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SALISBURY FOUNDRY Co. PTY LTD: EXAMINATION OF VARIOUS FURNACE REFRACTORIES

Preamble

The above company operates a cupola furnace in the casting shop of the foundry. After each melt it is necessary to repair the refractory near the tuyere zone of the furnace. The material currently used for repairs is a prepared refractory, "Silocene", imported from Victoria. This refractory is costly, $4 per cwt, by comparison with a naturally occurring material, and is also stated to have the disadvantages of being inconvenient to handle and difficult to instal in the furnace because of various physical characteristics.

A more suitable material, widely used for similar purposes in Victoria, is mainly a naturally occurring clay from a deposit at Ballarat. This material is similar to a deposit of weathered granite occurring near Gladstone in North Eastern Tasmania. The cost of the Ballarat clay to the company is not known, but it is probable that considerable saving of freight could be effected by utilization of the Tasmanian deposit.

A series of refractoriness tests was therefore undertaken to enable a comparative evaluation of the three materials to be made.

Similar tests were performed on a sample submitted by the company and stated to have been obtained from the area of the Endurance Tin Mine.

Mr Childs had submitted a sample of similar weathered granite from the Scottsdale area for examination. This deposit was mentioned to Salisburys who obtained a sample of the clay which was subjected to fusion and slagging tests.

Testing

Fusibility Determinations

These determinations were performed in a high temperature gas fired muffle furnace. Each sample was tested individually, and the Ballarat and Gladstone clays were also blended with 10 per cent of a bonding clay provided by McHugh Bros Pty Ltd of Launceston.

Results of these tests were:—

Gladstone clay—Infusible at 1500° C.

Gladstone clay plus 10 per cent bond clay—Infusible at 1500° C.

Ballarat clay—Infusible at 1500° C.

Ballarat clay plus 10 per cent bond clay—Infusible at 1500° C.

" Silocene "—Slight glazing at 1500° C.

Endurance—Softened at 1500° C.

Scottsdale clay plus 10 per cent bond clay—Infusible at 1500° C.

Resistance to Slag Corrosion and Penetration

These tests were conducted in the same furnace in fireclay crucibles lined with the refractories under test and containing samples of the Salisbury cupola furnace slag. Incidentally, this slag was found to have a melting point of approximately 1250° C.

The tests were performed at 1500° C, the specimens being held at this temperature for 30 minutes. It is unlikely that more severe temperature conditions would be experienced in practice. The temperature of metal being tapped from the furnace was 1400° C (Optical Pyrometer).

Results of these tests were:—

Gladstone clay plus 10 per cent bond clay—Hard and firm—no evidence of slag attack.

Ballarat clay plus 10 per cent bond clay—Simliar to above but refractory slightly more friable.

" Silocene "—Similar results to above.

Endurance plus 10 per cent bond clay—Severe slag penetration and corrosion with near fusion of the refractory.

Scottsdale clay plus 10 per cent bond clay—Similar to Gladstone clay.

Summary

The above tests indicate that, technically, there is little differentiation between Gladstone clay, Ballarat clay, and " Silocene ". The addition of a suitable bond clay to the refractories has no apparent effect on their properties, and may or may not be necessary as an expedient to facilitate working of the material.

The Endurance sample is obviously not suitable for the application under consideration.

Although no costs can be quoted for the supply of Gladstone material to the Salisbury works, it is anticipated that this would be considerably less than that for material imported from Victoria.

Salisburys tried in their cupola patches of Scottsdale and Gladstone material with bonding clays and of two thicknesses. These performed as well as Silocene, and they will use Scottsdale material as the basis of their patching in future.