

## CHAPTER 2

## MORTARS

## SPECIFICATION NO. 2.1—Mortars (General)

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| <p>1. The ingredients for mortars shall be mixed in the specified proportions by volume. In very important works, batching may however, be done by weight, if so directed by the engineer-in-charge. A table of recommended mortar mixes for common masonry for finishing items is given in appendix No. 1 for guidance.</p>   | <p><b>Proportions.</b></p> |
| <p>2. Materials shall be as specified hereafter for each type of</p>   | <p><b>Materials.</b></p>   |
| <p>3. Mixing shall be carried out in the required proportions in a manner indicated for each type of mortar. Hand-mixing shall be done on clean water-tight platforms, which shall have raised sides to prevent materials flowing out during mixing. The minimum necessary quantity of water shall be added to ensure that the mixed mortar can be used without the risk of joints remaining unfilled. At the same time, a mortar shall be firm enough not to run out and shall be capable of being easily spread.</p> | <p><b>Mixing.</b></p>      |
| <p>4. Mortar shall be used as fresh as possible and in any case within the limiting period specified for each type of mortar.</p>  | <p><b>Freshness.</b></p>   |
| <p>5. After the close of each day's work, the mixing trough and pans shall be thoroughly washed and cleaned.</p>   | <p><b>Cleaning.</b></p>    |

## SPECIFICATION NO. 2.2—Cement-Sand Mortar

## Proportions.

1. For all important works, proportions of ingredients in cement mortar and water cement ratio shall be specified in the design. The batching shall be done by weight. For all other works, batching may be done in specified proportions by volume.

## Sand.

2. Sand shall be as per specification No. 3.11.

## Mixing.

3. (i) **Hand-mixing.**—Portland Cement and sand shall be spread on a clean dry platform in layers one over the other in the proportions specified, and mixed dry three times over. The sand used should be perfectly dry.

Water should be added to the dry mix, only when the mortar is required for use, and then only in sufficient quantity to make the materials moist and not profuse enough to draw the cement. When water cement ratio is specified, the quantity of water shall be such that this ratio is never exceeded.

(ii) **Mechanical mixing.**—Where large quantities of mortar are required at a fast rate, mechanical batching and mixing shall be adopted, if found economical and feasible. Special specifications for mechanical mixing shall be issued for each job depending upon the designed mix and upon the size and working of batching and mixing machines.

## Freshness.

4. All cement mortar to which water has been added shall be finally used within 30 minutes of the addition of water, any mortar that is not used within this time limit, shall be discarded.

SPECIFICATION NO.—2.3 Lime-Cement-Sand Mortar

1. Lime, cement and sand shall be mixed in the specified proportions by volume. Lime and sand shall be measured in boxes of suitable size. The volume of lime putty shall be taken as equal to the volume of dry slaked lime.

Proportions.

2. Lime of class 'B' (semi-hydraulic in hydrated or quick lime form) and class 'C' (non-hydraulic in hydrated or quick lime form) specified in specification No. 3-8 shall be used, as directed by the Executive Engineer. Before mixing with cement and sand, lime shall be made into putty as described below.

Lime.

When hydrated lime is used, it shall be mixed thoroughly with water by adding it to water in suitable container. It shall then be stirred to a thick consistency. This shall be left undisturbed for not less than 36 hours. Extra water which separates out on top shall then be drained out. The putty formed shall be protected from drying out.

When quick lime is used, it shall be converted into lime putty by tank-slaking process, as laid down in specification No. 3.8 on lime.

3. Sand shall be as per specification No. 3.11.

Sand.

4. Cement and sand in the required proportion shall be mixed dry in a mechanical mixer and lime putty dissolved in water be passed into the mixer and mixed until a well-mixed mortar of uniform appearance is obtained. Quantity of water added to lime putty should be slightly less than the required quantity to ensure that no lime water will be left over. Final adjustment of water to obtain a mortar of required consistency may be made by adding clean water afterwards.

Mixing.

For small works, however, hand-mixing may be allowed by the engineer-in-charge. Cement and sand shall be mixed dry and then lime putty added. It is important that the hand-mixing is thorough and complete.

5. The mortar shall be mixed only in such quantities which can be readily used. Mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within 30 minutes after the lime putty is added to the dry mixture of cement and sand.

Freshness.

### SPECIFICATION NO. 2.4—Lime-Surkhi Mortar

**Proportions.** 1. Unless otherwise specified, lime-surkhi mortar shall consist of a mixture of one part by volume of slaked lime or lime putty and two parts by volume of surkhi.

**Lime.** 2. Any one of class 'A' (eminently hydraulic) or class 'B' (semi-hydraulic) or class 'C' (non-hydraulic or fat) lime specified in specification No. 3.8 shall be used in hydrated or quick lime form as directed by the Executive Engineer.

When lime in hydrated form is used, it shall be mixed thoroughly with water by adding it to water in a suitable container. It shall then be stirred to a thick consistency. It shall be left undisturbed for not less than 36 hours. Extra water which separates out on top shall then be siphoned out. The putty formed shall be protected from drying out.

When lime in quick lime form is used, it shall be properly platform-slaked as laid down in specification No. 3.8.

**Surkhi Mixing.** 3. Surkhi shall be as per specification No. 3.9.

4. The lime and surkhi shall be measured in boxes and shall be mixed on a brick or wooden platform or in a mixing trough. If troughs are used, they shall be capable of being washed and drained. The mixing platform shall not be used for stacking materials.

**Grinding.** 5. The ingredients shall be thoroughly mixed, then sprinkled with the necessary quantity of water and ground in a mortar mill continuously for 3 hours or for 180 revolutions of the mill. The mortar shall be continuously raked up during the process, particularly in the angles and corners. The provision of the mill and the cost of grinding is included in the rate.

**Bullock mortar Mill.** 6. If a bullock mortar mill is used, it shall be constructed of first class bricks in lime mortar, the bricks in floor being laid on edge. The outer edge of the mill shall be raised above the track followed by the bullocks.

The track itself shall be sloped outward and shall be kept watered. No dust or mud shall be allowed to fall into the mortar being ground.

**Small works.** 7. For small work, grinding of mortar may not be resorted to, provided the lime is used in the form of putty. The mixing of lime and surkhi shall, however, be very thorough and may be done by mixer or by hand.

**Freshness.** 8. Mortar made from class 'B' or 'C' lime shall be made fresh daily and used as fresh as possible. No mortar left over from the preceding day shall be used on the work. Mortar made from class 'A' lime shall not be kept unused for more than four hours after grinding. The ground mortar in all cases shall be kept damp and should never be allowed to go dry till used.

## SPECIFICATION NO. 2.5—Lime -Sand Mortar

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|---|--------------|
| 1. Unless otherwise specified, lime-sand mortar shall consist of a mixture of one part of lime putty and two parts of sand.   | Proportions. |
| 2. Lime of class 'A' (eminently hydraulic lime in hydrated form) specified in specification No. 3.8 shall be used. Hydrated lime shall be mixed thoroughly with water by adding it to water in a suitable container. It shall then be stirred to a thick consistency. This shall be left undisturbed for not less than 36 hours. Extra water which separates out on top shall then be drained off. The putty formed shall be protected from drying out.   | Lime.        |
| 3. Sand shall be as per specification No. 3.11.   | Sand.        |
| 4. Lime putty and sand shall be measured in boxes and shall be mixed in a machine mixer. In case of small works, however, hand-mixing may be allowed on a brick or wooden platform or in a mixing trough. It is important that the hand-mixing is thorough and complete. If troughs are used they shall be capable of being washed and drained. The mixing platform shall not be used for stacking materials. Water shall then be added by means of a rose, turning the mixture over and over till it is thoroughly mixed and attains the required consistency. | Mixing.      |
| 5. Mortar shall not be kept unused for more than four hours after mixing. The mortar in all cases shall be kept damp and should never be allowed to go dry till used.   | Freshness.   |

## SPECIFICATION NO. 2.6—Mud Mortar

**Ingredients.**

1. Mud mortar shall be prepared from good earth which shall have clay and sand contents as required for brick earth or from clayey cohesive soil crushed into fine powder and freed from stones, grass roots, kankar and other such matter. No soil shall be used which contains efflorescencing salts nor shall soil be taken from a locality where there are white ants.

**Mixing.**

2. The soil shall be mixed with water on a plot of ground specially cleared and set apart for the purpose, and tempered for at least 2 days during which time it shall be worked up at intervals with men's feet and phowras.

**Consistency  
restriction  
to use.**

3. Mud mortar shall not be used for any brickwork or masonry likely to be under water at any time, or subject to heavy showers of direct rain or likely to bear any but direct vertical pressure.

**Pits.**

4. If permitted by the Executive Engineer, soil can be taken from the site of work or within 200 yards (200 metres) thereof. The contractor, shall however, in such a case fill all pits with good earth. Such filling is included in the rate for mud mortar.