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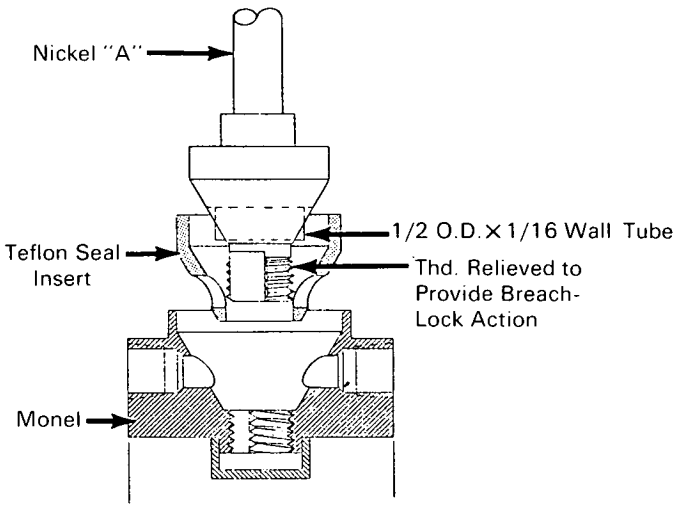
Abrasion- and Radiation-Resistant Discharge Valve Developed



The problem:

To develop a displacement valve which can withstand intense radiation and high abrasion. A process under development at Argonne National Laboratory involves a fluidized bed of alumina to provide high heat-transfer rates during the fluorination of irradiated uranium. To prevent buildup to fission products in the bed, the alumina is periodically discharged through a valve in the bottom of the bed. This valve must be capable of withstanding the radiation plus the abrasion of alumina, must be simple to operate and maintain by a master-slave manipulator, and must provide a straight-through port to permit occasional rodding of a caked bed.

The solution:

A discharge valve which has a replaceable Teflon seal and which meets all requirements for use in the fluidized bed reactor. The valve has only one moving part and is designed for remote assembly and disassembly. The Teflon seal is abrasion and radiation resistant and offers natural lubricity.

How it's done:

The body of the valve, shown in the figure, has a conical recess and a mating conical plug. Between these two sections is a Teflon insert which is replaced before each new closure of the valve to help minimize any deleterious effects of radiation, elemental fluorine, or abrasion.

Screw threads at the apexes of the cones drive the plug into the seat for closure. Upon opening, these threads produce a clearance which minimizes scoring of the seat by alumina. Cylindrical sections at the bases of the cones provide an auxiliary seal during discharge. A breech-lock cutaway of the threads allows rapid assembly and disassembly, which can be easily accomplished with one manipulator.

A tube, inserted into the plug and protruding from it, drives the Teflon seal with the plug, preventing

(continued overleaf)

independent rotation of the seal. This plug configuration also permits ready separation of the seal during replacement.

Notes:

1. This information has been published by Warren L. Gottwald in "Discharge Valve for Fluidized Bed Reactor Operating in a High Radiation Field," *Nuclear Applications*, Vol. 2, p. 429, December 1966.
2. The remotely replaceable Teflon seal appears promising, since abrasive wear in valves is a common industrial problem.
3. This information may be of interest to the chemical processing industry and manufacturers of valves.
4. Inquiries concerning this report may be directed to:
   Office of Industrial Cooperation
   Argonne National Laboratory
   9700 South Cass Avenue
   Argonne, Illinois 60439
   Reference: B69-10044

Source: W. L. Gottwald
Central Shops
Argonne National Laboratory
(ARG-10219)

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

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