Use of Molding Sands for Rammed Lining of Ladles

Given a mean lining resistance of 31 melts, the cost of a ton of chamotte brick is Rs. 32, k. 40, while a ton of molding sand costs Rs. 2, k. 4c, producing a yearly saving in the shop of more than 150,000 rubles (1961 price scale).

The transition to rammed linings for steel casting ladles using molding sands does not require large capital expenditure.

RESISTANCE OF REFRACTORIES IN TANK FURNACE WHEN MELTING CONTRAST GLASS

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Contrast glass is used to make the bottom of electron-ray tubes and hardened protective glass for television sets.

The chemical composition of contrast glass is 71.10% SiO₂, 1.22% Al₂O₃, 0.10% Fe₂O₃, 7.48% CaO, 3.29% MgO, 15.40% Na₂O, and 0.50% K₂O. 0.00% CaO and 0.22% NiO are added, above 100%, as dyes, and 1.15% Na₂SiF₆ is added as an accelerator. The dyes are added to the glass through the fritt.

The fritt prepared has the following composition: 57.7% SiO₂, 30.9% Na₂O, 10.8% NiO, and 1.5% CoO.

Contrast glass is melted in a tank furnace with a production channel in which 3 vertical drawing machines are fed directly with the glass mixture.

The tank furnace has a direct flow system and there is no bridge wall in the glass mixture zone. At the beginning of the cooling reservoir in the gas space of the furnace, there is a lowered arch-screen, behind which is one flat arc. The total area of the tank furnace reservoir is 90 m², including the cooling reservoir which is about 20 m². The depth of the reservoir is 1.2 m and that of the production channel 0.9 m. The capacity of the reservoir and production channel is about 330 tons of glass mixture.

The tank furnace and production channel are heated with purified generator gas obtained by gasification of AM anthracite. The calorific power of the gas is Q₆0 = 1250 kcal/m³. The generator gas consumption is about 8500 m³/hour and the air consumption 10,200 m³/hour.

Fig. 1. Refractories in hot row of reservoir and production channel, and temperature regime in furnace.
The top row of the furnace reservoir is lined as far as the production channel with high alumina blocks 500 x 400 x 250 mm, made by the Chasov-Yar Combine.

The chemical composition of the blocks was 30.4% SiO₂, 64.06% Al₂O₃, 1.16% Fe₂O₃, 0.48% CaO, 0.51% MgO, 2.45% R₂O₃, and 0.84% other impurities; the bulk density is 2.84 g/cm³, and the apparent porosity 7.6%.

The remaining area of the reservoir and channel was lined with chamotte wall blocks (specification GOST 7151-54).

Fig. 1 shows the refractories used for the top row of the reservoir and the temperature conditions in the furnace.

The furnace was heated up according to a 9-day schedule to 1450 °C. Before, the furnace was charged with 30 tons of glass facings. The reservoir was welded with the charge for 10.5 days.

After operating for a month, the reservoir was cooled with two fans, each delivering 17,000 m³/hour.

After 16 months the pot furnace was stopped for cold repairs and reconstruction.

The destruction of the glass mixture in the top row of high-alumina blocks in the melting and cooling reservoirs is shown in Fig. 2. The greatest wear and tear was suffered by the blocks at the level of the metal line. The destruction was accompanied by the formation of typical indentations, which had partly burned away. The bottom of the block was only slightly destroyed, in parts only to a depth of 5 - 10 mm.

In the cooling area of the reservoir in the middle of the full the high alumina beams had failed at the level of the glass mirror, forming cavities 8 to 10 mm deep and 20 to 30 mm in width. The remainder of the beam which was immersed in the glass remained unchanged in size.

Fig. 3 shows the high alumina blocks of the top row of the furnace reservoir after service.

The blocks showed even, mesh-like destruction; but the...