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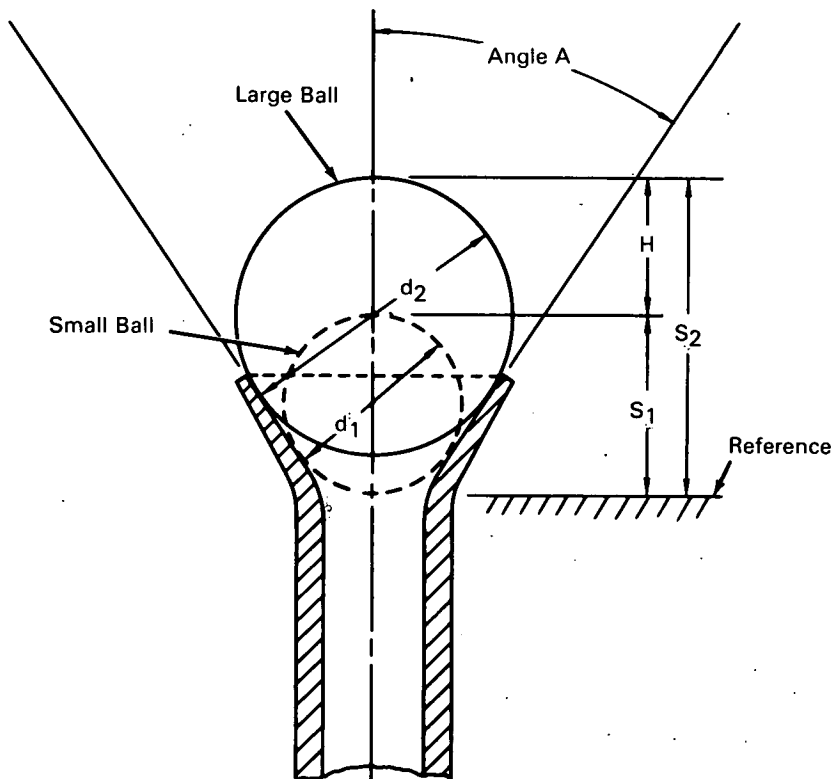
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NASA TECH BRIEF



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Flare Angles Measured with Ball Gage



Tubing joints have always been subject to leakage problems wherever high pressures, extreme temperature gradients, or excessive vibration have been involved. As a result, it is necessary to fabricate flared joints to very exacting standards and this requires precise means of measuring the internal angle of the planes. Prior methods involved making of a plaster or plastic cast of the internal flare and then inspecting the cast on an optical comparator.

A new method has been devised that uses precision tungsten carbide balls to measure the internal flare angle. Measurement is made by placing a small ball

into the throat of the flare, as shown in the sketch. The distance S_1 from the top of the ball to an external reference point is then measured. A larger ball is then placed in the flare and the distance S_2 from the top of the ball to the same reference point is measured. The difference H in distances ($S_2 - S_1$) to the reference point, and the difference in diameters d_1 and d_2 of the two balls determine the average slope of the flare between the points of ball contact. Thus, the required angle A is determined by:

$$\text{Cosec } \frac{A}{2} = \frac{2H}{d_2 - d_1} - 1.$$

(continued overleaf)

Note:

Inquiries concerning this invention may be directed to:

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Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,360,864), and royalty-free license rights will be granted for its commercial development. Inquiries about obtaining a license should be addressed to NASA, Code GP, Washington, D.C. 20546.

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