CEM BUILD

BUILDING

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CEM BRICK holds the CMA (Concrete Manufacturers Association) mark. We, as a company have established a brand in both private and public civil sectors. We remain customer focused enthusiastic and motivated. We strive to lead by example and we as company always make concrete promises.

BRICK LAYING

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Building Installation Guidelines

The aim of this insert is to provide information needed for mortar for use in bricklaying, this information is published with consent from PPC Cement and is intended for small building contractors, as well as DIY homebuilders.

Mortar binds bricks and blocks together to give strength and stability to a wall. Freshly mixed mortar must be soft and flexible, so that it spreads easily and makes good contact, without becoming too strong in its hardened state. The workability of the mortar can be assessed and improved in the following manner:

a) Place a small quantity of the mix (at plastering consistency) on a non-absorbent surface and form a flattened heap about 100 mm high and 200 mm in diameter. Place a plasterer's trowel on top of the heap and push the trowel downwards. A mix with adequate workability is one which permits the mix to squeeze out from under the trowel, and allows the trowel to be pushed to within a few millimetre of the underlying surface. An unworkable mix will "lock up" once the trowel has moved a few millimetre and prevents further downward movement of the trowel.

Too strong mortar may crack and is wasteful, as it is more expensive.

Mortar mixes must comply with the prescribed mix proportions provided by SANS 2001-CM1, using sand that complied with SANS 1090.

Selecting materials

The properties of mortar in both the fresh and hardened states depend to a large extent on the properties of the materials used. This section gives guidance on selecting materials.

Cement

All PPC Cement products comply with SANS 50197-1. For instructions on making high quality mortar mixes, refer to PPC Cement product brochure for the particular PPC Cement product being used.

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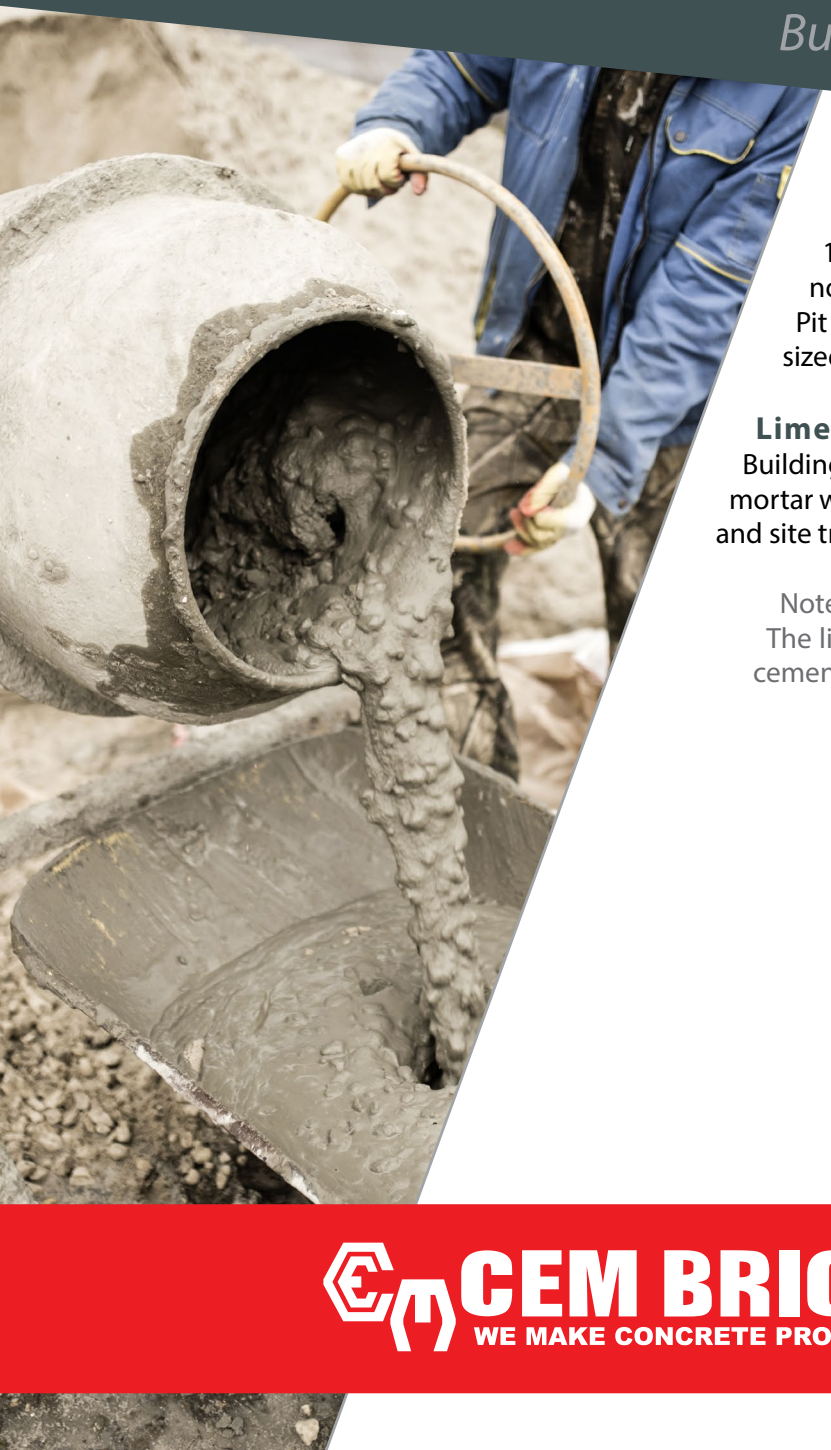


Sand

Sand is by far the major constituent of a mortar mix and has a significant influence on its performance and material cost. The sand must comply with the grading requirements for mortars shown in SANS 1090. The sand should be clean (grass, leaves, roots and other foreign matter are harmful) and it should not contain too much clay. It should consist of hard particles ranging in size from dust up to about 2 mm. Pit sands generally have these characteristics. Dune and beach sands are often too uniform in size (single sized) to give good results.

Lime

Building lime should be used if the sand lacks fine material or is single sized, as such sands tend to produce mortar with poor workability. The amount added to the mix may be as much as the amount of cement by volume and site trials is advisable.

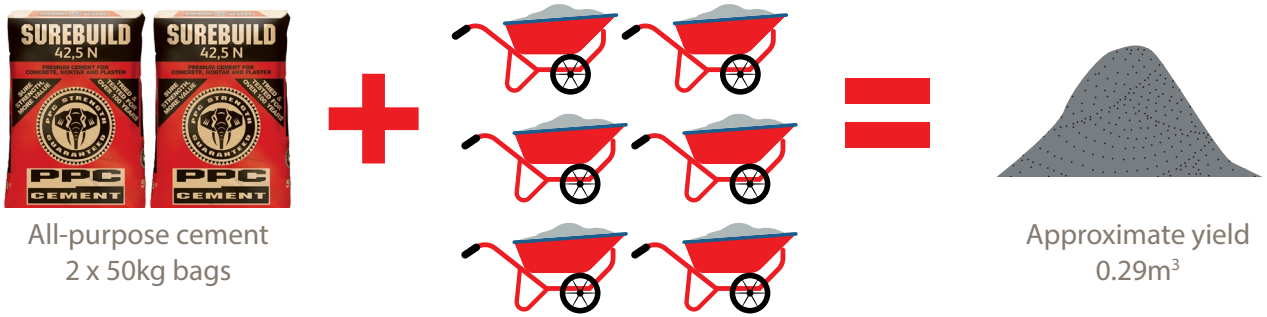
Note:
The limes used in South Africa do not have cementing properties. They can therefore not be used to replace cement but are used in addition to cement.

Mix proportions

The proportion of each material in the mix should suit the type of work being done. Strength classes and corresponding mix proportions are given in PPC Cement product brochure for the particular product being used. In general terms there are three classes of mortar:

Class I

Highly stressed masonry:
Incorporating high strength structural units, as used in multi-storey load bearing buildings and walls exposed to severe dampness.



All-purpose cement
2 x 50kg bags

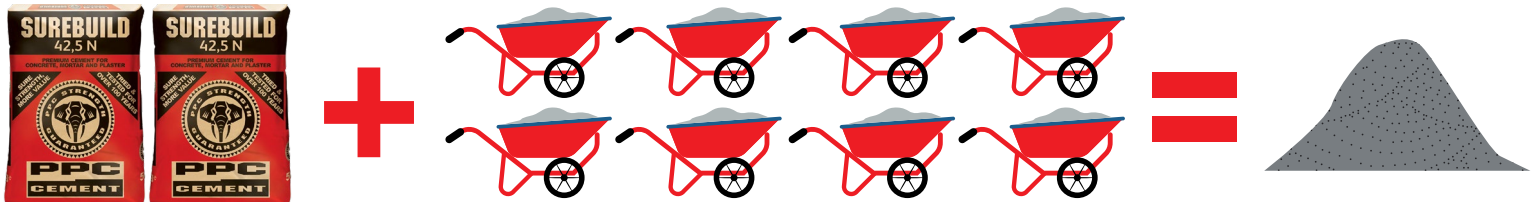
Building Sand
6 wheelbarrows

Approximate yield
0.29m³

Class II

Mix A:
Exterior/Exposed to dampness.

Batching by wheelbarrow



All-purpose cement
2 x 50kg bags

Building Sand
8 wheelbarrows

Approximate yield
0.39m³

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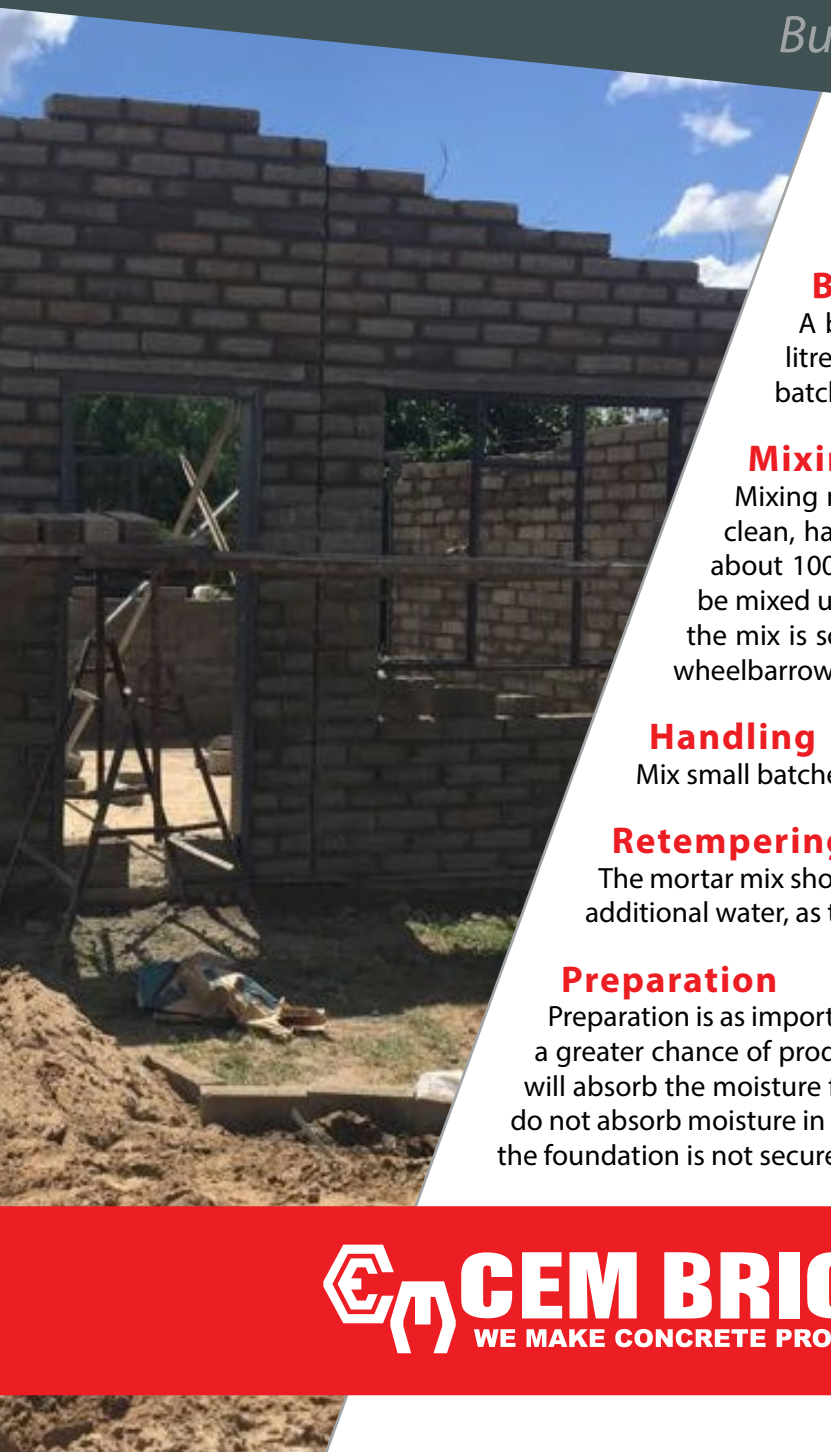

Mortar must not be used after it has started to set, which usually occurs about two hours after it has been mixed. To reduce wastage, it is better to mix a number of small batches as they are required, rather than mixing one large batch.

Batching the materials

A builder's wheelbarrow is a convenient measure for large batches. Its capacity is 65 litres. Steel drums of 20 or 25 litre capacity and buckets are useful for small batches. To batch, shovel material into the measure and then strike off level with the brim.

Mixing

Mixing may be done by machine or by hand. Machine mixing is preferable. Hand mixing should be done on a clean, hard, non-absorbent surface, such as a smooth concrete floor or a steel sheet. First spread out the sand about 100 mm thick. Spread the cement uniformly over the sand. Sand and cement - and lime, if used - should be mixed until the colour of the mix is uniform. Then add water in small quantities, mixing after each addition until the mix is soft and flexible. The mix should stick to the trowel but spread easily. Small batches may be mixed in a wheelbarrow, provided that the volume of the batch is no more than half the capacity of the wheelbarrow.

Handling

Mix small batches that can be used before loss of workability, never re-temper by adding additional water

Retempering

The mortar mix should be used within a maximum of two hours of being mixed and must never be retempered by mixing in additional water, as this reduces the resultant strength of the mix.

Preparation

Preparation is as important as the mixing and use of mortar. When your work area and materials are properly prepared, you have a greater chance of producing a good job. Clay bricks should be wetted down before you start the job. If they are too dry, they will absorb the moisture from the mortar, making it less effective. Cement bricks and blocks should not be wetted down, as they do not absorb moisture in the same way as clay bricks. Make sure that you are laying your bricks on a strong concrete foundation. If the foundation is not secure, your wall will crack as it settles over time.

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Tools required

Make sure you have all the tools you need to lay bricks before you start. Make sure all your tools are clean and in good working order. You will need:

- A wheelbarrow
- A bucket
- A spade
- A strong grade of builders line
- A pointed bricklaying trowel
- A straightedge (wood or steel)
- A spirit level (900mm long)
- A set of pointing tools
- A measuring tape
- A Mallet
- Profiles and supports
- Gauge rod
- Square
- Pencil and chalk
- Chalk line

Every effort has been made to ensure accuracy of data and information presented and no liability is accepted for errors and omissions Acknowledgment: "How to make concrete bricks and blocks" published by the Cement & Concrete Institute.

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Placing the mortar on bricks or blocks

1. Bricks or blocks should be laid on a prepared solid concrete slab or foundation. Refer to the PPC guide to making concrete for further information on concrete slabs and foundations.
2. Start by laying your first course along the concrete slab or foundation.
3. Lay one brick at either end, level them and secure the builders line so that it runs precisely along the back top edge of these two bricks.
4. This will give you a guide for placing the rest of the bricks in this bottom row.
5. Load your trowel with mortar and place enough onto the foundation to lay two or three bricks at a time. Drag your trowel along the length of the mortar to make a deep hollow along the middle of the mortar.
6. Prior to placing each brick, 'butter' the end of each new brick with mortar and place it firmly up against the previous brick.
7. Place your bricks onto the top of the mortar and tap into place until the top edge of each brick lines up exactly with the builders line.
8. Scrape off any mortar that has been squeezed out from between the bricks as you work.
9. Once you have laid the first course, begin building up the corners. Stretch the builders line tightly between the end bricks of each course at the two corners at either end of the wall. For larger scale brickwork, profiles are used for setting up the corners and supporting the builders line. The back top edge of each brick laid should line up exactly with the builders line.
10. As you fill in the brickwork between the corners, move the builders line up one row of bricks (a course) at a time.
11. Use the spirit level often to check that the row of bricks is level and that the corners are exactly vertical and not leaning in or out.
12. Do not use too thick a layer of mortar between bricks or blocks; this is wasteful and may lead to cracking. Ideally the thickness of the layer should be between 10 and 15mm. To ensure that the wall is weatherproof, point the joints if the wall is not to be plastered.
13. With block work, bed only the inner and outer shells in mortar. This reduces water penetration since the water can not travel along the mortar to the inner wall.
14. When building with weak building units, use a weak mortar.

Quantities of materials

See mix proportions for quantities of cement and sand required per 50kg bag of cement. Proportions by wheelbarrow of cement (2bags) as per the back of the bags. Quantities required for block laying depend on block size and are contained in the product brochures.

Conclusion

Provided sufficient attention is paid to the selection of materials, mix proportions, placing the mortar and bricks or blocks, the results should be strong, durable, good looking and last a lifetime. Ensure sufficient curing is done.

For further assistance, please contact our friendly Customer Service Department.

PLASTERING

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Plastering Guidelines

Sand-cement plaster is used extensively in building work as a decorative or protective coating for concrete, masonry walls and concrete ceilings. The aim of this publication is to provide the information needed for successful plastering. It is intended for small building contractors and DIY or BIY homebuilders. Aspects dealt with include the selection of materials, surface preparation and correct plaster application.

Requirements

Plaster has important requirements in the fresh and hardened states. In the fresh state, plaster must be workable and cohesive. In the hardened state, plaster must be:

- Strong enough to hold paint and withstand local impact and abrasion
- Free of unsightly cracking
- Well bonded to the substate
- Have an acceptable surface texture
- Have acceptable surface accuracy (with reference to a plane or curved surface)

The properties of hardened plaster depend on the properties of the fresh plaster and the substrate and on workmanship.

Selecting materials

The properties of plaster in both fresh and hardened states depend to a large extent on the properties of the materials used. This section gives guidance on selecting materials.

Cement

All PPC Cement's products comply with SANS 50197-1. For instructions on making high quality plaster mixes, refer to PPC Cement's product brochure for the particular PPC product being used.

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Sand

Sand is by far the major constituent of a plaster mix and has a significant influence on its performance and material cost. In South Africa, natural sands, i.e. pit, river and dune sands, are almost invariably used for plaster mixes. An essential requirement is that sand should be free of organic matter such as leaves, roots, twigs and humus. The sand must comply with SANS 1090.

Note: "Karoo" sands, which consist mainly of disc shaped dark-coloured particles, should not be used for plastering. This is because they exhibit excessive swelling and shrinkage with increasing and decreasing moisture content. Crusher sands are also not generally suitable, due to their angular particle shape. However, crusher sands are used successfully in rich mixes for special applications such as squash court plastering.

Important properties of sands are:

- Clay content
- Maximum particle size
- Grading
- Particle shape

Hydrated builder's lime can be added to the plaster mix using a sand which is lacking in fine particles. A sand with excessive fine particles may be improved by washing or by blending with a suitable coarser sand.

Note: Some coarser material may be acceptable, or desirable, for textured decorative work such as scratch plaster. Oversized particles and lumps should be removed by sieving.

Clay content

Only a small proportion of clay is acceptable in plaster sand. Sands with high clay content may generally be recognised as follows. Plaster mixes made with such sands:

- Are very 'fatty' and tend to cling to a trowel
- Have a high water requirement

2.5 kg cement | 12.5 kg sand | WATER

The following simple test can be done.

Water demand test

Sand will determine the quality of the plaster. Sands that contain too much clay will cause plaster to crack. To assess whether sand is suitable the following simple test may be applied. If more than 3 litres of water is required to make a workable mix, then the sand is unlikely to be suitable for plaster work. Specialist advice should be sought if there is any doubt about the content and type of clay in a sand.

Assessing the workability of the mix

Assess the workability of the mix (at plastering consistency) by forming a flattened heap about 100 mm high and 200 mm in diameter on a non-absorbent surface. Place a plasterer's trowel face down on top of the heap and try to push the trowel down. A workable plaster will squeeze out from under the trowel and it will be possible to push the trowel to within a few millimeters of the underlying surface. An unworkable mix will"lock up" once the trowel has moved a few millimeters and prevent further downward movement of the trowel.

The mix will also bleed, resulting in water separating from the mix quickly. If the mix appears to be workable, pick up some of the plaster on a trowel then tilt the trowel. The plaster should slide off easily. If it clings to the trowel the mix is too "fatty", an indication of excessive clay content in the sand.

Improving workability

Hydrated builder's lime is effective in improving workability. The amount added to the mix may be as much as the amount of cement by volume.

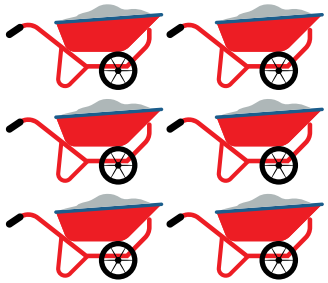
Note: The limes used in South Africa do not have cementing properties. They cannot therefore be used to replace cement but are used in addition to cement.

Types of mixes

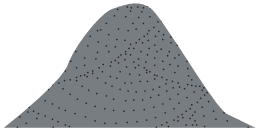
Depending on the exposure conditions of the plastered surface, different types of plaster mixes are recommended.

General Purpose plaster mix:

All-purpose cement
2 x 50kg bags



Building Sand
6 wheelbarrows



Approximate yield
0.3m³

Batching by wheelbarrow Area of plaster coverage (m²)

THICKNESS OF PLASTER	COVERAGE
10mm	±24m²
15mm	±16m²
20mm	±12m²

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Surface properties required for successful plastering

The surface should be rough, absorbent to a limited extent, strong and clean; that is - free of dust, oil or paint that could impair the bond between plaster and surface. Roughness improves adhesion by providing a positive "key" for plaster to grip onto. Absorption removes the water film between surface and plaster that would tend to weaken adhesion. Excessive absorption will, however, dry out the plaster. The strength of the surface material should be greater than, or equal to, that of the hardened plaster.

Preparation of various types of surfaces

The texture of surfaces to be plastered should be sufficiently rough to provide an adequate key for the plaster to adhere to. For smooth surfaces a spatterdash coat should be applied to provide a sufficiently textured surface for the plaster to adhere to.

Spatterdash

Spatterdash is a mixture of one part of cement to one and a half parts of coarse sand with enough water for a sluggishly pourable consistency. The mixture is thrown forcibly on to the wall, using a scoop or a brush with long, stiff bristles. The Spatterdash should cover the substrate surface completely and form a rough texture with nodules about 5 mm high. Spatterdash should be kept moist for at least three days. It should be tested for adhesion and strength by probing with a screwdriver or knife before plaster is applied to it.

Smooth concrete

Apply a Spatterdash coat to smooth concrete after ensuring that the surface is clean.

Concrete masonry

If plaster is applied in a single coat, thickness should be 10–15 mm. A single coat should not be thicker than 15 mm.

Applying the plaster

Plastering should be protected from the sun and drying winds. The plaster should be used up within two hours of being mixed and never be retempered by mixing in additional water. Ensure that plaster is not continuous across the line of a dampproof course as this will allow moisture to travel above the level of the dampproof course. Plaster should be cut through to the applied surface where different surface materials meet, e.g. masonry and concrete.

The general procedure for applying plaster is as follows:

For accurate work, apply screed strips before the wall is plastered. These are narrow strips of plaster along the perimeter of the wall, or at suitable intervals on the wall that act as guides for the striker board. Using a rectangular plasterer's trowel, push plaster onto the wall or ceiling using heavy pressure to compact the plaster and ensure full contact with the substrate.

The plaster should be slightly proud of the intended surface. Once the plaster starts to stiffen, it should be struck off to a plane (or curved) surface using a light striker board. Material removed in this way should be discarded.

If plaster is to be applied in more than one coat, the undercoat(s) should be scored with roughly parallel lines about 20 mm apart and 5 mm deep. The purpose of scoring is twofold: to provide a key for the next coat and to distribute cracking so that it is less noticeable. For the final coat, use a wood float to remove ridges made by the striker board. At the same time fill in any depressions and float flush with the surrounding plaster. If a very smooth texture is required, a steel trowel may be used on the surface, however such a surface is generally not recommended because it tends to craze and show up imperfections. Various decorative finishes are also possible. Techniques include brushing, flicking plaster onto the surface and lightly floating, etc.

Curing

After the plaster has been applied and finished, it is essential to protect it from the sun and wind by covering it with a plastic sheet and keeping it moist for a minimum of 7 days. Alternatively one can apply a specialised curing compound immediately after the wall has been plastered

Conclusion

Provided that sufficient attention is paid to the selection of materials, mix proportions, preparation of surfaces and the application of the plaster and sufficient curing is done, the results should be serviceable and aesthetically acceptable.

Common Problems

Grinning

Description

Positions of the mortar joints are clearly visible through the plaster.

Cause

Different rates of suction between the mortar and the bricks.

Solution

Apply plaster undercoat or spatterdash coat before plastering.

Crazing

Description

Network of closely spaced, fine cracks

Cause

Over-trowelling a rich mix, or a sand that contains too many fines.

Solution

Use a better plaster sand. Do not over-trowel.

Cracking

Description

Larger cracks randomly spaced.

Cause

Movement of the wall or shrinkage of the plaster which is caused by excessive loss of water from the plaster. Using a badly graded sand that lacks fine material. Excessive suction by the bricks or blocks. Exposure to direct sun or wind.

Solution

Do not use very rich mixes (too much cement). Use good quality sands. Limit plaster thickness to a maximum of 15 mm per coat.

Lack of hardness

Description

Plaster that is easily chipped away or is easily scraped off after hardening.

Cause

Plastering in full sun and wind. Not wetting absorbent bricks. Addition of extra water after first mixing. Using a very lean mix (too little cement).

Solution

Avoid causes listed.

Debonding

Description

Plaster not staying on the wall after hardening.

Cause

Dust on the wall when plastering. Over-rich mixes. Very thick layers of plaster (>15 mm).

Solution

Prepare surface properly before plastering. Limit plaster thickness to a maximum of 15 mm. Do not use very rich mixes.

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