



AEROSPACE STANDARD

AS9968™**REV. A**Issued 2014-07
Revised 2021-07

Superseding AS9968

(R) Laboratory Viscosity Measurement of Thickened Aircraft Deicing/Anti-icing Fluids with a Viscometer

RATIONALE

The scope of the standard has been expanded to allow other important uses aside from field verification and auditing purposes. A number of editorial and organizational revisions were also made.

The expanded scope allows the standard to be used for AMS1428 conformance testing or for quality assurance purposes when measurement of viscosity using different spindles, or temperatures different from 20 °C or rotational speeds different from 0.3 rpm is required. At the same time the standard preserves the original methodology used for field verification and auditing purposes.

New guidelines for reporting viscosity results make clearer that the results of independent measurements can only be compared when the same test parameters and conditions have been used.

The word "Brookfield" has been removed from the title because alternate viscometers (different from the Brookfield LV model) will be allowed if the alternative viscometer demonstrates equivalent performance to the Brookfield LV.

Section 3 was updated to include a significant amount of new content which has been divided into four new sections entitled: Summary of Test Method, Equipment and Test Parameters, Calibration of Test Equipment, and Testing of Samples. The contents of Sections 4 and 5 were revised and combined into a new section entitled Reporting.

An appendix was added to provide additional information and explanation of test parameters and conditions which have an effect on accuracy and precision of viscosity measurements.

FOREWORD

In freezing weather conditions, situations conducive to aircraft icing on the ground may be encountered. Under these conditions, thickened anti-icing fluids (AMS1428) are applied (using application methods described in AS6285) to protect aircraft surfaces.

Aircraft operators and deicing companies perform viscosity checks on these thickened anti-icing fluids for quality control purposes. Since checks are performed by various companies, a standard viscosity measurement method has been selected to allow comparison of results. This Aerospace Standard (AS) describes the selected method.

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1. SCOPE

This document describes a standard method for measuring the viscosity of thickened (AMS1428) Type II/III/IV Aircraft Deicing/Anti-icing Fluids.

The determination of viscosity for a Non-Newtonian fluid is very sensitive to shear and differences in sample chamber geometry. Even slight differences can have a large effect on measurement results.

The test parameters and associated error for this standard are applicable to the Brookfield LV viscometer. A Brookfield LV or equivalent viscometer shall be used. To be considered equivalent, an alternate viscometer must demonstrate statistically equivalent performance, i.e., accuracy and precision when testing thickened (AMS1428) fluids using the same test parameters and conditions. Test parameters and conditions outside of the ranges described within this standard may be used only if they meet minimum limits for precision and accuracy established for the Brookfield LV viscometer.

To compare viscosities, the same test parameters and conditions (including spindle number, rotation speed, sample volume and container type, sample temperature, and measurement duration) shall be used.

1.1 Objective

The objective of this method is to provide critical information about laboratory viscometers and to provide guidance on how to effectively compare viscosities of differently thickened (AMS1428) fluid samples and/or to compare sample viscosities to limits published for aerodynamic acceptance and Holdover Time use.

2. REFERENCES

2.1 Applicable Documents

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 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.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS1428 Fluid, Aircraft Deicing/Anti-Icing, Non-Newtonian (Pseudoplastic), SAE Types II, III, and IV

AS6285 Aircraft Ground Deicing/Anti-Icing Processes

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D2196 Standard Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscometer

ASTM E3116 Standard Test Method for Viscosity Measurement Validation of Rotational Viscometers

2.2 Abbreviations

FSR Full Scale Range

LOWV Lowest on Wing Viscosity

HOWV Highest on Wing Viscosity