One of the urgent problems in industry today is how to increase the capacity of existing glass-making furnaces. Experience has shown that their production capacity can be increased by introducing high-temperature glass making [1]. This requires that the cooling potential of the furnace be raised. Furnaces fitted with molten-glass blocking devices are becoming increasingly common today in sheet-glass manufacture.

Suspended screens of Bakor-33 (polyethylene glycol) were first installed in 1966 in the VGD (vertical glass-drawing) systems in the Gomel' and Riga glass plants [2]. They consist of H-shaped Bakor blocks suspended by means of metallic bars from a girder submerged into the molten glass and two protective flat arches separating the furnace from the gas environment channel.

Experience with such screens has demonstrated that they enable the cooling of the molten glass to be intensified while their influence on the convective exchange of molten glass between the glass-making and cooling tanks is significantly greater than that of blocking debiteuses. The coefficient of flow in the barrier installation region varies from 1 (total breakdown of convective flow) to 2–4 for furnaces of different designs. The weighted temperature gradient of the molten glass at barriers of the new kind is as high as $150 \degree C$, due not only to a weakening of the convection but also to the supplementary extraction of heat from the molten glass through force-cooled components [3].

No problems were encountered in the operation of the first furnaces with suspended screens, apart from the maintenance of the positive gas environment pressure in the cooling section and the processing channel. This problem is overcome by creating overflow channels linking the glass-making section to the cooling section.
through the gas environment, i.e., by reestablishing the traditional system of hydraulic furnace-condition control when the pressure is stabilized in the cooling zone by varying the pressure in the flame space. The overflows do, however, complicate the heating-up campaign of the furnace and the servicing of the screen unit during operation. In addition, the absence of methods of determining the area of the overflow cross sections by calculation has made it essential in many plants to increase the pressure in the flame space of the furnace which is known to accelerate wear in the brickwork of the superstructure.

A bridge-type blocking device [4] has been developed in the Institute of Glass. With the width of the cooling section of the furnace in the barrier installation region being greater than 4 m, the composite bridge has a supporting prop in the middle of the span. No protective arches, girders, or bars for suspending individual beams are required in this design. In addition, the beams are easily produced by casting, and these advantages explain why the bridge-type barriers are becoming more and more common (see diagram in Fig. 1). Of 50 furnaces for making sheet glass by the vertical drawing method, 29 are fitted with blocking devices of which 12 have suspended screens, 16 have bridge-type barriers, and one has a graphite barrier suspended in water coolers (see chart in Fig. 2). More than 50% of the sheet-glass output of the USSR is manufactured in these furnaces.

Table 1 gives the basic structural and operational characteristics of glass-making furnaces with molten-glass blocking devices. The tabular data show that the capacity can be increased and the product quality can be raised in virtually all furnaces by installing these blocking devices. The increase in capacity is 10% and the rise in the molten-glass utilization factor is 2.2%; the output of top-grade glass rises by 7.6% and the specific fuel consumption is reduced by 10% (Table 2).

Allowance should be made for the fact that good plant operation indices are obtained by virtue of increasing the quality of the refractories, by locating them efficiently, by perfecting the fuel consumption process and other scientific developments, and by raising the cultural level of production as well as by installing the blocking devices. The rise in the technical and economic indices and their absolute level are, however, higher for furnaces with barriers than in the industry as a whole (see Table 2). In many plants the failure to increase the capacity of the glass-making furnaces has been due solely to a failure to ensure an increase in the total width of the VGD machines, but in this case the quality is improved, the molten-glass utilization factor is raised, and the specific fuel consumption is also reduced.