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400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

SAE J1696

Issued 1994-04-04

Submitted for recognition as an American National Standard

STANDARD FUEL FILTER TEST FLUID

Foreword—This test fluid conforms essentially to ISO 4113.

1. Scope—This SAE Standard defines the requirements for fluid to be used in the SAE Fuel Filter Test Procedures.

2. References

2.1 Applicable Documents—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J905—Fuel Filter Test Methods

2.1.2 ASTM PUBLICATIONS—Available from ASTM, 1916 Race Street, Philadelphia, PA 19106-1187.

ASTM D 56—Test Method for Flash Point by Tag Closed Tester

ASTM D 86—Method for Distillation of Petroleum Products

ASTM D 129—Test method for Sulfur in Petroleum Products (General Bomb Method)

ASTM D 130—Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test

ASTM D 445—Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)

ASTM D 665A—Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water

ASTM D 892—Test Method for Foaming Characteristics of Lubricating Oils

ASTM D 1298—Test Method for Density, Relative Density (Specific Gravity or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method)

ASTM D 1500—Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)

ASTM D 2140—Test Method for Carbon-Type Composition of Insulating Oils of Petroleum Origin

ASTM D 2273—Test Method for Trace Sediment in Lubricating Oils

ASTM D 2500—Test Method for Cloud Point of Petroleum Oils

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2.1.3 ISO PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 2049—Petroleum products—Determination of colour

ISO 2160—Petroleum products—Corrosiveness to copper—Copper strip test

ISO 2719—Petroleum products and lubricants—Determination of flash point—Pensky-Martens closed cup method

ISO 3015—Petroleum oils—Determination of cloud point

ISO 3104—Petroleum products—Transparent and opaque liquids—Determination of kinematic viscosity and calculation of dynamic viscosity

ISO 3405—Petroleum products—Determination of distillation characteristics

ISO 3675—Crude petroleum and liquid petroleum products—Laboratory determination of density or relative density—Hydrometer method

ISO 4113—Road vehicles—Calibration fluid for diesel injection equipment

2.1.4 FTSM PUBLICATION—Available from NIST, Room 205, Building 202, Gaithersburg, MD 20899.

FTSM 5322.1—Corrosives of Oil on Bi-Metallic Coupling

2.1.5 IP PUBLICATION—Available from Institute of Petroleum, 61 New Cavendish Street, London, England W1M 8AR.

IP 306/82—Oxidation Stability of Straight Mineral Oil

3. **Property Requirements**—The filter test fluid shall be formulated from solvent refined petroleum stocks and blended with additives required to meet the specifications shown in Table 1. Figure 1 shows the typical viscosity versus temperature range of SAE J1696 APR94 test fluid.

The filter test fluid shall also meet fuel injection equipment manufacturer specifications and requirements.

4. **Performance Characteristics Approval**—The following fluid performance characteristics must be approved by a panel of users selected by the SAE Filter Test Methods Standards Committee:

4.1 **0.8 μ m Membrane Filterability**—A panel judgment of slow filtration rates, relating to additive removal or contamination, would constitute grounds for rejection.

4.2 **SAE Filterability**—A panel judgment of filter performance, which deviates measurably from previously qualified batches of fluid, would constitute grounds for rejection.

4.3 **Odor**—A panel judgment of objectionable odor, generated during any portion of SAE testing would constitute grounds for rejection.

5. **Test Codes**—SAE J1696 APR94 "Standard Fuel Filter Test Fluid" is used in the SAE J905 Test Code.

6. **Source Information**—Approved April 1994, Filter Test Fluid SAE J1696 APR94 is available by contacting Rock Valley Oil & Chemical Co., 1911 Windsor Road, Rockford, Illinois 60111. Phone: 815-654-2400. FAX: 815-654-2428. Other sources will be published as they are approved and become available.

This test fluid has generally been called Viscor L-4264-V-93.

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TABLE 1—FUEL FILTER TEST FLUID

Property	Specification Limit	Test
Density		ISO 3675
Specific Gravity	0.815 - 0.830/15.5 °C	ASTM D 1298
Flash Point	71 °C min	ISO 2719 ASTM D 56
Viscosity:		ISO 3104 ASTM D 445
cSt @ 20 °C		
cSt @ 37.8 °C		
cSt @ 40 °C ¹	2.40 - 2.85	
cSt @ 100 °C		
Distillation	5% max vol 210 °C 95% min vol 360 °C	ISO 3405 ASTM D 86
Oxidation Stability Catalyzed-48 h)		IP 306/82
Total Sludge		
Total Acidity after Oxidation ²		
Cloud Point	0 °C	ISO 3015 ASTM D 2500
Rust Protection (Polished panels 50 h)		ASTM D 1748
Corrosion Tests		
Ferrous Metal	Pass 24 h	ASTM D 665A
Copper	Pass 1A Class	ISO 2160 ASTM D 130
Galvanic Corrosion		FTSM 5322.1
Sulfur	0.4% max	ASTM D 129
Trace Sediment (incl. water)	0.01% max	ASTM D 2273
Aromatic components		ASTM D 2140
Foaming Tendency (After 5 min blowing)	50 mL max	ASTM D 892
(After 2 min settling)	0 mL	ASTM D 892
Color	2.5 max	ISO 2049 ASTM D 1500

¹It is recommended that the calibration fluid be renewed when the viscosity increases above 3.0 cSt (mm²/s) at 40 °C or 3.1 cSt (mm²/s) at 37.8 °C.

²Sum of volatile and soluble acidity.

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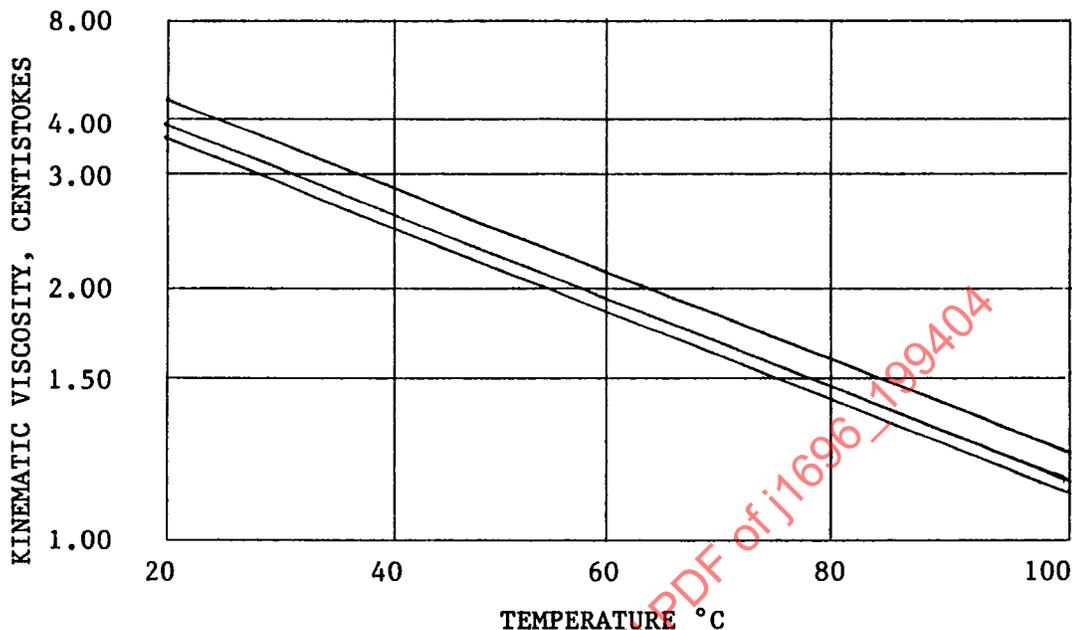


FIGURE 1—VISCOSITY VERSUS TEMPERATURE RANGE FOR SAE J1696 APR94
(SAE L4264-V-93)

7. Storage and Handling Procedure for SAE J1696 Test Fluid—It is essential that the SAE J1696 test fluid has uniform composition when used in testing fuel filters according to SAE J905 test codes, other SAE test codes.

The SAE J1696 test fluid as manufactured, if stored indoors, protected from the elements at temperatures of 10 to 30 °C, does not require special handling or mixing for a period of 6 months. Based on tests conducted by the producer of this test fluid, separation or stratification of components becomes appreciable, after storage in a quiescent state for more than 6 months, or when the test fluid is subjected to -10 °C or lower temperatures.

Before removing the SAE J1696 test fluid from the drum, it is suggested the drum be brought into room temperature environment for at least 48 h. The contents are then mixed by using a drum mixer or a drum pump, by pumping from one bung into the other, for 10 to 15 min. This procedure assures uniformity of composition of the SAE J1696 for use in a test stand. Water contaminated SAE J1696 test fluid, containing more than 0.05% water, is considered unsuitable for use in a test stand for the calibration of filters.

Use a dedicated and clean drum pump, twice flushed with SAE J1696 test fluid. Protect the test fluid from contamination by keeping the drum bungs closed when the drum is not in use.

PREPARED BY THE SAE FILTER TEST METHODS STANDARDS COMMITTEE