

BUILDING DIGEST

CENTRAL BUILDING RESEARCH INSTITUTE INDIA



FOAMED CONCRETE BLOCKS Part II—Laying & Rendering

Introduction

Foamed concrete blocks are manufactured by incorporating minute air bubbles in a slurry consisting of portland cement and pulverized sand and autoclaving the resultant product to obtain high early strength and dimensional stability (Building Digest No. 46). The blocks thus produced are lightweight and possess excellent thermal insulation properties. Further, they can easily be cut, sawn, and chiseled. Such blocks are being manufactured at the Hindustan Housing Factory (Pvt) Ltd., Jangpura, New Delhi and are marketed under the trade name of 'Vayutan'.

Blocks of dimension 50 cm × 25 cm × 10 cm (20 in × 10 in × 4 in) and a unit weight of about 640 kg/cu. meter (40 lbs/cuft) are being produced for non-load bearing partition walls. The walls constructed with these blocks are lightweight and as such are likely to undergo greater dimensional changes than those built with ordinary burnt clay bricks. Therefore, rendering of foamed concrete walls deserved greater attention. The performance of a rendering depends on the nature of the backing, the type of rendering used and its preparation and application. Useful information on these points based on the work done at the Central Building Research Institute and elsewhere is given in this Digest.

Backing

Since dimensional changes in a wall can lead to cracking of rendering, it is important that these should be reduced to the bare minimum. In order to ensure this the following precautions are necessary.

1. Foamed concrete blocks should be protected from moisture and rain and only dry blocks should be used.
2. Erection of partition walls should preferably be delayed until the structure has stabilised under the super-imposed loads; the panel filling may proceed from top-most storey downwards.
3. Partition walls should be separated from the ceiling by a small gap or by a resilient material such as a strip of impregnated fibre board, cork or cellular rubber and a mixture of asphalt (20/30 penetration) and saw dust, chopped hemp or coir etc. A typical joint filler mixture may be composed of 60 percent sand, 30 percent asphalt, 7 percent saw dust, and 3 percent cement.
4. Blocks should be laid in a weak mortar so that

shrinkage cracks occur in mortar joints and not in blocks. For good bond, edges of the blocks should be wetted by sprinkling water and not by immersion.

5. Four inch thick blocks can be used for normal heights of a non-load bearing wall or partition. If the wall length exceeds 4.5 meters (15 ft), adequate permanent supports in the form of brick or concrete pillars should be introduced vertically to divide the wall or partition into panels, for ensuring structural stability. The panel edges should be attached to the permanent supports to ensure adequate lateral rigidity. This can be done by providing anchors of 10 mm (3/8") m.s bars or flats 1/6 cm (1/16") × 2½ cm (1") grouted in the pillars to a length of 7½ cm (3") and to a length of 12.7 cm (5 inches) in every third or fourth course of this panel (fig. 1).

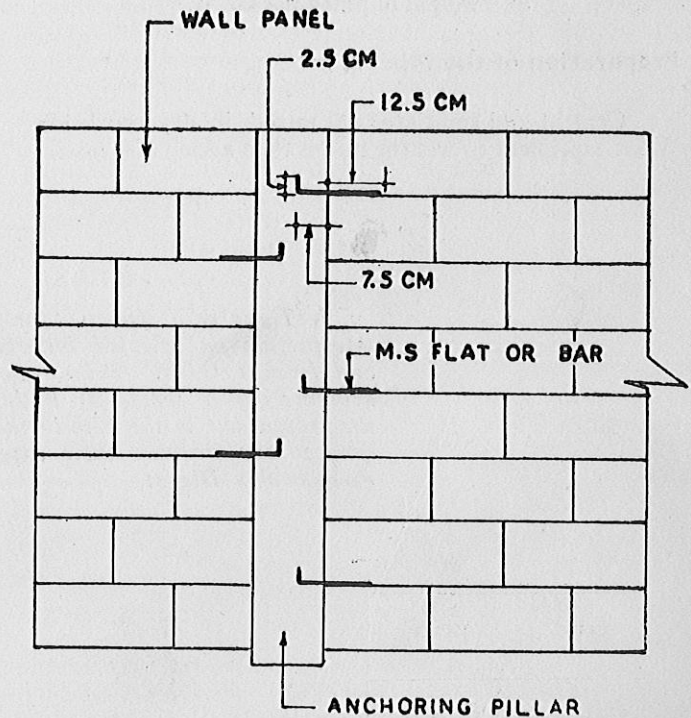


FIG. 1

For a rendering to be durable under a particular set of climatic conditions, it should be compatible with the backing i. e., there should be a good adhesion and its movements should be in conformity with those of the backing. Cement-lime-sand mixes are better than ce-

ment-sand mixes; because of their greater resistance to cracking. The resistance to cracking was found to be about 2 for 1 : 4 and 1 : 6 cement-sand rendering against the values of 3.2, 3.5 and 4.3 for 1:1:6, 1:2:9 and 1:3:12 cement-lime-sand mixes respectively. An undercoat of 1 : 2 : 9 and a finishing coat of 1 : 3 : 12 cement-lime-sand mix is therefore recommended. The use of gypsum plaster is not recommended because of its higher cost and poor performance under tropical conditions.

The materials required for rendering are ordinary portland cement, lime and sand, conforming to relevant Indian Standard Specifications. 'Lime' here means 'dry hydrate lime' which is a dry powder obtained by treating quick lime with enough water to satisfy its chemical affinity. In practice lime putty should be preferred and it should be prepared in accordance with the procedure specified in IS: 1635: 1960. The putty is obtained by adding quick lime to water and stirring the mass to a thick creamy consistency, and allowing it to stand and mature for a period not less than 16 hours. (Normally 24 hours are sufficient for it). If the mix is designed on weight basis, the actual weight of lime putty equivalent to the weight of hydrated lime can be calculated by using the following formula:

$$W_h = \frac{G}{G-1} (W_p - 62.4)$$

where,

W_h = weight of dry hydrate in 1 cu. ft of lime putty,

G = sepecific gravity of the hydrated lime assumed to be 2. 25.

W_p = weight of putty per cu. ft.

Preparation of the Mix

Cement and sand are first mixed in dry condition. Water sufficient to wet the mix is then added and mixing

continued for about a minute. Lime putty is then added and mixing is continued for another couple of minutes. The workability of the mortar is adjusted by adding more water if necessary. The mix should be used within two hours of the addition of water.

Rendering

For rendering of foamed concrete walls, the following precautions should be taken.

- (a) Backing should be cleaned with a stiff brush to remove loose particles of dust and sand.
- (b) Backing should be wetted sufficiently (i.e. till shining appearance becomes dull) before applying the under coat.
- (c) Plastering should be done in two coats i.e. under coat and a finishing coat.
- (d) Under coat of 1:2:9 cement-lime-sand should preferably be applied by dashing the mortar on the wall by a trowel. The thicknesses of the coat should not exceed 1 cm (3/8 in) and it should be left untrowelled.
- (e) Adequate time should be allowed after the application of the under coat for drying before the application of the finishing coat.
- (f) Finishing coat of 1:3:12 cement-lime-sand should be of workable consistency and its thickness should not exceed 13 mm (1/2 in). It should also be dashed against the wall. Levelling should be done with a straight wooden edge and the surface finished with a wooden float.
- (g) Water curing of the rendering should start 12 hours after the final coat is applied and should be continued for a week.

There is a demand for short notes summarising available information on selected building topics for the use of Engineers and Architects in India. To meet the need, this Institute is bringing out a series of Building Digests from time to time and the present one is the 47th in the series. Readers are requested to send to the Institute their experience of adopting the suggestion given in this Digest.

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