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R. 464

28. CLAY FROM LUCK BROTHERS PTY. LTD., DEVONPORT

The Samples

Three samples of white siliceous clay were submitted by Luck Brothers Pty. Ltd., Devonport, for brick manufacturing tests by semi-dry and stiff-plastic pressing methods.

Samples were numbered 1, 2 and 3, and were obtained from the road cutting near Sheffield (S 13 — 9 R). They were similar in appearance to sample No. 1542, submitted by the same company in August, 1963, obtained from the same locality. The object of the investigation was to confirm and extend the results of brick manufacturing tests on this sample.

Summary

1. The samples have been tested for brick manufacture by semi-dry and stiff-plastic pressing methods. Satisfactory quality bricks were produced from each sample, and the material is considered to be suitable for the manufacture of building bricks or of firebricks for use at a temperature not exceeding 1,300° C.

2. Bricks fired to 1,100° C were pale cream in colour, of good appearance and regular dimensions. Transverse breaking strength ranges from 300 to 600 lbs per square inch and is somewhat low for good quality building bricks.

3. Refractoriness tests show slight softening and vitrification at 1,500° C, more pronounced in sample No. 3 than in Nos. 1 and 2.

4. Sample No. 1 showed a tendency to laminate during pressing. This was not apparent in the other two samples. The fired stiff-plastic pressed bricks from all samples showed cracks and curved surfaces to a slight degree, but these defects are not considered significant.

5. Several bricks from Sample No. 1 were fired to 1,350° C. The bricks at this firing temperature showed slight glazing but were of regular conformation with no sign of distortion. The colour of the bricks was greyish white.

Bricks from all samples were fired to 1,450° C. Those from semi-dry pressings of samples 1 and 2 were vitrified but showed no distortion. Those from stiff plastic pressings were vitrified and slightly distorted. The bricks from sample 3 were rather bloated with signs of incipient fusion.

Preparation and Testing

The samples were partially dried and then crushed to minus ¼ inch and thoroughly mixed. A representative sample was then taken from each by riffling. This sample was then further dried, jaw and roll crushed to minus 10 mesh and again mixed in the dry state.

The required amount of water was then incorporated by repeated hand mixing followed by a pass through a Rawdon Pug Mill.

PRESSING

No real difficulties were encountered in pressing. Sample No. 1 showed rather a bad tendency to lamination and the green stiff-plastic pressed bricks from this sample were of poor to moderate green strength.

The test pieces from the other samples showed moderate to good green strength.

MOISTURE CONTENTS OF THE PRESSED BRICKS

The tabulation shows (A) the per cent moisture in the green brick, and (B) the per cent water added to the dry clay.

	Semi-dry		Stiff-plastic	
Sample No.	A	B	A	B
1	12.2	13.9	15.5	18.8
2	11.5	13.0	18.0	22.0
3	13.5	15.6	16.9	20.3

DRYING AND FIRING

The pressed bricks were dried naturally for several days and finished by heating in an electric oven at 110° C.

The dried bricks were fired to 1,100° C, soaking for two hours at this temperature.

Drying and firing contractions are shown in the following tabulations. All contractions are based on the original length of green pressed brick.

Contractions—Per Cent

Sample No.	Semi-dry			Stiff-plastic		
	Drying 110° C	Firing 1,100° C	Total	Drying 110° C	Firing 1,100° C	Total
1	1	½	1½	4	1	5
2	½	Nil	½	4	Nil	4
3	1	1	2	4	1	5

Firing to 1,350° *C.* Sample 1 showed a total contraction of 2 per cent on semi-dry pressed pieces and 6 per cent on stiff-plastic pressings.

Firing to 1,450° *C.* Semi-dry pressings from Samples 1 and 2 showed total contractions of 6 per cent and 5 per cent respectively.

Bricks from stiff-plastic pressings of 1 and 2 showed total contractions of 7 per cent and 8 per cent respectively. Bricks from Sample 3 were somewhat bloated.

Losses of weight on firing the various bricks to 1,100° C are shown below. Calculations are based on the weight of brick dried at 110° C.

Sample No.	Firing Loss: Per Cent
1	4.2
2	4.4
3	4.9

REFRACTORINESS

Refractoriness tests were performed on each sample with the following results:—

Sample No.	Softening Point	Fusion Point
1	1,500° C	above 1,500° C
2	1,500° C	above 1,500° C
3	1,500° C	above 1,500° C

All test pieces were vitrified and showed surface glazing.

COLOUR OF FIRED BRICKS

The colour of the bricks fired to 1,100° C was pale cream. Bricks from Sample No. 3 showed more of a slightly red tinge than those from Samples 1 and 2.

All the test bricks are slightly disfigured by reddish streaks caused by abrasion of iron from the surfaces of the forming die.

Bricks fired to 1,350° C and above are grey in colour.

MODULUS OF RUPTURE

Modulus of rupture tests on fired specimens from both forming methods were carried out. These tests were undertaken by Mr. K. Payne, Acting Principal, Launceston Technical College.

Sample No.	Modulus of Rupture/lbs per square inch Semi-dry Press	Stiff-plastic Press
1	400	300
2	400	300
3	600	300

(S.A.A. Interim 323 specifies an average requirement of 400 lbs per square inch).

The results were calculated from the force required to rupture a bar 1½ inches wide by 1 inch deep supported on knife edges 2.75 inches apart.