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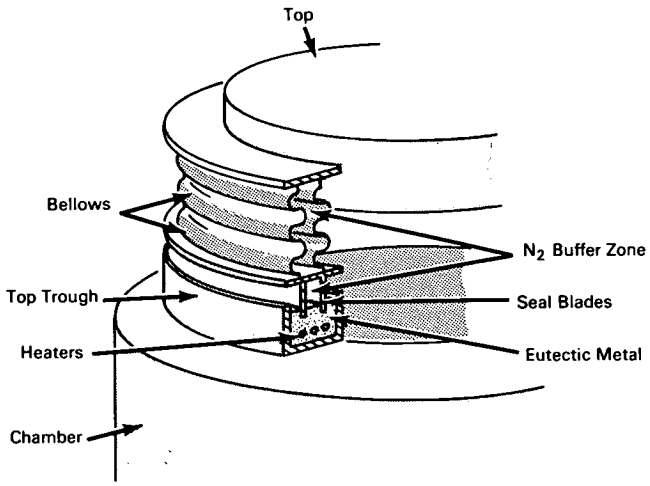
AEC-NASA TECH BRIEF

Vacuum Chamber Is Remotely Sealed by Eutectic Metal



The problem:

To devise a method of sealing a vacuum chamber remotely. The final seal could be made only after the chamber body was positioned below a fixed top. Working space and safety factors minimized the allowable manipulations for effecting a practical vacuum seal. Moreover, the process had to be easily reversible.

The solution:

A design that uses metal seal blades which are inserted into a molten eutectic metal by pressurizing an expansion bellows.

How it's done:

The vacuum chamber is provided with a trough that contains a eutectic metal. In the bottom of the trough, electrical heaters are provided to melt the eutectic. The seal blades are attached to the bellows, which, in turn, are attached to the fixed top section. The chamber is remotely positioned directly under the top and the seal blades are lowered into the molten eutectic by pressurizing the bellows with nitrogen. Upon solidification of the eutectic metal, the seal is completed. Opening the chamber requires reheating the eutectic and removal of bellows gas pressure (with possible small amount of vacuum applied to bellows to insure retraction).

Notes:

1. The space between the sealing plates is pressurized with nitrogen to prevent atmospheric air from entering the vacuum chamber.
2. The eutectic metal is an alloy of 45% lead with 55% bismuth with a melting temperature of 255°F.

(continued overleaf)

3. A vacuum of 52 mm Hg has been achieved with this configuration.
4. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
AEC–NASA Space Nuclear Propulsion Office
U.S. Atomic Energy Commission
Washington, D.C. 20545
Reference: B67-10059

Patent status:

No patent action is contemplated by AEC or NASA.

Source: R. Cordova and G. H. Sacoane
of AETRON Division
Aerojet-General Corporation
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AEC–NASA Space Nuclear Propulsion Office
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