PNEUMATIC-VACUUM TRANSPORT OF GLASS BATCH AND ITS COMPONENTS

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The article "Vacuum Transport of Batches" published in "Steklo i Keramika" No. 1, 1960, gave the first account of the development and assessment in a glass plant (the "Druzhnaya Gorka") of pneumatic-vacuum equipment for transporting glass batch.

This article deals with the experience and also experimental and technical-economic data for progressive transport means introduced into the plant.

During 1958-62 the plant designed and developed four vacuum-transport units: for carrying batch components (sand, dolomite, soda ash) to the scales; for feeding batch from the batching department to the department making thin-walled vessels; for transporting batch from the batching department to the department making thick-walled vessels, and for carrying quartz sand and its tailings to the nontransparent quartz department. The first three units and their layout are shown in Fig. 1.

In all units, when the vacuum pump is operated, the powdered material (batch or its components) is sucked from the pneumatic-intake chambers (cone) and fed along the pipe line (material duct) and into the separator where about 99% of the material settles. The dust-like residue is carried along the air pipe into cyclones where the air is purified from the dust, passed through the vacuum pump and rejected into the atmosphere, and the extracted dust is transported for use in the compilation and blending of the batch.

The units for pneumatic transporting of two types of batch and their main components gave excellent results for a long time.

The efficiency of each worker in the batching department was almost doubled (1.55 ton instead of 0.8), and the staff strength was cut from 18 to 12 men.

The quality (homogeneity of the batch) was somewhat improved. Batch losses suffered with the old method, amounting to 2%, were eliminated. Dust removal from the separator to the cyclones did not exceed 1-1.2%. The abrasion of the pipes in the linear sections was negligible, so batch contamination by metal dust was assessed at ten-thousandth parts of one per cent.

Observations pointed to the following advantages of the pneumovacuum units:

- simplicity of design in which only one uncomplicated machine acts continuously and dynamically—the vacuum pump, and all the remaining parts consist of the simplest statically acting designs (collector nozzle and cones, pipe lines, separator, cyclones, etc.).

* The section of the pipeline from the intake unit to the separator.
ease of controlling the equipment, reducing the number of servicing personnel to a minimum;

the possibility of using the equipment in existing production bases without capital expenditure for constructing the building;

the possibility of using the equipment in troublesome conditions (without rearranging and relocating the equipment) where it is impossible to use ordinary mechanical transport (conveyers, elevators, autocars, telphers, etc.);

pneumotransport units facilitate the execution of complex automation including the automation of the control of all technical processes in batching departments;

pneumovacuum units in hermetic units and in vacuum conditions ensure dust-free transporting of loose materials, which is especially important in batch departments of glass plants.

Experiments with glass batch were made on three experimental and two working units at the "Druzhnaya Gorka" Plant to determine the best type of design and optimum working schedules of pneumatic transport units.

The table gives the results of experiments with these five units, the main parameters, and their operation. The material lines of the test and working units are rectilinear with one ring on the separation part.

The following components are contained in the system (see Fig. 1):

(a) the batch department unit, including a water tank 1, a vacuum pump RMK-2 (10 kW electric motor) 2, 2" diameter plugtype valves 3, cyclones 4, vacuum gages 5, pneumatic collection cones on the vibratory sieve for dolomite 6, a counter sieve No. 1 soda ash 7, and also a sieve No. 2 8, a pneumocollector cone for soda ash 9, a bunker for the processed soda ash 10, a vibrissieve for it 11, scales 12, a container for weighed out components 13, the pneumatic collector chambers of the rotary mixer 15, the rotary mixer 16, the bunker for sand 17, the sand separator 18, the dolomite bunker 19, the dolomite separator 20, the soda-ash separator 21, and the soda ash bunker 22;

Fig. 1. Layout of pneumatic units for transporting loose materials. a) Batch dept. unit, b) pneumo-unit for glass-batch No. 29, c) system for feeding alumino-magnesia batch.