Properties of bricks received from Elmsdale, N.S.

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TECHNICAL NOTE

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PREPARED FOR Central Mortgage and Housing Corp. DATE Sept. 8, 1953.

SUBJECT: Properties of Bricks Received from Elmsdale, N.S.

Six bricks were sent to D.B.R. by C.N.R. express from Elmsdale, Nova Scotia, July 1, 1953, presumably from the brick plant there of L.E. Shaw, Limited.

It is understood that these bricks are similar to those to be used in the construction of brick-veneer, plankwall buildings in Halifax, and, also, it is understood that the bricks were sent to D.B.R. by C.M.H.C. in order to obtain information on a suitable mortar for use with these bricks.

The bricks supplied are solid (uncored), of the extruded, wire-cut type, and red in colour, some being quite darker in shade of colour than others, which possibly indicates a higher temperature of firing. They were labelled, for our use, ELM1, ELM2, ELM3, ELM4, ELM5 and ELM6, the first two of these being the bricks which are much darker in colour than the others.

Some properties of the bricks were determined, in accordance with A.S.T.M. Standard Methods of Sampling and Testing Brick (Designation C67-50). These properties are shown in Table 1.

TABLE 1

Some Properties of the Bricks

Brick	Initial Rate of Absorption (grams) (1)	Absorption 24 H.C. (%) (2)	Absorption 5 H.B. (%) (3)	Saturation Coefficient (4)
ELM1	2.1	0.3	1.3	.20
ELM2	2.5	0.5	2.2	.22
ELM3	8.5	3.9	5.3	.74
ELM4	7.9	3.7	5.1	.73
ELM5	10.2	5.3	6.8	.79
ELM6	7.3	4.9	6.1	.81

(1) Initial Rate of Absorption is the amount of water in grams which the dry brick absorbs when placed flat-side down in 1/8 inch of water for one minute, based on an area of 30 square inches. The initial rate of absorption or suction of a brick determines, to a considerable degree, the strength and extent of bond which the brick establishes with a mortar.

(2) Absorption 24 H.C. is the amount of water, expressed as a percentage of the dry weight of the brick, which the brick absorbs when it is immersed for 24 hours in water at room temperature.

(3) Absorption 5 H.B. is the amount of water, expressed as a percentage of the dry weight of the brick, which the brick absorbs when it is immersed in boiling water for 5 hours (following immersion in water at room temperature for 24 hours).

(4) Saturation Coefficient is the ratio of the amounts of water absorbed by the brick in immersion for 24 hours in water at room temperature and absorbed by the brick in further immersion for 5 hours in boiling water. It is, to some extent, a measure of the ratio of "easily filled" to total pore volume of the brick.

Saturation coefficient, along with compressive strength, or other properties, has been used in the A.S.T.M. Specification C62-50 for clay and shale bricks, to classify bricks with respect to frost resistance. In this respect, these bricks from Elmsdale would be classified as grade SW ("Brick intended for use where a high degree of resistance to frost action is desired and the exposure is such that the brick may be frozen when permeated with water.")

The initial rate of absorption, or suction, of bricks has been found to be a factor of importance in the resistance of brick walls to rain penetration, since this property of bricks considerably affects the extent of bond established between brick and mortar.

Two indications of the proper initial rate of absorption of bricks in regard to securing rain-tight walls are available. The A.S.T.M. (In a Note in its Specification C62-50) states, "Data indicate that a low rate of suction (20 grams per minute or less) is desirable both from the standpoint of bond and watertightness". Another authority (C.C. Connor, A.S.T.M. Proc. Vol. 48, 1948) says that the suction should be within the range of 5 to 25 grams (when the brick is placed in 1/8 inch of water for 1 minute). It can be seen from Table 1 that two of the six bricks are lower in suction than the lower limit placed on this property by Connor for rain-resistant brickwork.

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The composition and properties of mortar can also affect the rain resistance of brick walls. It is generally agreed that mortar for brickwork should have high water retentivity (i.e. give up its water slowly to an absorbent brick), and be of easy workability (i.e. not harsh to work under the trowel). In general mortars of the portland cement-lime type such as 1-1-6 (one cement, one lime, six sand, by volume) are suitable. Usually, the higher the lime content, the more workable is the mortar; the higher the cement content, the stronger it is (but not necessarily the brickwork).

For adequately rain-resistant brickwork the mortar probably should not have more than 2 volumes of portland cement per volume of lime.

With dense, low rate of absorption bricks, such as those received from Elmsdale, used with a plastic mortar, such as are most mortars high in lime, some difficulty may be experienced due to "floating" of the bricks in the mortar (i.e. not "staying put" when laid, or easily displaced thereafter). In this event, a mortar higher in cement would be more suitable; however, the type and grading of the sand would influence the results, also.

In summary, the following remarks are made concerning the bricks received from Elmsdale:

(1) They can be expected to be, in themselves, highly durable in regard to the action of frost.

(2) Because of the low initial rate of water absorption of some of them, it may be difficult to secure good bonding with mortar.

(3) A suitable mortar for use with them is probably of composition 1-1-6, one volume portland cement, one volume lime and six volumes sand.

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