DEVELOPMENT OF HERMETIC EQUIPMENT ON THE BASIS OF JET TECHNOLOGY ELEMENTS

Yu. A. Sazonov, V. I. Zayakin, and S. N. Koshtorev

The widening of the range of applications of the jet technology is determined mainly by unique properties, simplicity, and reliability of this equipment. In oil and gas industry, studies associated with the application of jet pumps and jet compressors are well known [1-3]. The Orenburgneft' OAO is carrying out experimental studies to develop jet dosing pumps-dispergators, jet boosters, and diodes. Jet elements are used as a basis for designing hermetic ecologically clean systems, satisfying the new safety rules in oil and gas industry [4].

Theoretically it is very difficult to describe completely the complicated hydrodynamic processes taking place in the jet elements. Therefore, experimental data are very valuable in this case. Production experience confirms the need to use simple measuring devices for controlling the working parameters of jet elements. In a number of cases, it is sufficient to obtain comparative data on modeling working media, for example, when inspecting the quality of manufacture of jet elements or when

Fig. 1. Diagram of the stand for testing the jet pump-dispergator (a) and the jet booster (b): 1) compressor; 2-5, 13, 14) valve; 6-10) liquid pressure gauges; 11-12) choke disc; 15) jet pump; 16) jet booster.
determining dimensionless hydrodynamic parameters. Investigations using air as the working medium replacing liquid are well-known [5-7]. In this case, the investigations are greatly accelerated and the cost of investigations and equipment is greatly reduced.

The Orenburgneft OAO has developed a stand for examining the jet elements.

The diagram of the experimental stand equipment is shown in Fig. 1. The use of an air compressor and flexible pipelines makes it possible to assemble rapidly the required pneumatic system for testing jet pumps (see Fig. 2), jet boosters (see Fig. 1b), or other elements. The supply of air to the system is regulated by the valves 2 and 3. Under variable operating conditions, the load on the jet apparatus is varied using the valves 4 and 5. The pressure in this case is controlled using the liquid pressure gauges 6-10.

The stand was used for verifying the dimensionless working characteristics of a jet dosing pump-dispergator which in July, 1995 was assembled at the Tananyksk oilfield. The pump is now in service and is used to supply a corrosion inhibitor into the pipelines of the system for maintaining the layer pressure. After six months in operation, the pump was additionally fitted with an electronic regulation system shown in Fig. 2. The supply line of the inhibitor was passed through the regulator and the two-position electromagnetic valve protected against explosions. The control unit was connected by the cable with the electromagnetic valve and the feedback line with the sensor of the operating parameter whose role is played by the flowrate meter measuring the feed of the power centrifugal pump of the block drilling pumping station.

Under the industrial conditions, the specific flowrate of the corrosion inhibitor is maintained automatically after preliminary setting and selecting the value from the range 60-100 g/m³. In subsequent stages, the variations of the supply of the centrifugal pump, caused by starting up or arresting operation of a number of pressure wells, have no influence on the specific flowrate of the inhibitor. The pressure at the outlet of the jet pump in tests was varied in the range 0.5-3 MPa, the pressure at the inlet of the working liquid into the nozzle reached 10 MPa. Equipment with the jet element is hermetic and does not contain moving sealing devices that are sources of fugitive emission.