QUALITY ASSURANCE
For CEMENT PLASTERING

Plastering is a process of applying one or more coats of mortar to a concrete surface, brickwork, stone masonry or lathing. It must be durable such that it resists the penetration of moisture and should be able to weather uniformly. It should also be pleasing in appearance. These properties depend upon materials used, composition of mix, and degree of mechanical bond between the plaster and the backing surface and workmanship.

Surface preparation: The joint shall be raked to a depth of 15 mm for brickwork and 20 mm for stonework. For new work, where subsequantant plastering is to be done, the raking of joints shall be done during the progress of the work, when the mortar is still green. Dust or mortar powder (loose mortar) shall be washed out. The whole surface shall be thoroughly cleaned and brushing and scrapping shall remove efflorescence, if any. The surface thoroughly washed with water, cleaned and kept vet for the day previous and up to the time start the work is started, and shall be kept very damp during the progress of the plastering.

Bonding: Cement mortar has two types of bonds with its backing one being mechanical in which the mortar squeezes into the irregularities and gets interlocked when hardened and other due to the adhesive property of Portland cement on hardening. The degree of bond will therefore depend on the roughness of surface to be treated and the quality of cement and sand used in preparation of mortar.

Concrete surface: All monolithic concrete walls should be roughened by hacking at close intervals with bush hammers or with a chisel and hammer and then washed thoroughly with water to remove all dirt and loose particles. Monolithic concrete can be roughened with a heavy wire brush or a special scouring tool if forms are removed early.

Forms for concrete, that is to receive plaster, should not be given excessive mould oil coating. as it is likely to remain on the concrete, interfering with the bond. Special care must be taken to remove the mould oil coating before plaster is applied. Curing compound if used should also be removed completely before commencing the plasterwork.

Brick and stone masonry: There are excellent bases for direct application of cement plaster. The surface should be hard, rough and clean. The joints should be racked. It may be desirable to roughen with a pick or a similar sharp tool if the surface of stone is too smooth.

Tools for plastering: Following tools are used for plastering, Gauging trowel, floats, floating rule, plumb bob, straight edge, bushes, set square, sprit level, scratcher, plumb rules etc.

Material: Sand cement mortar of specified mix shall be used.

Mortar: Cement mixed with fine aggregate should produce smooth, plastic, cohesive, strong and workable mortar. Cement plaster shall unless other wise specified, to be the following proportion and thicknesses. The mortar of specified mix shall be used.

Situation	Mix	Thickness
Ordinary buildings	1:6	13 mm
Important buildings	1:4	13 mm
Drain, skirting, dados, etc.	1:3	13 mm for drains, 19 mm for skirting and dados
Septic tanks, reservoirs etc.	1:2	19 mm

Cement: At present 33 grade and high grade cement such as 43 grade and 53 grade are being used. These are essentially recommended for use in concrete. It is also used in masonry and plastering work.

Fine aggregate: Sand must be clean, sharp, suitably graded, and free from all deleterious and impure matter. Deleterious materials beyond a certain limit adversely affect the hardening, strength, durability or the appearance of the plaster or causes corrosion of metal lathing or other metal in contact with plaster.

Grading of Sand: Most suitable particle size grading of sand plasterwork for internal and external walls and ceiling is given below:

IS Sieve	% passing
10.0 mm	100
4.75 mm	95-100
2.36 mm	95-100
1.18 mm	90-100
600 micron	80-100
300 micron	20-65
150 micron	00-50

Water: Water used in plasterwork should be of quality suitable for drinking purpose. It should be free from chlorides and organic impurities.

Water proofing compound: Generally, they are not required specially if correct type and quality of other materials of mortar are available. Where it is used, it should disperse uniformly and mixed properly in mortar.

Workability admixtures: Plasticizers can be used in warm or hot weather condition as desired with field requirements.

Scaffolding: It is always advisable to provide double scaffolding for plastering work. It is easier to fix and remove at various heights without damaging the masonry or plaster.

Mixing of ingredients of plaster: It is preferable to mix the ingredients in a mixer. Dry mortar is mixed initially and thereafter water is added to the dry mix to get the required consistency. It is observed that excess mortar is often prepared and not utilised in time. The workers even break for lunch leaving the wet mixed mortar to dry out. Water is again added resulting in lower strength and more shrinkage problem.

The quantity of the mortar made at a time should be such that it can be consumed within 30 minutes. Any mortar that falls to the ground in the process of application, it is thrown away and on no account re used. If excess mortar is prepared it dries up either due to evaporation of water or due to water absorption by sand and / or due to water consumed by cement hydration. Addition of water should be carefully monitored and should be added in such a quantity that it gives the required workability

Application of plaster: The walls shall be prepared as above and rendered with a mortar of cement and fine sand in specified proportions. At suitable intervals, 15 cm x 15 cm mortar squares to full thickness of base coat shall be first laid to serve as a guide to ensure a plane, smooth layer of plaster over the entire surface of the wall.

The mortar shall be dashed against the surface to be plastered with considerable forced, and shall be thoroughly worked into all joints and other surface depressions, to ensure a permanent bond. The plaster surface will be roughened and not beaten.

Ceiling plaster shall be completed before commencement of the wall plastering. Plastering shall be started from the top and worked down, filling all putlog holes in advance of the plastering as the scaffolding is being taken down.

All corners arise, angles and junctions shall be truly vertical or horizontal as the case may be, and shall be carefully finished. Rounding or chamfering corners, arises, junctions, etc., where required, shall be carried out with proper templates to the required sizes.

At the end of the day suspending plastering work shall be left cut clean to line both horizontally and vertically. Horizontal joints in plasterwork shall not occur on parapet tops and copings.

Coats for plastering

Scratch coat: The thickness of this coat should approximately 10 mm to 12.5 mm and must be laid over the full length of the wall or the natural breaking points like doors and windows.

Base coat (In case of thick plaster): The surface of scratch coat should be dampened evenly before base coat is applied. This coat is about 10 mm thick depending upon the overall thickness and then roughened with a wooden float to provide bond for the finishing coat. The second coat must be damp-cured for at least seven days and then allowed to become dry.

Finishing coat: Before this coat is applied, the base cat is dampened evenly. Joints should be avoided and the finishing coat should be applied in one operation with thickness not exceeding 6 mm.

External Plaster: The external plaster is made in richer cement mortar proportion than the internal plaster. It is usually done in two layers. First layer is of 10 to 12.5 mm and final layer is of 6mm thickness. Waterproofing compound may be added in case the plaster is exposed to severe wet conditions. The finish can be of the type specified.

Internal Plaster: The internal plaster is usually done in single layers of 12.5 mm.

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

Plaster finishes: There are four different types of finishes that can be obtained with cement plaster.

Smooth finish: When a smooth finish is desired, the minimum amount of working should be applied to the wetted surface and the wooden float, rather than a steel trowel is to be used.

Roughcast finish: This finish suitable for rural or coastal areas and the sever conditions of exposure. This is a finish, which is splashed on to the surface as a wet mix and left rough. The maximum sizes of sand, crushed stone or gravel vary from 12.5 mm to 6.3 mm.

Pebbledash finish: This is most durable of all finishes and is generally free from defects. This gives a rough texture and is obtained by means of small pebbles or crushed stone, graded from 12.5 mm to 6.3 mm being splashed on to a fresh coat of

mortar and left exposed. This pebbles or stones are some times lightly pressed or tapped in to the mortar.

Textured finishes: Textured finishes are now becoming very popular and may be obtained in a variety of ways in many different designs. Special effects can be obtained by scraping the surface of the rendering with a straight edge hacksaw blade or with the edge of a steel trowel.

Curing: Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for 7 days during which period it shall be suitably protected from all damages at the contractor's expenses by such means as the Engineer may approve. The dates of plaster shall be legibly marked on the various sections of the wall so that curing for the specified period thereafter can be watched.

Defects in plastering

- **Cracks:** Appear on the plastered surface in the form of hair cracks or wider cracks. Its due to old surface is not properly dressed, bad workman ship, and due to expansion and shrinkage in plaster coat during drying.
- **Effloresce**nce: Some time soluble salts are present in plaster making materials or bricks. They appear on the plastered surface in whitish patches and produced ugly appearance. It may remove by brushing and washing the surface several times.
- **Blistering of plastered surface**: Small patches swell out beyond the plastered surface like boils.
- **Falling out of plaster**: Due to excessive thermal variation in plaster, Inadequate bonding between coats of plaster, and due to imperfect adhesion of the plaster to the back ground.
- **Discoloration:** The usual causes of discoloration in plaster are to variation in the cement and water content of mortar from place to place, uneven suction of the backing and un-uniform curing and inadequate mixing of the material resulting in lack of uniformity.

*The contents of this pamphlet are for guidance only and are **not statutory**. It also does not supersede any existing instructions from Railway Board, RDSO and Zonal Railways & the provisions of IRWM, BIS Code and reports on the subject.*

If you have any suggestion & comments on contents of the pamphlet, please write to: ***Director (Civil), CAMTECH, Maharajpur, Gwalior (M.P) – 474 020***

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