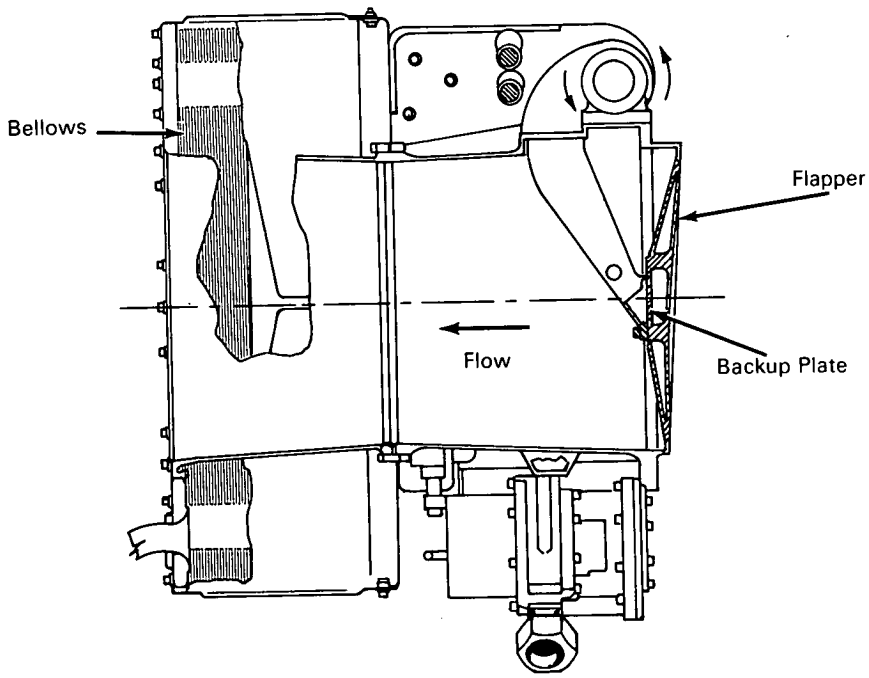
January 1968

Brief 68-10014

NASA TECH BRIEF

Vent and Relief Valve Maintains Low Leakage Rate Over Broad Temperature Range



A low leakage rate, large diameter vent and relief valve has been developed with several novel features. The valve operates satisfactorily over a temperature range from −320° to +450°F by a design that accommodates waviness and distortions due to thermal gradients. The design is based on a fixed sealing member or seat having an inclined or tapered lapped surface to which a flexible flow gate or flapper conforms. The valve seat contour allows dynamic loading to be absorbed on the outer edge of the seat and static loading (sealing load) to be applied on the inner edge.

To prevent chatter and buzz of the main valve as it works near the seat, a rigid backup plate is used in conjunction with the flapper. The flexible flapper is preloaded against the rigid backup plate, causing rubbing contact near the outer periphery of the flapper thus providing a measure of damping.

A pressure-operated metal bellows is used to provide the actuating power for the flapper. A sleeve type damper wraps around the bellows and holds against the convolution outer edges with a selected tension load, and completely eliminates amplification at the bellows' resonant frequency. An

(continued overleaf)

appropriate linkage system converts the linear bellows motion into rotary motion to drive the flapper.

Notes:

1. Leakage tests of the vent valve at +450°F, room ambient, and −320°F, were highly successful through 7,900 cycles, verifying the integrity of the design.
2. This valve, of 10-inch seal internal diameter, and with a closure time of 175 milliseconds, should find application wherever large volumes of gases must be transferred under close control.
3. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B68-10014

Patent status:

No patent action is contemplated by NASA.

Source: Ralph G. Weitenbeck
of Parker Aircraft Company
under contract to
Marshall Space Flight Center
(MFS-12807)