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REPORT ON A 20 INCH DIFFUSION PUMP

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A 20 in. diffusion pump removed from the old electromagnetic isotope separation plant has been under test for some time. The pump has a flared 20 in. Westinghouse barrel and D.P.I. MC-7000 jets. The 8 in. booster pump has jets similar to those in D.P.I. MB-200 series of booster pumps.

The water cooled baffle at the top of the pump has been modified to use Freon cooling instead of water cooling. The baffle is normally operated at -10° to -15°C .

The test facility was constructed directly on top of the pump, and consists of a cylinder the same diameter as the top of the pump and approximately 24 in. high. The cylinder welded to the pump at one end, and closed with a lid sealed with a neoprene gasket at the other. A leak valve is used to admit gas to the system and an Alpert type vacuum gauge is used to determine the pressure. Both the valve and the gauge are baffled so that they do not look directly into the pump or each other.

The pump performed well with very little backstreaming of oil (Octoil). The only visible oil getting into the system was by creep up the metal walls. The average creep rate was 0.3 in. per day. Freon cooling of a section of the wall to -10°C did not reduce the creep rate appreciably.

The ultimate pressure reached by the pump was 8×10^{-8} mm measured on a Veeco Alpert gauge. With an air leak into the fore pressure line the base pressure remains unchanged until a fore pressure of 150μ is reached. About 300μ of hydrogen fore-pressure can be held before breakdown of the pump.

The pressure variation caused by a leak between the booster pump and the 20 in. pump were of some interest. This pressure variation with time is shown in Figure 1. Figure 2 shows variation with no leaks.

Figure 3 shows the net number of particles per second removed by the pump as a function of pressure. The straight portion of the curves corresponds to a pumping speed of 6000 L/sec. for air and 9000 L/sec. for hydrogen.

Fig. 1. Pressure Variation Resulting from a Leak between 8-in. Booster Pump and 20-in. Main Pump.
Tracing Taken on 10^{-6} Scale of Veeco Gage.

Fig.2. Variation in Pressure after Removal of a Leak between 8-in. Booster Pump and 20-in. Main Pump. Tracing Taken on 10^{-7} Scale of Veeco Gage.

Fig. 3. Net Particles Per Second Removed by a 20-in. Diffusion Pump as a Function of Pressure.