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NASA TECH BRIEF



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High-Pressure Seals for Rotary Shafts

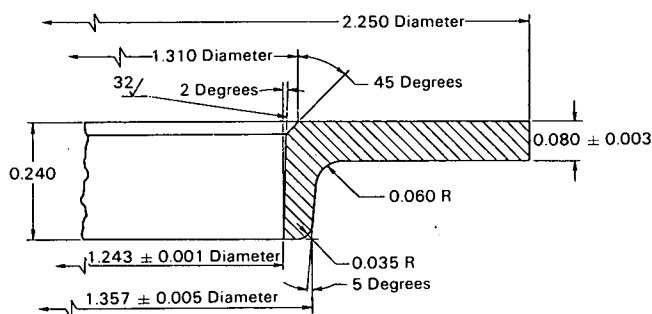


Fig. 1. Cross Section of a Seal (dimensions are in inches)

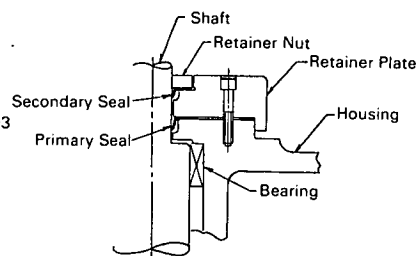


Fig. 2. Seal Assembly

The problem:

Development of 5,000-lb/in² seals for shafts rotating at temperatures between -400° and $+900^{\circ}$ F (500° F for continual operation).

The solution:

A new type of seal, machined from a polyimide resin, meets these specifications. It is more durable, longer-lived, and 85% cheaper than the older seal made of plastic-coated metal; it does not require the long stem now used on most cryogenic valves to form a gas pocket between the cold fluid and the seal.

How it's done:

The new seals are machined (fig. 1) from either blocks (available thicknesses, 0.25 to 2 in.), or sheets ranging from 0.015 to 0.060 in. in thickness. Available blocks are of the basic resin or contain one of three additions: 15% by weight of MoS₂, for unlubricated seals and bearings in vacuum or dry environments; 44% by weight of glass fibers, for precision parts in which only minimal thermal expansion is tolerable; or 15% by weight of graphite, for unlubricated seals and bearings.

A seal assembly comprises two lip-type seals: primary and secondary. The seals, separated by a retainer plate that is bolted to the housing, are locked in place by a retainer nut (fig. 2). A vent port in the retainer plate enables monitoring of leakage. The seal is suitable for all rotary machinery at speeds as high as 1,200 rev/min.

Notes:

1. The seal may interest designers or manufacturers of rotary machinery.
2. No further documentation is available. Inquiries may be directed to:

Technology Utilization Officer
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Patent status:

No patent action is contemplated by NASA.

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