (not girthed supporting frame work shall not be measured separately	1.20 (for each side)
10.	Wood shingle roofing	Measured flat (not girthed)	1.10 (for each side)
11.	Boarding with cover fillets and match boarding	Measured flat (not girthed)	1.05 (for each side)
12.	Tile and slate battening	Measured flat overall no deductions shall be made for open spaces	0.80 (for painting all over)
II.	STEEL WORK DOORS, WINDOWS ETC.		
13.	Plain sheeted steel doors or windows	Measured flat (not girthed including frame edges etc.	1.10 (for each side)

S. No	Description of work	How measured	Multiplying coefficients
14	Fully glazed or gauzed steel doors and windows (excluding painting of wire gauze portion)	-do-	0.50 (for each side)
15.	Partly panelled and partly glazed or gauzed doors and windows (excluding painting of wire gauze portion)	-do-	0.80 (for each side)
16.	Corrugated sheeted steel doors or windows	-do-	1.25 (for each side)
17.	Collapsible gates	Measured flat	1.50 (for painting all over)
18.	Rolling shutters of interlocked laths	Measured flat, (size of opening) all over; jamb guides, bottom rails and locking arrangement etc. shall be included in the item (top cover shall be measured separately)	1.10 (for each side)
III GENERAL			
19.	Expanded metal, hard drawn steel wire fabric of approved quality, grill works and gratings in guard Bars, balustrades, railing partitions and MS Bars in windows frames.	Measured flat overall; no deduction shall be made for open spaces; supporting members shall not be measured separately	1 (for paint all over)
20.	Open palisade fencing and gates including standards, braces, rails stays etc in timber or steel	-do- (see note No. 12)	1 (for paint all over)
21.	Corrugated iron sheeting in roofs, side cladding etc.	-do- Measured flat (not girthed)	1.14 (for each side)
22.	AC corrugated sheeting in roofs, side cladding etc.	-do-	1.20 (for each side)
23.	AC semi corrugated sheeting in roofs, side cladding etc. or Nainital pattern using plain sheets	-do-	1.10 (for each side)
24.	Wire gauze shutters including painting of wire gauze	-do-	1.00 (for each side)

Explanatory notes for Table 9.14

(1) Measurements for doors windows etc., shall be taken flat (and not girthed) over all including Chowkhats or frames, where provided. Where Chowkhats or frames are not provided, the shutter measurements shall be taken.

(2) Where doors, windows etc., are of composite types other than those included in Table 9.14 the different portion shall be measured separately with their appropriate

coefficients, the centre line of the common rail being taken as the dividing line between the two portions.

- 3) The coefficients for door and windows shall apply irrespective of the size of frames and shutter members.
- 4) In case steel frames are used the area of doors, windows shutters shall be measured flat excluding frames.
- 5) When the two faces of a door, window, etc. are to be treated with different specified finishes, measurable under separate items, the edges of frames and shutters shall be treated with the one or the other type of finish as ordered by the Engineer-in-charge and measurement of this will be deemed to be included in the measurement of the face treated with that finish.
- 6) In the case where shutters are fixed on both faces of the frames, the measurement for the door frame and shutter on one face shall be taken in the manner already described, while the additional shutter on the other face will be measured for the shutter only excluding the frame.
- 7) Where shutters are provided with clearance at top or/and bottom each exceeding 15 cm height, such openings shall be deducted from the overall measurements and relevant coefficient shall be applied to obtain the area payable.
- 8) Collapsible gates shall be measured for width from outside to outside of gate in its expanded position for height from bottom to top of channel verticals. No separate measurements shall be taken for the top and bottom guide rails rollers, fittings etc.
- 9) Coefficients for sliding doors shall be the same as for normal types of doors in the table. Measurements shall be taken outside to outside of shutters, and no separate measurements shall be taken for the painting guide rails, rollers, fittings etc.
- 10) Measurements of painting as above shall be deemed to include painting all iron fittings in the same or different shade for which no extra will be paid.
- 11) The measurements of guard bars, expanded metal, hard drawn steel wire fabric of approved quality, grill work and gratings, when fixed in frame work, painting of which is once measured else where shall be taken exclusive of the frames. In other cases the measurements shall be taken inclusive of the frames.
- (12) For painting open palisade fencing and gates etc., the height shall be measured from the bottom of the lowest rail, if the palisades do not go below it, (or from the lower end of the palisades, if they project below the lowest rail), upto the top of rails or palisades whichever are higher, but not up to the top of standards when the latter are higher than the top rails or the palisades.

Width of moulded work of all other kinds, as in hand rails, cornices, architraves shall be measured by girth.

For trusses, compound girders, stanchions, lattice girders, and similar work, actual areas will be measured in sq. metre and no extra shall be paid for painting on bolt heads, nuts, washers etc. even when they are picked out in a different tint to the adjacent work.

Painting of rain water, soil, waste, vent and water pipes etc. shall be measured in running metres of the particular diameter of the pipe concerned. Painting of specials such as bends, heads, branches, junctions, shoes, etc. shall be included in the length

and no separate measurements shall be taken for these or for painting brackets, clamps etc.

Measurements of wall surfaces and wood and other work not referred to already shall recorded as per actual.

Flag staffs, steel chimneys, aerial masts, spires and other such objects requiring special scaffolding shall be measured separately.

Precautions: All furniture, fixtures, glazing, floors etc. shall be protected by covering and stains, smears, splashings, if any shall be removed and any damages done shall be made good by the contractor at his cost.

Rate: Rates shall include cost of all labour and materials involved in all the operations described above and in the particular specifications given under the several items.

PAINTING PRIMING COAT ON WOOD, IRON OR PLASTERED SURFACES

Primer

The primer for wood work, iron work or plastered surface shall be as specified in the description of item.

Primer for plaster/wood work/Iron & Steel/Aluminium surfaces shall be as specified below:

TABLE 9.9 Details of Primer and surfaces

Sl. No	Surfaces	Primer to be used
1.	Wood work (hard and soft wood)	Pink conforming to IS: 3536
2.	Resinour wood and plywood	Aluminium primer conforming to IS: 3585
3.	(A) Aluminium and light alloys (B) Iron, Steel and Galvanized steel	Zinc chromate primer conforming to IS: 104 Red Oxide Zinc chromate Primer conforming to IS: 2074
4.	Cement/Conc/RCC/brick work. Plastered surfaces, asbestos surfaces to receive Oil bound distemper or paint finish	Cement primer conforming to IS : 109

The primer shall be ready mixed primer of approved brand and manufacture.

Where primer for wood work is specified to be mixed at site, it shall be prepared from a mixture of red lead, white lead and double boiled linseed oil in the ratio of 0.7 kg : 0.7 kg : 1 litre.

Where primer for steel work is specified to be mixed at site, it shall be prepared from a mixture of red lead, raw linseed oil and turpentine in the ratio of 2.8 kg 1 litre : 1 litre.

The specifications for the base vehicle and thinner for mixed on site primer shall be as follows:

(a) **White Lead:** The White lead shall be pure and free from adulterants like barium sulphate and whiting. It shall conform to IS: 103.

(b) **Red Lead:** This shall be in powder form and shall be pure and free from adulterants like brick dust etc. It shall conform to IS: 102.

(c) **Raw Linseed Oil:** Raw linseed oil shall be lightly viscous but clear and of yellowish colour with light brown tinge. Its specific gravity at a temperature of 30 degree C shall be between 0.923 and 0.928.

Note: The oil shall be mellow and sweet to the taste with very little smell. The oil shall be of sufficiently matured quality. Oil turbid or thick, with acid and bitter taste and rancid odour and which remains sticky for a considerable time shall be rejected. The oil shall conform in all respects to IS: 75. The oil shall be of approved brand and manufacture.

(d) **Double boiled linseed oil:** This shall be more viscous than the raw oil, have a deeper colour and specific gravity between 0.931 and 0.945 at a temperature of 30 degree C. It dry with a glossy surface. It shall conform in all respects to IS: 77. The oil shall be of approved brand and manufacture.

(e) **Turpentine:** Mineral turpentine i.e. petroleum distillate which has the same rate of evaporation as vegetable turpentine (distillate product of oleoresin of conifers) shall be used. It shall have no grease or other residue when allowed to evaporate. It shall conform to IS: 533.

All the above materials shall be of approved manufacture and brought to site in their original packing in sealed condition.

Preparation of surface

Wooden surface: The wood work to be painted shall be dry and free from moisture.

The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Knots, if any shall be covered with preparation of red lead made by grinding red lead in water and mixing with strong glue sized and used hot. Appropriate filler material conforming to IS: 345 with same shade as paint shall be used where specified. The surface treated for knotting shall be dry before paint is applied. After obtaining approval of Engineer-in-charge for wood work, the priming coat shall be applied before the wood work is fixed in position. After the priming coat is applied, the holes and indentation on the surface shall be stopped with glazier's putty or wood putty see 9.33 and 13.37.1 respectively. Stopping shall not be done before the priming coat is applied as the wood will absorb the oil in stopping and the latter is therefore liable to crack.

Iron & Steel Surface: All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during rolling which becomes loose by rusting, shall be removed.

All dust and dirt shall be thoroughly wiped away from the surface.

If the surface is wet, it shall be dried before priming coat is undertaken.

Plastered Surface: The surface shall ordinarily not be painted until it has dried completely. Trial patches of primer shall be laid at intervals and where drying is satisfactory, paint shall then be taken in hand. Before primer is applied, holes and undulations, shall be filled up with plaster of paris and rubbed smooth.

Application: The primer shall be applied with brushes, worked well into the surface spread even and smooth.

Treatment on Steel for Aggressive Environment

A second coat of ready mixed red oxide/ zinc chromate primer may be applied where considered necessary in aggressive environment such as near Industrial Establishment and Coastal regions where the steel members are prone to corrosion. The second coat (which shall be paid for separately) is to be applied after placing the member in position and just before applying paint. The second coat of primer is not necessary in case of painting with synthetic enamel paint as it is applied over an under coat of ordinary paint.

PAINTING WITH READY MIXED PAINT

Ready mixed paints of approved brand and manufacture and of the required shades shall be used. They shall conform in all respects to relevant IS Specifications.

Painting on New Surface: The surface which has not been painted earlier, or the paint had been removed by paint remover, burning, caustic soda etc. shall be considered to be new surface.

Preparation of Surface

(a) **Wood Work:** The surface shall be cleaned and all unevenness removed. Knots if visible, shall be covered with a preparation, of red lead. Holes and indentations on the surface shall be filled in with glazier s putty or wood putty conforming to IS: 419 and rubbed smooth before painting is done. The surface should be thoroughly dry before painting.

(b) **Iron and Steel Work:** The priming coat shall have dried up completely before painting is started. Rust and scaling shall be carefully removed by scraping or by brushing with steel wire brushes. All dust and dirt shall be carefully and thoroughly wiped away.

(c) **Plastered surface:** The priming coat shall have dried up completely before painting is started. All for dirt that has settled on the priming coat shall be thoroughly wiped away before painting is started.

Application: The number of coats to be applied will be as stipulated in the item. The painted surface shall present a uniform appearances and glossy finish, free from streaks blisters etc.

Painting on old surface: The surface which has been painted earlier shall be considered to be old surface

Preparation of surface

(a) **Wood work:** If the old paint is sound and firm Its removal is considered unnecessary, the surface shall be rubbed down with pumice stone after it has been cleaned of all smoke and grease by washing with lime and rinsing with water and drying. All dust and loose paint shall be completely removed. The surface shall then be washed with soap and water.

If the old painted surface is blistered or flaked badly old paint shall be completely removed and such removal shall be paid for separately. Holes and cracks if any shall be stopped with glazier's putty or wood putty conforming to IS: 419. Further the painting itself shall be treated as on new surface and paid for, accordingly.

(b) **Iron and Steel Work:** If the old paint is sound and firm and its removal is considered unnecessary, it shall be rubbed with wire brushes and any loosened paint

taken off. All dust shall then be thoroughly wiped away. The surface shall then be wiped finally with mineral turpentine to remove grease and perspiration of hand marks etc. and then allowed to dry.

If the old painted surface is in bad condition and blistered and flaked, the old paint shall be completely removed and the surface prepared. Such removal shall be paid for separately. The painting including the priming coat shall be treated as on new work and paid for accordingly.

(c) Plastered surface: It shall be as specified for wood work. If before painting any portion of the wall shows signs of dampness, the causes shall be investigated and the damp surface shall be properly treated. Such treatment shall be paid for separately. A thin coat of white lead if so required shall be applied on the wet or patchy portion of the surface before painting is undertaken and this shall be paid extra.

Application: The number of coats to be given shall be as stipulated in the description of the item.

PAINTING READY MIXED PAINT OVER G.S. SHEETS

Ready mixed paint, suitable for painting over G.S. sheets, of approved brand and manufacture and of the required shade shall be used. New or weathered G.S. sheets shall be painted with a priming coat of one coat of red oxide zinc chromate paint. Primer shall be applied before fixing sheets in place.

Preparation of Surface

Painting New Surface: The painting of new G.S. sheets shall not usually be done till the sheets have weathered for about a year. When new sheets are to be painted before they have weathered they shall be treated with a mordant solution prepared by mixing 38 gm of copper acetate in a litre of soft water or 13 gm hydrochloric acid in a solution of 13 gm each of copper chloride, copper acetate in a and ammonium chloride dissolved in a litre soft water. This quantity of solution is sufficient for about 235 sq.m. to 280 sq.m of area and is applied for ensuring proper adhesion of paint. The painting with the mordant solution will be paid for separately.

Before painting on new or weathered G.S. sheets, rust patches shall be completely cleaned with coarse emery paper and brush. All grease marks shall also be removed and the surface washed and dried and rusted surface shall be touched with ready mixed paint of red lead.

Painting Old Surface: If the old paint is firm and sound, it shall be cleaned of grease, smoke etc. The surface shall then be rubbed down with sand paper and dusted. Rusty patches shall be cleaned up and touched with red lead.

If the old paint is blistered and flaked, it shall be completely removed and such removal shall be paid for separately and painting shall be treated as on new work.

Application: The number of coats to be applied shall be as in the description of item. In the case of C.G.S, sheets, the crowns of the corrugations shall be painted first and when these get dried the general coat shall be given to ensure uniform finish over the entire surface without the crowns showing signs of thinning.

The second or additional coats shall be applied when the previous coat has dried.

PAINTING CAST IRON RAIN WATER, SOIL, WASTE AND VENT PIPES AND FITTINGS

The primer shall be prepared on site or shall be of approved brand and manufacture as specified in the item.

Paint shall be anti-corrosive bitumastic paint aluminium paint or other type of paint as specified in the description of the item.

Painting New Surface

Preparation of Surface: The surface shall be prepared for priming coat.

Application: The number of coat painting over the priming coat shall be as stipulated in the description of the item.

Measurements: Measurements will be taken over the finished line of pipe including specials etc. in running metres, correct to a cm.

Pipes of different diameters of bore shall be measured and paid for separately.

Specials and fittings such as holder bat plugs etc. will not be measured separately.

Rate: The rate shall include the cost of materials and labour involved in all the operations described above, including painting of all and fittings.

PAINTING WITH SYNTHETIC ENAMEL PAINT

Synthetic enamel paint (conforming to IS:2932) of approved brand and manufacture and of the required colour shall be used for the top coat and an undercoat of ordinary paint of shade to match the top coat as recommended by the same manufacturer as far the top coat shall be used.

Application: The number of coats including the undercoat shall be as stipulated in the item.

(a) **Under Coat:** One coat of the specified ordinary paint of shade suited to the shade of the top coat, shall be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.

(b) **Top Coat:** Top coats of synthetic enamel paint of desired shade shall be applied after the undercoat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.

Painting on Old Surface

Preparation of Surface: Where the existing paint is firm and sound it shall be cleaned of grease, smoke etc. and rubbed with sand paper to remove all loose particles dusted off. All patches and cracks shall then be treated with stopping and filler prepared with the specified paint. The surface shall again be rubbed and made smooth and uniform.

If the old paint is blistered and flaked it will be necessary to completely remove the same. Such removal shall be paid for separately and the painting shall be treated as on new surface.

Painting: The number of coats as stipulated in the item shall be applied with synthetic enamel paint. Each coat shall be allowed to dry and rubbed down smooth with very fine wet abrasive paper, to get an even glossy surface. If however, the surface is not satisfactory additional coats as required shall be applied to get correct finish.

PAINTING WITH ANTI-CORROSIVE BITUMASTIC PAINT

Ready mixed paint (conforming to IS:158) shall be of approved brand and manufacture. It shall be black, lead free, acid-alkali-heat-water resistant.

The drying time between consecutive coats, however, shall be not less than 3 hours.

11.1.10 MISCELLANEOUS BUILDING WORKS**URINAL PARTITIONS****Reinforced Cement Concrete Partition**

The partition shall be of precast reinforced cement concrete slab, suitably embedded in the wall and the exposed surfaces finished in terrazzo. The size of the slab shall be 105 cm high and 60 cm deep (overall). The thickness of the slab, excluding finishing shall be 32 mm. The cement concrete for slab shall be of mix 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 6 mm nominal size). The slab shall have reinforcement of mild steel bars 6 mm dia at 15 cm centre to centre both ways. The specifications for R.C.C. work shall be as described in Chapter 4.

Fixing :

The partitions shall be fixed in the wall 60 cm apart between the centres of slabs or as specified in the relevant drawings, with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm nominal size) in the vertical recesses cut/left for this purpose. The size of the recess shall be 11.5 cm wide and 11.5 cm deep. The slab shall project 50 cm from the face of the wall unless otherwise specified. The lower edge of the slab shall be kept 45 cm above the standing level unless otherwise specified. The partition slab shall be fixed and set in position true to plumb. The lower edges of all slabs fixed in one wall shall lie in one horizontal plane, similarly the top edges. The front edges shall be in one plane.

Finishing:

All the exposed surfaces of the slab shall be finished with 6 mm thick terrazzo plaster in cement mortar 1 : 2 (1 part of cement and 2 parts of marble chips of 3 mm size and down) over an under coat of 6 mm thick cement plaster in cement 1:3 (1 cement : 3 coarse sand). The finishing of all slabs in one lavatory block shall be done at one time to ensure uniform colour of the finished terrazzo work and uniform size of marble chips.

The specifications in general shall be as under 13.13 except that the thickness of under coat shall be 6 mm instead of 12 mm. The finished thickness of slab shall be 5.6 cm-with a tolerance of ± 3 mm.

Rate:

The rate shall include the cost of labour and, material involved in all the operations described above, including the leaving/cutting of recess in the wall.

Marble Slab Partitions

The partition shall be of marble slab, embedded in the wall. The size of the marble slab shall be 105 cm high and 60 cm deep (overall). The finished thickness shall be 2.5 cm. The specifications for marble work, in general, shall be as in SH. 8, except

that the marble shall be of white Makrana unless otherwise specified. The marble shall be cut into slabs of required thickness and shall be one piece.

Finishing:

The partition of the slab to be embedded in the masonry shall be rough dressed. The dressed slab shall be of one piece. It shall be secured to shelves shall be of the thickness as specified with a tolerance by means of screws to avoid slipping or lateral of ± 1.5 mm. The slab shall be got approved from movement. The partition, when fixed, shall be truly the Engineer-in-Charge before fixing.

Fixing shall be as per standards of practice except that the recess shall be 7.5 cm wide.

Rate: The rate shall include the cost of labour and materials involved in all the operations described above including the leaving /cutting recess in the wall.

CUP BOARD

The work shall be carried out as-per drawing or as directed by the Engineer-in-Charge. The timber shall conform to the specifications and standards.

Frame Work: Frame work shall be made to the sizes and shape as shown in the drawings, or as specified.

Shutters: The quality and the thickness of the shutters shall be as specified or as shown in the relevant drawings. The shutters shall be flush/panelled/glazed or panelled and glazed as specified or as shown in the drawings.

Shelves: The number, size and thickness of the shelves shall be as shown in the relevant drawings or as specified. The planks for shelves shall be of specified timber and planed on all faces and edges. The shelves shall rest on wooden supports, 25 x 25 mm, for their full depth. The wooden supports shall be fixed in the masonry by means of wooden plugs and screws, at suitable intervals. The shelves shall be fixed to the supports with wood screws of suitable size at 10 cm centre to centre. The shelves, when fixed, shall be truly horizontal.

Internal Partitions: Where specified or shown in the drawings, the vertical partition of timber of size and thickness shown shall be provided and shall be of one piece. It shall be secured to shelves by means of screws to avoid slipping or lateral movement. The partition, when fixed, shall be truly vertical.

Hanger-rod: The hanger rod, where specified or shown in the drawing, or as directed by the Engineer-in-Charge, shall be provided at the top of cup board. The clear gap above the rod shall be not less than 8 cm. The rod shall be of single piece. The diameter of wooden rod shall be 25 mm while that of metal shall be 20 mm, unless otherwise specified. The end supports shall consist of brass or C.P. brass bracket of approved quality fixed to the side masonry of the cup board with suitable plugs and screws.

Fittings: These shall be provided and fixed as per specifications and schedule of fittings given in appendices H unless otherwise specified. Where fittings are stipulated to be supplied by the department free of cost, wood screws for fixing the fittings shall be provided by the contractor.

Finishing: All the wood work shall be painted or finished as specified. After fixing the plugs for supports, the plaster should be neatly repaired with cement mortar 1:4 (1

cement: 4 coarse sand). Where wood lining is not specified, the inside plaster portion shall be finished with two coats of oil bound distemper or flat wall paint of approved colour, as specified. When required, the inside of the cub board shall be lined with wooden planks/ply wood of specified quality where shown on the drawings or specified in the description of the item. Specifications for wood lining shall be as suggested in the specifications, except that the lining shall be directly fixed without any battens on the masonry surface by means of plugs and screws spaced at not more than 20 cm apart in both directions. The finishing of the exposed surface of the lining shall be as specified above in this clause.

Measurements: The cup boards shall be measured in numbers.

Rate: Payment will be made at the rate specified in the contract. Separate rates shall be payable for each type of cupboard, depending upon the size, the shelves, finishing and other features.

The rate shall include the cost of all materials and labour involved in all the above operations.

However, the rate does not include any brick work, plastering, R.C.C. work, flooring and holdfasts for frames, which shall be paid for separately under relevant items, if executed.