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# SURFACE VEHICLE STANDARD

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An American National Standard

## (R) CALIBRATION FLUID FOR DIESEL INJECTION EQUIPMENT

***Foreword*—**This Document has not changed other than to put it into the new SAE Technical Standards Board Format. References were added as Section 2. All other section numbers have changed accordingly.

***1. Scope*—**This SAE Standard defines the requirements of a calibration fluid recommended for flow bench testing, calibration, and flushing of fuel injection equipment, in production facilities, in laboratories, and in service establishments.

***2. References***

**2.1 Applicable Publications—**The following publication forms a part of the specification to the extent specified herein.

2.1.1 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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 1748—Test Method for Rust Protection by Metal Preservatives in the Humidity Cabinet
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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2.1.2 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 products—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

2.1.3 IP PUBLICATION

IP 306/82

2.1.4 FSTM PUBLICATION

FSTM 5322.1

***3.*** ***International Standard—***This SAE Standard meets the specifications for ISO 4113 calibration fluid for diesel injection equipment.

***4.*** ***Property Requirements—***The calibration fluid shall be formulated from refined and deodorized fuel stocks. It shall meet the specifications shown in Table 1. Anti-wear additives may be included.

The calibration fluid shall not contain components in such a concentration that it could irritate the normal skin.

The calibration fluid shall have good storage and thermal stability, and shall be such that without cleaning of the equipment after calibration, proper functioning of the equipment is ensured after being stored one year in normal conditions.

***5.*** ***Certification—***A supplier of this calibration fluid must supply, with each container or bulk shipment, certification that the fluid meets this standard, state the specific revision, the date of manufacture, and indicate the presences of anti-wear additives. The presence of anti-wear additives must also be included on the shipping container.

## TABLE 1—CALIBRATION FLUID SPECIFICATIONS

| PROPERTY | SPECIFICATION LIMIT | TEST |
|---|---|---|
| Density | 0.820 – 0.830 g/ml at 15 °C (59 °F) | ISO 3675 |
| Specific Gravity | 0.819 – 0.829 at 15.5 °C (60 °F) | (ASTM D 1298) |
| Flash Point | 75 °C (167 °F) Minimum | ISO 2719 (ASTM D 56) |
| Viscosity | 2.45 – 2.75 cSt ($mm^2/s$) at 40°C (104°F) | ISO 3104 (ASTM D 445) |
| | 2.55 – 2.85 cSt ($mm^2/s$) at 37.8°C (100°F)(1) | |
| Distillation | 5% volume maximum at 210 °C (410 °F) | ISO 3405 (ASTM D 86) |
| | 95% volume minimum at 360 °C (680 °F) | |
| Oxidation Stability (Catalyzed-48 h) | | IP 306/82 |
| Total Sludge | 0.05% maximum by weight | |
| Total Acidity after oxidation | 0.7 maximum mgKOH/g(2) | |
| Cloud Point | –10 °C (14 °F) maximum | ISO 3015 (ASTM D 2500) |
| Rust Protection (Polished Panels-50 h) | Pass 5 out of 6 faces of three panels | ASTM D 1748 |
| Corrosion Tests | | |
| - Ferrous Metal | Pass-24 h | ASTM D 665A |
| - Copper | Pass-classification 1 at 100 °C (212 °F) 3 h | ISO 2160 (ASTM D 130) |
| Galvanic Corrosion | Pass-10 days | FSTM 5322.1 |
| Sulfur | 0.4% weight, maximum | ASTM D 129 |
| Trace Sediment (including water) | 0.01% volume, maximum | ASTM D 2273 |
| Aromatic components | 12% $C_A$ maximum | ASTM D 2140 |
| Foaming Tendency (After 5 min blowing) | 50 ml maximum at 24 °C (75 °F) | ASTM D 892 |
| Foaming Stability (after 2 min settling) | 0 ml maximum at 24 °C (75 °F) | ASTM D 892 |
| Color | | ISO 2049 |
| New Product | 2 maximum | (ASTM D 1500) |
| After 6 months' storage | 3 at 43 °C (109.4 °F) maximum | |

1. It is recommended that the Calibration Fluid be renewed when the viscosity increases above 3.0 cSt ($mm^2/s$) at 40 °C (104 °F) or 3.1 cSt ($mm^2/s$ at 37.8 °C (100 °F).
2. Sum of volatile and soluble acidity.

## 6. *Notes*

**6.1 Marginal Indicia—**The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

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