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Author

Cantelow, Herbert P.

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Herbert P. Cantelow

December 23, 1958

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Herbert P. Cantelow

Lawrence Radiation Laboratory
University of California
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Protecting delicate pressure gages from corrosion when measuring process gas streams can be quite difficult. The specific problem in this instance was the measurement and control of the slight negative pressure (about 1 in. water gage) maintained in gloved boxes used as enclosures for radioactive work.

The instrument available was actuated by a brass bellows, with a full-scale range of 5 inches water gage and a corresponding bellows displacement of 50 cc. A purge system was ruled out because of a requirement to keep all leakage into the system at an absolute minimum. Since the box atmosphere would contain hazardous radioactive contaminants in addition to miscellaneous acid vapors, accuracy and reliability were of prime concern.

The isolating seal described here solved this problem with complete success. The heart of this device is a long, thin, polyethylene bag used as the isolating membrane. This design has the important feature of allowing a large displacement of gas without any measurable effect on the transmittance of pressure. Of several designs tried this was the only one completely satisfactory in this respect.

This isolating membrane was made from a length of thin-walled flat polyethylene tubing of the type normally used for making bags. The tubing used for this application which was 2.5-in. wide and 0.002-in. thick, can be obtained from plastic-bag fabricators. (It should be noted that the 2-1/2-in. dimension

* This work was done under the auspices of the U. S. Atomic Energy Commission.

refers to the width when flat, not the diameter.) One end of this tubing was heat-sealed to form a long, thin bag. The open end was then drawn over a No. 10 rubber stopper and the assembly inserted into one end of a 12-in.-length of 2-in.-o.d. Lucite tubing. Another rubber stopper in the other end and tubing nipples through each stopper complete the device.

The use of a transparent Lucite outer chamber allows easy inspection of the interior polyethylene membrane to make sure it is operating properly--neither fully distended nor completely collapsed, as might occur if the system leaked.

One feature is of particular value when the process gas stream is radioactively contaminated. Since the polyethylene membrane has been stretched up over the rubber stopper, the membrane and stopper may be removed as a unit. This allows the instrument to be disconnected from the process system without fear of contamination, since no opening need be made in the "hot" side of the system. The cost of the discarded polyethylene membrane and stopper is negligible, and the instrument can be made immediately available for further use by merely inserting a new membrane and stopper into the Lucite tube.

LEGEND

Fig. 1. Cross section of isolating seal.

