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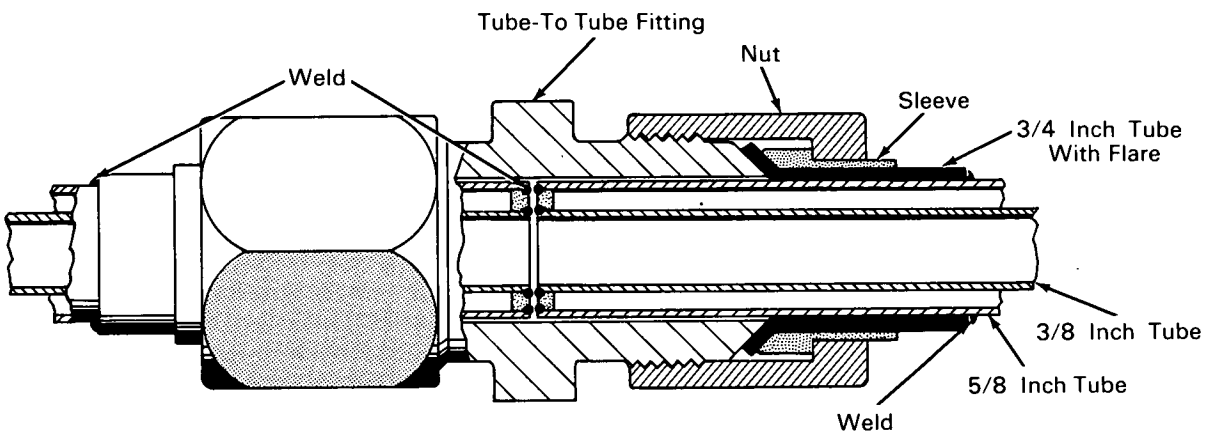
NASA TECH BRIEF

This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the NASA space program.

Connector for Vacuum-Jacketed Lines Cuts Tubing System Cost



Note: Standard pin fittings are used as an example for this typical assembly sketch.

The problem: Design of a low-cost connector for disconnecting vacuum-jacketed flow lines, as used in cryogenic systems. Cryogenic systems generally require many disconnect fittings. Available connectors are only suited to low pressures, are large in size, and are quite expensive. They utilize small line sizes that are unsatisfactory for liquid hydrogen applications because of too great a heat loss.

The solution: An improved fitting fabricated from standard connectors and utilizing vacuum-jacketed lines made from two sizes of tubing that have been welded at the ends. The improved connectors are inexpensive and yet are more satisfactory than those generally available. Strength is excellent. Connectors assembled with copper tubing have been proof-tested to more than 5,000 psi.

How it's done: Various combinations of tubing and fitting sizes may be utilized in fabricating the low cost vacuum-jacketed line connector. In this case, 3/8-inch tubing is placed inside 5/8-inch tubing and the ends are welded together. This forms a sealed space for the vacuum. A standard tube-to-tube fitting is drilled to fit the outside of one end of the vacuum line and welded in place by the inert gas-shielded arc method. A flared sleeve, made from 3/4-inch tubing, is welded to the other vacuum line. A standard nut and sleeve are placed over the vacuum line before the flared sleeve is assembled and welded in place.

Connections can be made or broken in the same manner as a standard tubing assembly. Setup time is reduced, as compared with the conventional aluminum gasket type while replacement of parts in the system is greatly simplified.

Notes:

1. If a large number of connectors are needed, as in industrial systems, cost savings can be large. Conventional vacuum connectors may cost up to $400

(continued overleaf)

each, while this innovation can be fabricated for approximately $25 per fitting.

2. When maximum strength is needed, the vacuum tubing can be made from stainless steel. It would have all of the advantages of the copper tubing yet be useful in pressure levels above 5,000 psi. Another variation would be to install tube-to-tube fittings at both ends of the vacuum line. For properly equipped valves, one length of tubing would then be interchangeable with another.

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

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