

TR12-182-183

R. 539**LUCK'S BRICK WORKS—DULVERTON****Samples**

Two samples of white clay marked Sheffield area and McHugh's Old Pit were supplied by Mr A. Luck of Devonport for evaluation.

Summary

Both clays are amenable to extrusion and can be processed to yield a firm smooth brick. The Sheffield area material yields a product, depending on the firing temperature, with a colour range from buff white to cream, whereas the material from McHugh's pit gives a good white brick when fired at 1000° C.

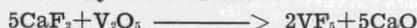
However, both materials are prone to vanadium efflorescence which negates their use without some modifications. By the addition of 1% calcium fluoride to the material, the vanadium efflorescence is drastically reduced and the resulting product shows only a little divergence from the untreated material with respect to colour.

Discussion

Many of the clay materials at present in use in Tasmania as brick materials contain vanadium, either as the oxide V_2O_5 or as a vanadate present in the clay matrix. This causes unsightly efflorescence, typified by yellowish-green patches of salts on the face of the brick, when subject to normal weathering conditions in use. This effect, although tolerable on a normal rust red brick would be quite unacceptable on a white brick.

It is generally accepted that hard firing removes vanadium, but this is not always the case, as the attendant materials in the clay may inhibit its removal. Additionally, the colour of the final product is related to the temperature of firing, so that high temperature treatment is not always a satisfactory solution.

The use of fluorspar, calcium fluoride, has been recommended for vanadium removal by the reaction:—



The vanadium is volatilised during firing as the pentafluoride and the resulting lime formed is incorporated into the clay body with the formation of calcium silicate

Experiments in this laboratory have shown drastic reduction in vanadium efflorescence when 1% fluorspar is used. Although this item will increase the cost of manufacture and will need controlled incorporation into the clay mix, where a high grade brick is required, its use would seem to be justified.

Preparation and Testing

Both materials were in a satisfactory state of subdivision to be used without any further size reduction. Materials were mixed with water, pug milled and then de-aired and extruded.

In both cases satisfactory extrusion was obtained, the high sand content of the materials (35%) made the column somewhat soft and the water content should be kept as low as possible to facilitate handling of the green ware.

Cut bricks were marked, air dried and finally oven dried at 110° C for twenty-four hours prior to firing at various temperatures.

Test Results

	Water Lost on Drying	Green	950° C	1000° C	1050° C	1100° C	Firing Loss at 950° C
		Total Contraction					
Sheffield material ..	22%	8%	8%	8%	9%	10%	4.2%
Colour			pinky white	off white	cream white	cream white	
McHugh's material ..	22%	7%	8%	8%	8%	10%	5.2%
Colour			white	pure white	off white	cream white	

The water lost on drying includes the water originally present in the raw material and should not be interpreted as water added for processing.

Conclusions

Both the submitted materials can be processed to give firm smooth bricks, the colour of the final product being dependent on the firing temperature. The only significant disadvantage of the materials is their high vanadium content which causes unpleasant efflorescence when the brick is subjected to normal weathering conditions.

By the addition of 1% calcium fluoride to the clay mix it is possible to reduce this efflorescence to a tolerable level without causing too much change in the colour of the final brick.