TR9-189-191 R. 473

29. CRISP AND GUNN CO-OPERATIVE LTD., HOBART: BRICK MANUFACTURING TESTS

The Samples

Two samples were obtained to be tested for their suitability for brick manufacture by stiff plastic pressing.

The samples were given the following descriptions:—

A. "Knocklofty Sandstone".
B. "Knocklofty Bottom Mudstone".

Preliminary tests on the samples and blends in the proportions of 1A to 1B, 1A to 2B and 1A to 3B, showed that each sample and blend had very poor plastic and cohesive properties. The green strength of bricks pressed from them was low enough to make the green ware liable to damage during handling and stacking, and the addition of some bonding agent is necessary to correct the defects.

In view of the above it was decided to amend the test programme to investigate the usage of these materials when blended with proportions of R.473-1, "Knocklofty shale" and R.473-4, "Kingston cream clay", both of which have good plastic and cohesive properties.

This decision was confirmed by conference with the company.

The blends investigated are shown in the tabulation of test results.

Summary

1. Both the sandstone and mudstone, either individually or blended with one another, have very poor plastic and cohesive properties and the consequent low green strength renders them unsuitable for brick manufacture unless blended with a more plastic material.

2. Bricks of good quality and appearance have been made by blending the sandstone and mudstone and mixtures of them with Knocklofty shale (R.473/1) in blends containing not less than 50 per cent shale. The actual quantity of shale necessary to provide adequate green strength would be determined in the company's brick making plant.

3. Bricks from blends of sandstone and economically usable quantities of Kingston cream clay (R.473/4) are of less green strength than blends of equivalent cost using Knocklofty shale as the bonding agent. (Kingston clay is stated to be approximately twice the cost of Knocklofty shale.)

However, the blend 1 clay to 3 sandstone produces bricks of good quality and appearance with adequate green strength.

4. Less bonding agent is required with the mudstone than with the sandstone to give adequate green strength to the pressed bricks.

5. Bricks fired to 1050° C are generally dark rust red in colour. Bricks fired to 1000° C are somewhat lighter in colour and rather more attractive in appearance. Bricks appear to be well fired at either temperature and have a good ring.

Preparation and Testing

Sample preparation and test procedure similar to that detailed in report No. R.472.

It is noteworthy that the sandstone is a very friable material and crushes readily.

Test Results

Blend	Per Cent						1000°C Modulus of Rupture lbs per sq. inch
		Contractions					
	Moisture in Green Brick	Drying 110°C	Firing 1000°C	Firing 1050°C	Total at 1050°C	Firing Loss	
(1) 2 parts Shale 1 part A	12.7	3	1	2	5	2.9	1600
(2) 2 parts Shale 1 part B	12.3	2	1	3½	5½	3.3	1200
(3) 2 parts Shale 1 part 1A/1B	12.1	2	1	3	5	3.1	700
(4) 2 parts Shale 1 part 1A/2B	13.1	2	1	3	5	3.2	1500
(5) 2 parts Shale 1 part 1A/3B	12.1	2	1	4	6	3.2	900
(6) 1 part Shale 1 part A	13.2	3	Nil	2	5	2.6	900
(7) 1 part Shale 1 part B	11.9	2	1	3	5	3.2	800
(8) 1 part Clay 3 parts A	11.8	2	Nil	1	3	2.5	500
(9) 1 part Clay 4 parts A	14.4	2	Nil	Nil	2	2.3	500

Shale = R.472/1 Knocklofty Shale.
A = R.473/A Knocklofty Sandstone.
B = R.473/B Knocklofty Bottom Mudstone.
Clay = R.472/4 Kingston Cream Clay.

Notes on Brick Manufacturing Tests of the Various Blends

Blend	Remarks
1. 2 parts Shale 1 part A.	Good plastic and cohesive properties. Pressed brick has good green strength and dries and fires without cracking or distortion. Fired brick of good quality and appearance. Light red at 1000° C, dark red at 1050° C.
2. 2 parts Shale 1 part B.	Similar to blend No. 1.
3. 2 parts Shale 1 part 1A/1B.	Similar to blend No. 1.
4. 2 parts Shale 1 part 1A/2B.	Similar to blend No. 1.
5. 2 parts Shale 1 part 1A/3B.	Similar to blend No. 1.
6. 1 part Shale 1 part A.	Moderate plasticity—poor cohesive properties. Pressed brick has rather low green strength and does not form quite as well as blends with higher shale content. Fired brick of good appearance, similar to Blend No. 1.
7. 1 part Shale 1 part B.	Moderate to good plasticity and cohesion. Pressed brick well formed with moderate green strength. Dries and fires without cracking or distortion. Fired brick good quality and appearance, similar to Blend No. 1.
8. 1 part Clay 3 parts A.	Moderate plasticity and cohesive properties. Green strength not high but probably adequate. Green brick rather sandy in texture but dries and fires with no cracking or distortion to brick of good quality and appearance. Slightly porous texture. Rather easily abraded edges and corners.
9. 1 part Clay 4 parts A.	Poor plasticity and cohesion. Pressed bricks soft with low green strength and bowed surfaces. The fired brick has a porous texture with more easily abraded edges and corners than Blend No. 8.