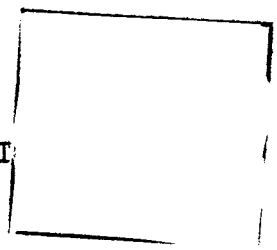

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GERMAN DEMOCRATIC REPUBLIC CONFERENCE ON REFRIGERATION ENGINEERING

by
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In February 1959, Soviet oxygen specialists visited the GDR (German Democratic Republic), where they attended the scientific and technical conference on refrigeration engineering organized each year by the Chamber of Technology.

A total of eight reports were presented and discussed by the participants at the conference. In our opinion, the report presented by Prof. Jungnikel (GDR) describing the production of pure argon as a by-product at nitrogen fertilizer plants is of great interest to specialists working in the field of low-temperature refrigeration engineering.

This method of producing argon was used with a unit having a capacity of 3000 m3/hr of 99.5% pure argon. This unit was recently put into operation at the Leuna Chemical Plant.

The argon extraction factor of this unit is approximately 0.5. In view of its reliable operation and the relatively low cost of obtaining argon in this manner, East German specialists believe that constructing equipment capable of extracting argon from the air is not expedient at the present time.

Of definite interest is the report presented by Mathiesen (Denmark) describing certain problems concerning the automatic control of ammonia and Freon refrigeration units. Candidate in technical sciences V. I. Yepifanova presented at the conference a report entitled "Oxygen Turbocompressors KTK-12.5 and KTK-7."

After the conference, the Soviet specialists were given the opportunity to familiarize themselves with the work done at individual enterprises specializing in the oxygen machine-building industry.

In becoming acquainted with the East German oxygen machine-building industry, we first visited an enterprise at Wurzen, where a designing bureau and a plant manufacturing refrigeration units and equipment are located. The Wurzen plant is specializing in the manu-

facture of oxygen units of lw and medium capacity, and also builds piston compressors and a wide range of oxygen pumps.

We were impressed by the wide range of oxygen units made at this plant, making it possible to satisfy the requirements of customers to a fuller extent. The plant manufactures a series of oxygen units with the following capacities: 5, 15, 25, 50, 100, 120, 200, and 400 m3/hr of oxygen. Extensive work on standardizing the individual component parts of the units is in progress, and, specifically, all lock-in and control fixtures have already been standardized. The assembly of the units is of high quality. A great deal of attention is devoted to the external appearance of the manufactured equipment. Equipment made of nonferrous metals is coated with a layer of water-resistant colorless lacquer.

This plant manufactures piston air compressors operating at an absolute pressure of 4 atm and having a capacity of 10 to 500 m3/hr; compressors for the compression of chlorine under an absolute pressure of 10 atm, with a daily capacity of up to 30 tons of chlorine; oxygen compressors with the following capacities: 16, 25, 40, 63, 100, 160, 250, 400, 500, 630, 800, 1,000, 1,250, 1,600 and 2,000 m3/hr. of oxygen under absolute pressures of 12 and 28 atm, and a capacity of 3,200 m3/hr. under an absolute pressure of 12 atm.

Graphite rings made in the GDR and also imported from West Germany are used as packing elements in the oxygen compressors. Extensive work is being done at the plant on experimental, by testing the quality of rings made of various grades of graphite.

Of definite interest is the use of an effective air cooling system in compressors having a low capacity (up to 80 m3/hr.) In transport air-fractionating units, such machines offer a number of advantages over compressors equipped with a water cooling system. A high rate of standardization of individual elements has also been achieved in the manufacture of compressor equipment.

An originally designed hydraulic control system for inlet and exhaust valves was noted in piston engines driven by compressed gas. This type of valve gear is very reliable and convenient during operation and is widely used in machines of various capacity.

The same plant also manufactures liquid-oxygen plunger pumps provided with a slit packing. The finishing of pump plungers and bushings is performed in cold, at a temperature close to the operating temperature. When the finishing treatment is of high quality, a better adjustment of these parts can be achieved by means of this technique.

The Soviet specialists also visited the Rudisleben Chemical Machine-Building Plant. This is a rather large enterpise specializing in the manufacture of various chemical equipment, including air-fractionating units. The plant manufactures a series of gaseous oxygen units having the following capacities: 600, 800, 1,000, 1,500, 2,000 and 3,000 m3/hr. of 02.

At present the plant is getting ready for the manufacture of a low-pressure unit with a capacity of 6,000 m3/hr of oxygen, utilizing regenerators provided with a filled checker work and built-in heat exchangers. It is planned to protect the regenerators from freezing by letting out part of the air, from which CO 2 will be removed in absorbers.

It should be mentioned that the bodies of the regenerators installed in the new units will consist of two sections made of different grades of steel: the hot section will be made of low-cabon steel, and the cold section will be made of stainless steel.

In addition to the above-mentioned gaseous oxygen units, the plant also manufactures stationary liquid-oxygen units having a capacity of 360 and 630-700 kg/hr. Combination units, producing both gaseous and liquid oxygen, are also manufactured at this plant. For example, the unit with a capacity of 750 m3/hr is also capable of producing up to 25% of liquid oxygen.

At present, copper is the principal material used in East German chemical machine-building plants for the manufacture of equipment operated at low temperatures. The various copper parts are joined by means of oxyacetylene or oxygen-hydrogen welding. At the same time, at the plant work is in progress aimed at finding and utilizing for industrial purposes other less deficient metals (i.e., metals which are not in such short supply as copper). Specifically, good experimental results have been obtained by using aluminum in the manufacture of acetylene absorbers. According to some plant specialists, aluminum adsorbers are about 20% cheaper than copper adsorbers. Standardization is also considered to be of great importance at this plant. For example, regenerator valves, cold angle valves, etc., have all been standardized.

At the end of their stay in the GDR, the Soviet specialists were given the opportunity to familiarize themselves with the production of oxygen and rare gases at the Leuna Chemical Combine, the largest plant in East Germany.

The oxygen shop of this plant is equipped with several two-pressure units with a capacity of 2,750 m3/hr of oxygen. One of the two-pressure units, which will soon be put into operation, is provided with equipment for the extraction of krypton. The German flow process for the production of a krypton concentrate differs from the Soviet pro-

cess in that it uses an acetylene pump and adsorber installed in the circulation stage of the liquefied concentrate in order to make the process more explosion-proof.

The unit for the production of argon is provided with an automatic device for analyzing the product. In addition, it is equipped with a test chromatograph for analyzing the argon-enriched mixture fed to the separation unit. Analyses of the mixture, giving the content of Ar, H_2, and CH_4, are recorded ever 6 minutes.

The oxygen shop is equipped with an instrument capable of giving a continuous analysis of gas mixtures with a low oxygen content (less than 1% O_2). The shop is also equipped with a test chromatograph for the periodic analysis of industrial-grade oxygen.

At the present time, the GDR has mastered the production of adsorbents of the molecular sieve type, which constitutes a substantial prerequisite for the development of a continuous analysis technique based on methods involving the chromatography of gas mixtures.

As a result of our visits to the above plants and our talks with German specialists, our general impression is that substantial progress has been made in the development of the oxygen machine-building industry in the GDR.

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