

TR7-204-205 R. 415: Part 3

T1 A, T1 B—SHALE FROM GRANTON

Summary

A sample of shale received from McHugh Brothers, Launceston, and stated to be from Granton has been examined for suitability for pipe and brick manufacture by de-aired extrusion.

The material proved to be suitable for this purpose. Bricks extruded from the minus $\frac{1}{8}$ inch shale show some notching of corners and are cut with difficulty due to unsoftened pieces of material. Crushing of the minus $\frac{1}{8}$ inch material to minus 22 mesh led to an improvement in extrusion and cutting properties. The shale has a fairly short firing range and those pipes fired at 1000° to 1050°C leaked water at 20 lbs. per square inch pressure, while pipes fired at 1100°-1200° withstand a pressure of 40 lbs. per square inch without leaking. Those pipes and bricks fired at 1200°C show some signs of bloating.

Description

T1A, buff coloured semi plastic Granton shale crushed to minus $\frac{1}{8}$ inch.

T1B, shale crushed to minus 22 mesh.

Preparation and Testing

The sample of shale was dried and roll crushed to minus $\frac{1}{8}$ inch for T1 A and minus 22 mesh for T1 B. The samples were thoroughly pugged after the addition of the necessary water and de-aired extruded at a vacuum of 28 inches of mercury. After drying naturally the test pieces were fired at the range of temperatures shown and soaked for 2 hours.

Results

		Sizing Analysis					
T1 A		Per Cent Weight	T1 B	Per Cent Weight			
Minus $\frac{1}{8}$ inch	+	22 mesh	11.3	Minus 22	+	44 mesh	1.5
	+	44 mesh	5.3		+	60 mesh	2.2
	+	60 mesh	1.8		+	100 mesh	4.4
	+	100 mesh	3.4		+	200 mesh	6.7
	+	200 mesh	6.8		+	minus 200 mesh	85.2
		minus 200 mesh	71.4				
Composite	100.0	Composite	.....	.....	100.0

Extrusion

Sample Description	Tempering Water %	Power KWH/1000g	% Drying Contraction	Percent Firing Contraction					Firing Loss of Weight %
				1000°	1050°	1100°	1150°	1200°	
T1 A pipe	16.4	....	2.50	3.0	4.5	5.75	5.75	5.00	....
T1 B pipe	17.9	....	3.00	2.75	4.5	6.00	6.50	6.00	....
T1 A brick	16.9	.0191	4.00	2.50	4.5	5.00	6.00	3.50	3.1
T1 B brick	18.5	.0132	4.00	2.00	5.0	5.50	6.00	4.75	3.0

Modulus of rupture on bricks (lbs. per square inch).

	Dried at 105°C	Fired at 1050°C
T1 A	240-270	2700-2900
T1 B	320-360	2700-3000

Power results represent the kilowatt hours of power needed to extrude 1000 grams of clay 1.25 x 1.5 inch cross section.

Modulus of rupture results are calculated from the weight necessary to rupture a bar 1.25 x 1.5 inch cross section supported by knife edges 2.75 inches apart.

Bricks and pipes may be rapidly dried at 105°C without cracking or warping, and fire up to 1150°C without cracking. At 1200°C bricks and pipes start to bloat and fuse.

Unglazed pipes fired up to 1050°C leak water at 20 lbs. per square inch pressure while pipes fired to 1100°-1200°C withstand a pressure of 40 lbs. per square inch. Pipes glazed at 1150°C withstand 40 lbs. pressure.

Colour of Bricks

	Firing Temperature ° C				
	1000	1050	1100	1150	1200
T1 A	Light Brown	Light Brown	Dark Brown	Chocolate	Chocolate
T1 B	Light Brown	Light Brown	Dark Brown	Chocolate	Chocolate

Basal on S.A.A. Interim Specification 323, the bricks showed no efflorescence.