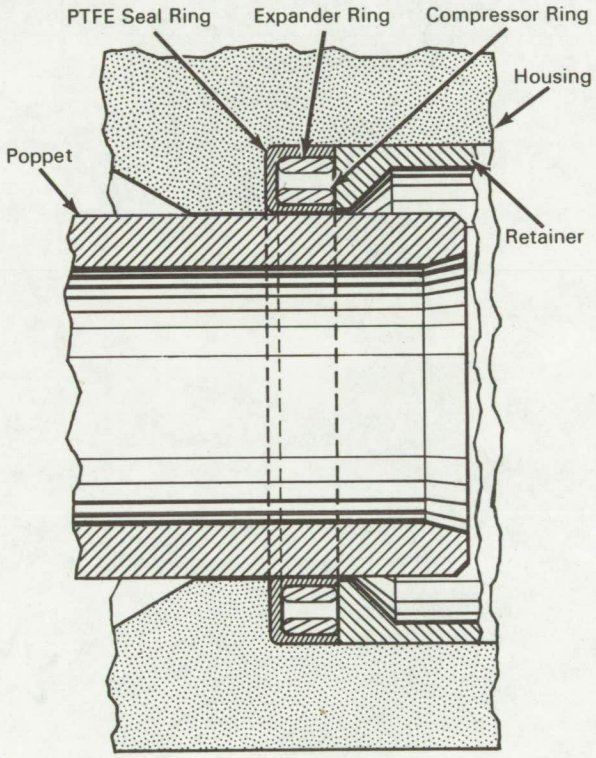
NASA TECH BRIEF

Dynamic Valve Seal is Reliable at Cryogenic Temperatures



The problem:

To devise a dynamic seal ring that will provide a reliable seal in cryogenic fluids over a fluid pressure range of 0 to 2000 psig. The leakage rate from conventional seals tends to increase as the temperature falls to the cryogenic level.

The solution:

A C-shaped PTFE (polytetrafluoroethylene) seal ring which is interference-fitted internally with a metal expander ring and a metal compressor ring.

How it's done:

The PTFE ring is dimensioned to obtain an interference fit on the outside diameter (in contact with the housing), thus minimizing the stress in the PTFE at cryogenic temperatures. The PTFE is used not only because of its compatibility with most cryogenic fluids but also because it provides the needed lubricity in a dynamic seal. The metal expander ring, in contact with the outer leg of the PTFE ring, is selected to have a much lower coefficient of thermal expansion than the mating housing to ensure proper sealing

(continued overleaf)

at lower temperatures. The metal expander and compressor rings are dimensioned to obtain interference fits. The sealing surfaces of the PTFE seal ring (the upper and lower legs) are serrated. The ridges of the serrations flow into the depressions when interference occurs upon assembly. Assembly is accomplished by cooling the subassembly of PTFE ring and metal rings in liquid nitrogen, dropping in place, warming to ambient temperature, then assembling the poppet in a similar manner.

Note:

Inquiries concerning this seal may be directed to:
Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B67-10526

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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of North American Aviation, Inc.
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Marshall Space Flight Center
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