NASA TECH BRIEF

High-Pressure Gas Facilitates Calibration of Turbine Flowmeters for Liquid Hydrogen

Nitrogen gas at a pressure of 60 atmospheres and ambient temperature permits accurate and relatively inexpensive calibration of turbine flowmeters used for monitoring the flow of liquid hydrogen in cryogenic systems. The effectiveness of 60-atmosphere nitrogen gas as a meter calibration fluid for liquid hydrogen has been experimentally established for three different internal configurations of 1.5-inch turbine flowmeters. The experimental measurements show that full-scale calibration factors can be obtained to an accuracy of 0.4 percent. Typical meter repeatability obtained with the nitrogen gas for a 95 percent confidence band is ±0.3 percent. All of the accuracy values include an analytically derived thermal-correction factor for non-zero blade clearance.

Notes:

1. Calibration of turbine flowmeters using liquid hydrogen itself as the working fluid is both time consuming and costly.
2. For the majority of flowmeters tested, liquid hydrogen calibrations were more accurately simulated by using the high-pressure nitrogen gas rather than water as the test fluid (see Tech Brief 67-10506).
3. Complete technical details are given in NASA TN D-3773, "Simulation of Liquid-Hydrogen Turbine-Type Flowmeter Calibration Using High-Pressure Gas," by A. J. Szaniszlo and L. N. Krause, December 1966, available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151. Inquiries may also be directed to: Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio 44135
   Reference: B68-10145

Patent status:

No patent action is contemplated by NASA.

Source: A. J. Szaniszlo and L. N. Krause
(LEW-10402)

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