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Semipermanent Sealing of Leaks in High Vacuum Systems

The problem:

To seal hair-line cracks in sections of a high vacuum system which are subject to mechanical or thermal stresses.

The solution:

Apply a silicone-rubber adhesive externally to the leak area while the system is partially evacuated.

How it's done:

No pretreatment of the surface is required; the adhesive will be drawn into the crack while the diffusion or ion pump is off. The adhesive is cured by gently heating the treated area, for example, with a 75-watt reflector lamp for a few hours; alternatively, the adhesive is allowed to cure overnight at room temperature. A second application may be required for troublesome leaks. When a permanent repair can be made, the cured adhesive can be easily peeled from the surface.

The silicone sealant has been used effectively with systems operating at 1×10^{-7} torr to seal leaks as large as 200 standard cm^3 sec^{-1} (net pumping speed of 8 liters per second at the leak); no troublesome outgassing has been detected after the curing period. The sealant appears equallly useful for glass, ceramic, metal, or plastic systems; because of the flexibility of the rubber adhesive, cracks do not reopen or enlarge under mechanical or thermal stresses as they might when an epoxy sealant is used.

Reference:

Christian, J. D. and Gilbreath, W. P.: Sealing of large leaks in high-vacuum systems subject to mechanical and thermal stresses. Journal of Vacuum Science and Technology, vol. 11, no. 4, July/August 1974.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
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Reference: B74-10175

Patent status:

NASA has decided not to apply for a patent.

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Category 04

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