Most glass-melting tank furnaces operating on gas fuel are equipped with automatic control of the thermal regime. However, tank furnaces operating on liquid fuel (mazut) are not sufficiently automated. This is due to the difficulties involved in measuring the consumption of mazut and maintaining a steady consumption and vaporization.

The Rosorgtekhsstrom has developed an automated system for the thermal regime of a glass furnace operating on mazut. The parameters to be controlled include the stabilization of the consumption of mazut in two zones, the stabilization of the vapor pressure for spraying the mazut, and of the pressure in the furnace.

The system has been installed, tested, and made operational in a tank furnace with vertical glass-drawing machines in the Velikii Oktyabr' Glass Plant.

The furnace is equipped with six pairs of ports and is fuelled by mazut preheated to 70 or 80°C which is sprayed as a vapor. The consumption of the vapor is 2 ton/h. The pressure of the vapor in front of the ports should be 2 to 2.4 kg/cm² with a pressure in the supply line of up to 8 kg/cm². The pressure is...
reduced by a throttle valve set into the feed pipe. In view of the fact that, in addition to the tank furnace, the boiler serves other parts of the Plant which require varying amounts of vapor the pressure in the supply lines varies from 4 to 8 kg/cm². The pressure in the jets changes correspondingly.

The pressure in the gas space of the furnace of 0.2 to 0.4 kg/m₂ is controlled by the movement of a damper in the flue stack. Before automation these parameters were controlled manually.

For the best thermal regime in a furnace the mazut supply is divided into two channels each supplying three ports on either side.

In the automated system for the thermal regime (Fig. 1) an apparatus made by the Ivano-Frankov Instrument Plant, the Khar'kov KIP Plant, and the Cheboksar EIM Plant has been used.

The vapor pressure for spraying the mazut is controlled by a valve (Fig. 2) designed and made in the Cheboksar Branch. Its static characteristics — vapor pressure against the setting of the regulating unit — are given in Fig. 3.

The system which automatically stabilizes the vapor pressure for the spraying of the mazut operates as follows (Fig. 1).

The vapor pressure in front of the jets is measured by an MIM manometer (1a and 1b) and is transformed into a standard current signal of 0 to 5 mA which reaches the RP2-U3 proportional control unit (1c) and the secondary recording instrument (1). This signal is compared in the measuring block with the signal from the ZD-50 reference element (1d) which defines the required pressure value. When there is a difference between the specified and the actual pressure from the controller, a signal across the UMD-10A magnetic amplifier (1e) reaches the MEO-10/250 executive mechanism (1f) to activate the valve (1g). The position of the valve is monitored by the position indicator of the DUP-M (1b). The system is controlled in the automatic or remote-control regime by the 1 kF and 1 kV switches.

The thermal capacity of the second stage of the furnace is controlled by a system which stabilizes the consumption of mazut. The consumption of mazut is measured on an MPSF mazut meter (2a) into the head of which are inserted two PF-4 ferrodynamic control units. The reference inputs are passed to the floating control RP2-P3 (2b) and the secondary recording instrument of the VFS type (2h). The difference between the actual voltage and the value specified by the reference unit reaches the input of an electronic block which activates the MEO-10/250 executive mechanism (2f) via the amplifier (2c); the executive mechanism is connected to a valve (2f) which is opened to an extent controlled by the position indicator (2g).

The control of the thermal power of the first zone (positions with the index 3) is analogous to that of the second zone.

The pressure in the working space of the furnace is automatically controlled by a change in the resistance of the effluent flue duct according to the impulse obtained by totalling the pressure from both sides of the furnace (4a) in the conditioning end.

The pressure control transducers are DKOFM-T₀ differential pressure-head instruments (4b, 4c, 4i). The required pressure is established by ZD-50-type reference units (4e). Any difference between the actual and specified value is eliminated by the RP2-P3 regulator (4d) via the amplifier (4f), the MEO-63/100

Fig. 2. Vapor-pressure control valve.

Fig. 3. The static characteristics of the vapor-pressure control valve.