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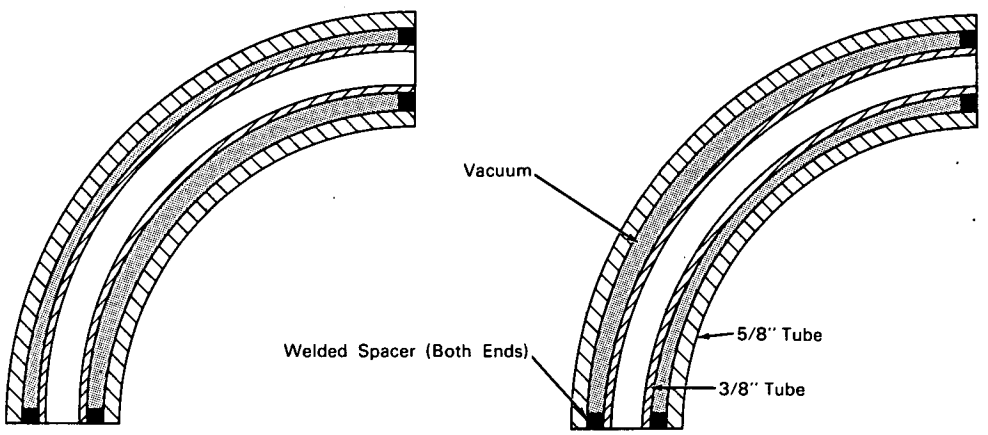
NASA TECH BRIEF

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.

Composite, Vacuum-Jacketed Tubing Replaces Bellows in Cryogenic Systems



The problem: Improving the reliability of high-pressure cryogenic systems. To allow for metal contraction and expansion required in such systems, metal bellows are normally employed where necessary. These become potential trouble spots in the equipment.

The solution: Eliminate the need for bellows by employing one or more 90-degree elbow expansion devices consisting of a conducting tube surrounded by a larger support tube. A vacuum in the space between the two tubes serves as insulation.

How it's done: Two pieces of tubing, one 3/8 inch in diameter and one 5/8 inch in diameter are each bent in a 90-degree circular section. The radii of the bends are chosen so that when the smaller tube is placed inside the larger, more clearance will be available between the tubes on the inside of the bend than on the outside. Spacers are welded at the two ends of the composite tubing, the space between the tubes being evacuated.

Under cryogenic temperatures the smaller, inside tube repositions itself by moving toward the inside curve of the larger tube. Expansion and contraction are thus permitted without the use of bellows.

Notes:

1. This principle has been used satisfactorily in straight line systems, Y-sections, and 4-way sections.
2. It has been used successfully with liquid hydrogen, and also at pressures up to 2500 p.s.i.
3. For further information about this innovation inquiries may be directed to:
   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio 44135
   Reference: B63-10368

Patent status: NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA Headquarters, Washington, D.C. 20546.

Source: Howard F. Calvert (Lewis-67)