



Dear Reader,

Plastering – a finishing procedure carried out before painting of the masonry and concrete surfaces, is of utmost importance. It protects the surfaces from external elements, acts as a damp proof coat, enhances the durability, and provides a level surface for painting.

If plastering procedure is not carried out in a proper manner, then it may not serve the purpose providing the plaster.

*This mailer, **Plastering – Materials and Methods** attempts to provide the reader information on Plastering, specifications, application procedure and some latest ready mix plastering material available in market.*

We hope you find the mailer informative and useful. Happy Reading!!



Issue Highlights

- Plastering & Objectives
- Materials & Specification
- Application procedure
- Plastering Dry Mortars available in market

Plastering

Plastering is a skilled process of providing smooth, even and durable surfaces for different building components such as walls, ceilings, beams, columns etc. with cement mortar. Plastered surfaces not only provide better protection from elements of weather such as rain, humidity, temperature etc., but also provide an ideal base for economical decorative treatment such as painting, white washing etc.

Plastering could be applied on the masonry surfaces either in one, two and three coats. In the 3- coat plaster, the first coat is known as rendering coat, second coat is known as floating coat and the third coat is known as finishing coat. The number of coats depend on the extent of undulations on the surface. The coat formed on the rough surface is called plaster when applied inside of the building and it is called as rendering when applied outside of the building. But the material is same.



Requirements of a Good Plastering Mortar

A good plastering mortar has to fulfil several requirements in both fresh and hardened state.

In **fresh state** the plaster mortar should be workable and cohesive i.e., its consistency and adhesion (also termed as placeability) qualities should be such that can be trowelled with ease and adheres to the surface firmly without much rebound loss when dashed against the surface. The properties of fresh mortar for plaster are significantly influenced by (a) type and properties of cement, (b) size and quality of sand, (c) Ratio of cement to sand and (d) amount of water. Mortars with blended cements (PPC /PCC/ PSC) or gauged mortars (mortars in which hydrated lime is used along with cement) exhibit better plasticity and adhesion characteristics compared



to OPC and are hence better suited for plastering. Another important requirement of mortar for plaster in green state is its ability to retain water known as water retentivity. Water retentivity is the ability of the mortar to retain its moisture when spread as thin layer over absorbent masonry units like bricks or blocks. A mortar required water for workability and to develop bond with masonry units. A typical defect occurring when plaster having less retentivity hardens, is called 'grinning' of plaster. Grinning is a condition of plastered surfaces where mortar joints of masonry blocks are visible through plaster.



In **hardened state** a good plaster should be strong enough to bond with the base / substrate. It should be able to withstand weathering to which it is likely to be exposed to in addition to the intended impact and abrasion experienced during its service life. It should not shrink and crack while providing an even and plane surface for paint and other surface treatments. The quality of hardened plaster depends not only on the materials used but also the workmanship and curing regime it has undergone.

Plastering Materials

Cement: The commonly used cements for plastering are blended cements like Portland Pozzolana Cement (PPC) or Portland Slag Cement (PSC) and Ordinary Portland Cement (OPC). Composite Cements which are recently introduced in market are environment friendly like PPC/PSC and very good for plastering

Sand: Sand used for Plastering should be clean, well graded, and free from all deleterious and organic impurities. Clay, Silt and dust shall not be more than 5%. For smooth finishes sand less than 2.36mm is preferred whereas for rough and textured finishes it shall be between 4.75mm and 2.36mm. These grain sizes can be obtained by sieving the sand.

Scarcity of natural river sand has popularised the use of Crushed Stone Sand-CSS (also colloquially called as Manufactured Sand). It is observed that CSS exhibits better Water Retentivity resulting in better strength and bond development.

Grading of Sand: The particle size grading of sand for plasterwork for internal and external walls as well as ceiling shall be as given below,. As per IS 1542:1992(Reaffirmed 2003) the grading shall be as 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	00-15

(*analysed by the method described in IS 2386 (Part 1) : 1963-Reaffirmed 2002)

Water: Water for mixing cement mortar shall not be salty or brackish, shall be clean, clear and free from objectionable quantities of silt, traces of oil etc. which would weaken the mortar or create efflorescence. Potable quality water is used for making mortar for plaster. It should have a pH between 6 and 8. Once plaster has hardened, it shall be cured with water of similar quality as used for mixing mortar.

Preparation of Mortar for Plaster

Cement plaster is made by mixing specified proportions of Cement, Sand and Water. Usually, the following cement: sand proportions are recommended for different surfaces:

- External/Outside plaster – 1:4
- Internal/Inside plaster – 1:5 or 1:6
- Ceiling/Roof plaster – 1:3
- Concrete Surfaces – 1:3 or 1:4

Mixing is usually done by manual method and it shall be done on a clean, dry, water tight platform. Initially, cement and sand of required proportions are mixed thoroughly to obtain dry mortar mix of uniform colour. Water is then added to the dry mix and thoroughly mixed till it gets the required consistency. The mortar shall be mixed back and forth for 10 to 15 times after adding water. The quantity of the mortar made at a time should be such that it can be consumed within 30 to 45 minutes. i.e. it shall preferably be used within 30 minutes after the addition of water. Sometimes it is observed that excess mortar is often prepared and not utilised on time, leaving the wet mixed mortar to dry out. When water is again added to this mix, it will result in lower strength and shrinkage.

Any mortar or plaster which is partially set shall be rejected and removed from the spot. Any mortar that falls to the ground in the process of application, it is discarded and on no account re-used.

Procedure for Plastering

Surface preparation:

For the durability of the plaster, it is important to obtain a satisfactory bond between the substrate and the first plaster coat as well as between subsequent coats.

For masonry surfaces, the joints should be raked to a depth of 12 mm for providing key to the plaster before onset of plastering operation. Dust and loose particles on masonry shall be removed either by water jet or by brushing followed by water jet. If the substrate contains soluble salts, particularly sulphates, the application of the plaster shall be done only after the efflorescence of the salts is complete (which is scrubbed off). In case of Ceiling, any laitance on the underside of the slab as well as some masking tape that might be sticking should be removed by wire brush. Concrete surface may also often be contaminated by oils in the moulds. This shall be removed by brushing and washing. Any trace of algae or moss formation shall be removed.



In case of smooth concrete surfaces, the surface is roughened by wire brushing, or by hacking or bush-hammering. To obtain a rough surface, mortar made of 1 part of cement: 1.5 to 3 parts of coarse sand by volume is prepared to a wet consistency and applied. This is called as "spatter dash" treatment. On smooth concrete surfaces, after hacking, a thin coat of cement slurry containing 1 part of cement to 1 part of fine sand can be applied as an alternative.

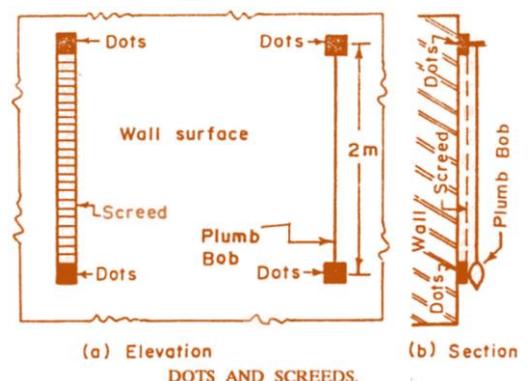


The prepared substrate shall be even in order to avoid variations in the thickness of the plaster. Any unevenness must be levelled before the plaster is applied. Local projections in brickwork can lead to differential thickness over the surface. For two-coat plaster, a local projection shall not exceed 6mm and local depression 12mm. If the projection on the wall surface is more than 6mm, then knock it off, so as to obtain a uniform surface of wall. This will reduce the consumption of plaster. The surface to be plastered shall be moistened with water and shall be kept wet at least for 6 hours. This will prevent absorption of water from the mortar by the backing/substrate.

Application of Plaster

Before the application process, in order to get uniform thickness of plastering throughout the wall surface, dots are formed on the wall. A dot means patch of plaster of size 15 cm X 15 cm and having thickness of about 10 mm or proposed thickness of base coat.

Dots are fixed on the wall first horizontally and then vertically at about 2 meters apart, covering the entire wall surface. The verticality of surface of dots is checked by means of plumb-bob as shown. After fixing



dots, the vertical strips of plaster, known as screeds, are formed in between the dots. These screeds serve as the guide for maintaining even thickness of plaster being applied.

Cement plaster is usually applied in one or two coats. The thickness of coat can be 12mm, 15mm or 20mm, depending upon the site conditions like undulations to be covered. When the thickness of plaster is more than 15mm, it shall be done in two layers.

It will sometimes be necessary to apply plaster in three coats. In general, these are called as Undercoats and Finishing coats; Undercoats are sub-classified into 2 coats - first coat is called as Rendering/Scratch coat, second coat is called as Floating coat / Base coat. Final or last coat is called as Finishing coat.

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 gets dismantled.

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

At the end of the day completed plastering work shall cut clean to line both horizontally and vertically. Horizontal joints in plasterwork are not allowed on parapet tops and copings as it may lead to water seepage.

Rendering /Base/ Scratch coat shall be 10 to 15 mm thick and carried to the full length of the wall or to natural breaking points like doors or windows. Before the rendering coat hardens, it shall be roughened to provide mechanical key for the second coat. The surface shall be left rough and furrowed 2 mm deep with a scratching tool diagonally both ways, to form key for the subsequent coat. The surface shall be kept wet till the finishing coat is applied. The rendering coat shall be trowelled hard and tight, forcing it into surface depressions to obtain a permanent bond.



On smooth concrete walls, the rendering coat shall be dashed on to ensure adequate bond. The dashing of the rendering coat shall be done using a strong whipping motion at right angles to the face of the wall, or it may be applied with a plaster-machine or cement-gun. In either case, the plaster shall be projected on to the surface with considerable force.

Floating or Second Coat - Before starting to apply the second coat, the surface of the rendering coat shall be damped evenly. The second coat shall be approximately 3 to 8 mm thick. It shall be brought to a true, even surface and then roughened as explained in base coat to provide bond for the finishing coat.

Each coat shall be kept damp till subsequent coat is applied. It shall be carried out preferably within 48 hours of the previous coat.

Finishing coat - Before this coat is applied, the undercoat should be dampened evenly and any joints should be avoided. Finishing coat shall be applied with wooden floats to a true even surface and using a steel trowel, give it a finishing touch. It should be applied starting from top towards bottom and completed in one operation to eliminate joining marks. Ratio of cement and sand for finishing coat plaster varies from 1:4 to 1:6. The thickness of finishing coat may vary between 2 to 3 mm. This shall have to be applied within 48 hours of the previous coat.

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.

Internal Plaster is usually done in single layers of 12.5 mm.

Plaster finishes

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

Smooth finish: To obtain smooth cast finish, mortar used should be in the ratio 1: 4 (cement: sand). Fine Sand should be used to prepare the mortar. For spreading the mortar, skimming float or wood float is best suitable tool so that smooth and levelled surface is obtained.



Rough cast finish: Mortar used to get rough cast finish consists of coarse aggregate (CA)/gravel along with cement and sand. Their ratio cement : sand : coarse aggregate is about 1: 1.5: 3. The size of coarse aggregate used is 3mm to 12mm. Large quantity of mortar is taken by trowel and it is dashed into the surface and levelled using wooden float. Usually this type of plaster finish is preferred for external renderings. This finish is durable as well as decorative.

Sand Faced Plaster finish: To get sand faced finish two coats of plastering is required. For first coat, 12mm thick layer of cement sand mortar in 1: 4 ratio is preferred. The first coat should be provided with zigzag lines. And then it is allowed for curing for 7days. After that 8mm thick layer of second coat with cement and sand in 1:1 ratio is applied. Surface is levelled using sponge. Some sand is taken and screened to obtain uniform grain size. The screened sand is applied on the second coat using skimming float or wooden float. Thus, sand faced finish with uniform grain size of sand is obtained.



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 sometimes lightly pressed or tapped into the mortar using a wooden float. Pebble dash finish requires mortar layer of 12mm thickness with cement and sand in the ratio of 1:3. After hardening they provide aesthetic appearance to the structure.

Textured finish: 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 or using other suitable tools.



Curing of plastered surfaces



Curing shall be started immediately after stiffening / hardening of the plaster surface. The plaster shall be kept wet for a minimum of 10 days during which period it shall be suitably protected from any damages. Curing is generally carried out by regular spraying of water without allowing the surface to dry at any point of time. Improper or irregular curing may lead to crack formation in plaster work.

Special Cements & Dry Mix Mortars:

With the advancements in technology, premixed dry mix mortar are available in the Market. UltraTech Cement being the pioneer in special products, technology and services, has brought to the customers many new building products and special cements.

UltraTech Readiplast is a ready mix cement plaster/ render with high quality polymer additives, special binders, well graded sand and fillers. It can be efficiently applied on brick & block masonry for both external and internal plastering works. It requires water of 17%–19% of weight of powder. Application procedure is similar to that of conventional plasters, but the major advantage of this product are improved coverage, least rebound. It requires water curing 2 to 3 times a day for 3 days only. This enables faster construction with crack resistant, durable surfaces.



UltraTech Super Stucco is a ready mix cement-based, polymer enriched, and high performance surface finishing material for thin bed /coat applications. i.e., it can be used for thin coat plastering on inner and outer walls which have negligible undulations. It requires 25% - 30% of water by weight of powder. It should be mixed using mechanical stirrer for 2-3 minutes to ensure homogenous mix free of lumps. It must be applied with perfect level putty blades and levelling edges. It can be used effectively on cement/fly-ash bricks/blocks, AAC blocks as well as smooth concrete surfaces. Maximum thickness of plastering is in the range of 3-6 mm. Highly recommended over Mivan finishes, smooth concrete areas without requirement of any hacking of the surfaces.

Conclusion

Plaster is an essential building material used for the protective and/or decorative coating of walls and ceilings. Using good quality material, following appropriate way of applying plaster, and curing the plastered surfaces is of utmost importance to achieve weather-proof, durable and aesthetically appealing finishes to the building.

References:

- IS 1542 : 1993 (Reaffirmed 2003) – Indian Standard Sand for Plaster - Specifications
- IS 1661 : 1972 – Code of Practice for Application of Cement and Cement Lime Plaster Finishes
- Quality Assurance for Cement Plastering - <https://rdso.indianrailways.gov.in/>
- www.constructor.org
- UltraTech TDS Readiplast
- UltraTech TDS Super Stucco

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