REFRACTORIES IN SERVICE

Guncreting Refractory Linings. In the Main Trends in Economic and Social Developments of the USSR for 1981-1985 and for the period up to 1990, mention was made of the serious task of further developing ferrous metallurgy. One of the trends contributing to the stable operation of metallurgical equipment is an increase in the resistance of furnace linings by means of guncreting, which at present is being widely introduced in iron and steel enterprises. Guncreting reduces the consumption of refractory products, leads to the mechanization of lining jobs, and reduces the time and labor content of them. Below we publish articles dealing with work being done on guncreting.

INTRODUCING "ORION" EQUIPMENT FOR MECHANIZED GUNCRETING OF STEEL LADLES

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Mechanized guncreting of steelcasting ladles using the complex "Orion" plant was first introduced at the Rustav metallurgical factory. The equipment can be used for ladles having capacities of from 70 to 350 tons. Depending on the capacity and degree of wear of the lining, from 15 to 45 min is spent on guncreting [1, 2].

The Institute used the results of the first year's experience to develop specifications (TU 14-8-265-78) for guncrete-powder, and then corrected the production instructions for mechanized guncreting and made certain improvements in the design of the guncrete-nozzle manipulator. The standard TU 14-8-265-78 specifies the production of three grades of chamotte-clay powders, differing in their Al₂O₃ concentrations. In powders with a refractoriness of not less than 1750°C the weight proportion of Al₂O₃ equals not less than 39%; refractoriness not less than 1730°C — not less than 37%; refractoriness not less than 1690°C — not less than 35%. The moisture content of the powders may vary in the range 2-5%. The production of guncrete powders is being organized at the Kondrat'evsk refractories factory.

The equipment complex "Orion" includes a device for handling the guncrete-nozzle; a unit for storing and feeding the guncrete-powder; a unit for storing, preparing and feeding the bond; and a control panel.

At present mechanized guncreting of steel ladles using "Orion" is also being introduced at the Magnitogorsk metallurgical combine. A start has been made on introducing mechanized guncreting at the Taganrogsk metallurgical factory.

Depending on the actual conditions of the shops in these enterprises, the layout of the complex "Orion" equipment will vary. At Rustav (see Fig. 1a) the guncrete powder, using a dump-car, is loaded into hopper 1, whose discharge aperture has a manual sector gate. From the hopper the powder is gravity fed into the working chamber of guncrete machine 2. The solution of high-concentration binder is located in transfer hopper 3, which is placed over reception-funnel container 4, working under pressure. In this vessel equipped with a bubbling system, the density of the solution is brought to the necessary level; the solution is moved by compressed air from the vessel to the manipulator collector.

At Magnitogorsk (see Fig. 1b) the guncrete powder is loaded with a dump car 5 into reception hopper 6, and an auger feeder 7 transports it to elevator 8 which fills

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Fig. 1. Plan of "Orion" complex at the Rustav combine (a), the Magnitogorsk combine (b), and the Taganrogsk factory (c).

consumption hopper 9. Guncrète machine 10 is placed under the output of the hopper covered by a hand sector gate. The solution of bond with a high concentration is delivered to the section with a transfer hopper 11. In mechanical mixer 12 the solution is brought to the necessary concentration and a pump 13 feeds it to the manipulator collector.

In contrast to other enterprises, the combine uses guncrète powder of its own production based on scrap firebrick made from Arkalysk and Berlinsk clays [3]. The physicochemical properties of the guncrète-powder are: not less than 35% Al₂O₃, refractoriness not less than 1690°C, and moisture content 4-6%.

At the Taganrogsk factory (see Fig. 1c) the powder is fed to consumption hopper 14 with a transfer hopper using a crane on the steelcasting span. The outlet of the hopper is fitted with a vibrofeeder, by means of which the working chamber of guncrète-machine 15 type SB-67 is filled. The solution of bond is prepared and stored in a heated vessel 16. From consumption container 17 equipped with air-bubbling system, the prepared solution is fed to the collector of the manipulator by pump 18.

The design of the equipment for manipulating the nozzle in all factories is the same. The specifications of the device for manipulating the nozzle are shown below [2]:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Nozzle rpm</td>
<td>6</td>
</tr>
<tr>
<td>Speed of displacement of nozzle vertically, m/min</td>
<td>1.2</td>
</tr>
<tr>
<td>Distance from nozzle to surface being guncrèted, m</td>
<td>1.2-1.5</td>
</tr>
<tr>
<td>Output, m³/h (using SSB-02 and SB-67 machines)</td>
<td>4-16</td>
</tr>
<tr>
<td>Rating, kW</td>
<td>4.5</td>
</tr>
</tbody>
</table>

The complex is serviced by one or two operatives depending on the degree of automation.

The control scheme and the equipment of the guncrèting section that were developed ensure all-round mechanization of all transport and preparatory operations and remote