



AEROSPACE STANDARD

AS5304™

Issued 2011-06
Reaffirmed 2017-02

Standard Specification for Turbine Flowmeters

RATIONALE

AS5304 has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

This is a SAE Standard specification with minimum performance characteristics for Turbine Flowmeter (TFM) that pertains only to sizes from ½ to 2 inches. The utilization of TFM is for hydrocarbon liquid fuel volumetric flow measurements. This Standard specifically excludes smart electronics in accomplishing the defined performance objectives. Users of this Standard should specify other TFM characteristics required to satisfy their application and utilization in operational environment. A User should understand fit and function of the TFM and define end user specific fit and function requirements. The TFM should be calibrated by the manufacturer should be based upon end user requirements and presented as Roshko versus Strouhal at a reference temperature. The Supplier shall be prepared to show evidence to User that the device demonstrates compliance with all requirements identified in this Standard.

2. REFERENCES

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of the other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

ARP4990 Turbine Flowmeter Fuel Flow Calculations

2.2 API Publications

Available from American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005-4070, Tel: 202-682-8000, <http://api-ec.api.org>.

API ANSI Z11.299/API-2534 Turbine flow meters & Application to Hydrocarbon Products

API Manual of Petroleum Measurement Standards, Chapter 21; Section 2

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2.3 ISO Publications

Available from International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland, Tel: +41-22-749-01-11, www.iso.org.

ISO 4406 First Edition, 1987-12-15 (E)

2.4 NIST Publications

Available from National Institute of Standards and Technology, 100 Bureau Drive, Stop 1070, Gaithersburg, MD 20899-1070, Tel: 301-975-6478, www.nist.gov.

NIST Technical Note 1297 1994 Edition, titled "Guidelines for evaluating and expressing the Uncertainty of NIST Measurement Results"

2.5 U.S. Government Publications

Available from the Document Automation and Production Service (DAPS), Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-9495, <https://assist.daps.dla.mil/quicksearch/>.

MIL-PRF-7024E Performance Specification, Calibrating Fluids, Aircraft Fuel System Components, 01 October 1997. Superseding MIL-C-7024D 30 August 1990

2.6 Other Publications

Mattingly, G. E., Titled "The Characterization of a Piston Displacement-Type Flowmeter Calibration Facility and the Calibration and Use of Pulsed Output Type Flowmeters", Journal of Research of the National Institute of Standards and Technology, Volume 97, Number 5, September-October 1992, pp. 509-531.

3. DEFINITIONS

K-FACTOR: A traditional representation of TFM characteristics of a flowmeter shown as cycles/US-gal or cycles/L versus output frequency divided by kinematic viscosity (f/v). This is provided that the fluid is operated at the same temperature calibrated

TIME CONSTANT: The time required for the TFM indication to reach 63.2% of the final value after the application of a step input flow.

STROUHAL NUMBER (St): Dimension-less in basic form is equal to (output frequency) * (reference diameter of meter)³. This number compensates for temperature change and is referenced to a standard temperature.

ROSHKO NUMBER (Ro): Dimension-less in basic form is equal to (output frequency / kinematic viscosity) * (reference diameter of meter)². This compensates for temperature change when referenced to a standard temperature.