



# INDUSTRIAL LUBRICANT STANDARD

MS1005™

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Lubricants, Industrial Oils, and Related Products Type HF  
Fire-Resistant Hydraulic Fluids—Specification

## RATIONALE

Limited need for revisions, move the document to stabilized status.

## STABILIZED NOTICE

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## FOREWORD

The SAE International Industrial Lubricants Committee has developed a number of industrial, non-production lubricant performance specifications.

The purpose of these voluntary SAE specifications is to:

- a. Define minimum performance requirements for industrial lubricants.
- b. Provide lubricant suppliers with performance targets for a minimum number of key industrial lubricants.
- c. Improve the availability of these lubricants to member companies.
- d. Provide a plant oriented, user friendly, classification system using common test standards and properties.

ISO Standard 6743 - Lubricants, industrial oils and related products (class L) - Classification is the foundation for these documents.

- a. Performance characteristics and test procedures are specified.
- b. For information, equivalent ISO, DIN, CEN, BSI, ASTM, AFNOR, CETOP, and IP test methods are referenced.<sup>1</sup>

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1. International Standards Organization (ISO)  
Deutsches Institut für Normung e. V. (DIN)  
European Committee for Standardization (CEN)  
American Society for Testing and Materials (ASTM)  
Association of Française de Normalisation (AFNOR)  
The Institute of Petroleum (IP) NOTE: Now combined with BSI  
British Standards Institution (BSI), BS 2000: XXX where XXX is the corresponding IP number  
European Committee on Hydraulic Oil and Pneumatics (CETOP)

Industrial lubricant classifications targeted:

- a. Lubricants, Industrial Oils and Related Products - Classification (SAE MS1000)
- b. General purpose and total loss lubricants (SAE MS1001)
- c. Gear oils (SAE MS1002)
- d. Compressor oils (SAE MS1003)
- e. Hydraulic fluids (SAE MS1004)
- f. Fire resistant hydraulic fluids (SAE MS1005)
- g. Lubricants for spindle bearings and associated clutches (SAE MS1006)
- h. Slideway lubricants (SAE MS1007)
- i. Metal removal fluids (SAE MS1008)
- j. Lubricants for pneumatic tools (SAE MS1009)
- k. Turbine oils (SAE MS1010)
- l. Lubricating greases (SAE MS1011)

See SAE MS1000 - Index of lubricants and symbols.

NOTE 1: Environmental, Technical Reports, and/or health and safety regulations may present additional specifications to the supplier. EXAMPLE: Factory Mutual Research Corporation, Spray Flammability of Hydraulic Fluids and Development of a Test Method.

NOTE 2: There can be issues related to the quality of industrial lubricants that fall outside of the scope of this specification.

## 1. SCOPE

ISO 7745 shall be used for providing detailing, operational characteristics, advantages, disadvantages, and factors affecting the choice to be made among fire-resistant fluids.

TABLE 1 - SCOPE AND FIELD OF APPLICATION

| Code letter | General Applications | More specific applications                            | Composition and properties                                                              | Symbol | Remarks                                                                                                                                                        |
|-------------|----------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| H           | Hydraulic systems    | Applications where fire-resistant fluids are required | Oil-in –water emulsions                                                                 | HFAE   | Typically more than 80% water content                                                                                                                          |
|             |                      |                                                       | Chemical solutions in water                                                             | HFAS   | Typically more than 80% water content                                                                                                                          |
|             |                      |                                                       | Water-in-oil emulsions                                                                  | HFB    | Typically less than 80% water content<br>Fluids in these categories should be selected carefully, taking into account possible environmental or health hazards |
|             |                      |                                                       | Water polymer solutions                                                                 | HFC    |                                                                                                                                                                |
|             |                      |                                                       | Synthetic fluids containing no water and consisting of phosphate esters                 | HFDR   |                                                                                                                                                                |
|             |                      |                                                       | Synthetic fluids containing no water and consisting of chlorinated hydrocarbons         | HFDS   |                                                                                                                                                                |
|             |                      |                                                       | Synthetic fluids containing no water and consisting of mixtures of HFDR and HFDS fluids | HFDT   |                                                                                                                                                                |
|             |                      |                                                       | Synthetic fluids containing no water and of other compositions                          | HFDU   |                                                                                                                                                                |
|             |                      |                                                       | Vegetable Oils and esters of vegetable oils – biodegradable fluids                      | HETG   |                                                                                                                                                                |

HFAE, HFC, HFDR, HFDU and HETG oils are covered in this specification. HFAS, HFB and HFDS fluids are not addressed.

## 2. REFERENCES

### 2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

#### 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 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

SAE MS1000 Lubricants, Industrial Oils, and Related Products—Classification

SAE MS1001 Lubricants, Industrial Oils, and Related Products Type A Lubricants for General Purpose and Total Loss Systems

SAE MS1002 Lubricants, Industrial Oils, and Related Products Type C (Gears) Specification

SAE MS1004 Lubricants, Industrial Oils, and Related Products Type H (Hydraulic Fluids) - Specification

SAE MS1005 Lubricants, Industrial Oils, and Related Products Type HF Fire-Resistant Hydraulic Fluids - Specification

SAE MS1006 Lubricants, Industrial Oils, and Related Products Type F Lubricant for Spindle Bearings, and Associated Clutches - Specification

SAE MS1007 Lubricants, Industrial Oils, and Related Products Type G Slideway Lubricants - Specification

SAE MS1008 Lubricants, Industrial Oils and Related Products Type M (Metal Removal Fluids) - Specification

SAE MS1011 Lubricants, Industrial Oils and Related Products - Type X (Greases) - Specification

### 2.1.2 Publications

Referenced ASTM, BS, CEN, DIN, IP, ISO, and VDMA Standard hardcopies are available from the ILI Website (<http://www.ili-info.com>) or by contacting ILI at:

#### Europe

ILI, Index House, Ascot, Berkshire, SL5 7EU, UK  
Tel: +44 (0)1344 636400 Fax: +44 (0)1344 291194  
Email: [databases@ili.co.uk](mailto:databases@ili.co.uk)

#### USA

ILI, 610 Winters Avenue, Paramus, NJ 07652, USA  
Tel: 201-986-1131 Fax: 201-986-7886  
Email: [sales@ili-info.com](mailto:sales@ili-info.com)

### 2.1.3 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](http://www.astm.org).

ASTM D 92 Test Method for Flash and Fire Points by Cleveland Open Cup

ASTM D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation

ASTM D 97 Test Methods for Pour Point of Petroleum Products

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

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

ASTM D 471 Test Method for Rubber Property - Effect of Liquids

ASTM D 482 Test Method for Ash from Petroleum Products

ASTM D 664 Test Method for Neutralization Number of Petroleum Products by Potentiometric Titration

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

ASTM D 665B Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Synthetic Sea Water

ASTM D 892 Test Method for Foaming Characteristics of Lubricating Oils

ASTM D 943 Standard Test Method for Oxidation Characteristics of Inhibited Mineral Oils

ASTM D 974 Test Method for Acid and Base Number by Color-Indicator Titration

- 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 1401 Test Method for Water Separability of Petroleum Oils and Synthetic Fluids
- ASTM D 1744 Test Method for Determination of Water in Liquid Petroleum Products by Karl Fischer Reagent
- ASTM D 2140 Test Method for Carbon-Type Composition of Insulating Oils of Petroleum Origin
- ASTM D 2270 Practice for Calculating Viscosity Index from Kinematic Viscosity at 40°C and 100°C
- ASTM D 2422 Classification of Industrial Fluid Lubricants by Viscosity System
- ASTM D 2619 Test Method of Hydrolytic Stability of Hydraulic Fluids (Beverage Bottle Method)
- ASTM D 2896 Standard Test Method for Base Number of Petroleum Products by Potentiometric Perchloric Acid Titration
- ASTM D 3238 Method for Calculation of Carbon Distribution and Structural Group Analysis of Petroleum Oils by the N-D-M Method
- ASTM D 3427 Test Method for Air Release Properties of Petroleum Oils
- ASTM D 3707 Test Method for Storage Stability of Water-in-Oil Emulsions by the Oven Test Method
- ASTM D 4052 Test Method for Density and Relative Density of Liquids by Digital Density Meter
- ASTM D 4289 Standard Test Method for Elastomer Compatibility of Lubricating Greases and Fluids
- ASTM D 4294 Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-ray Fluorescence Spectrometry
- ASTM D 4927 Test Method for Elemental Analysis of Lubricant & Additive Components - Barium, Calcium, Phosphorus, Sulfur & Zinc By Wavelength-Dispersive X-Ray Fluorescence Spectroscopy
- ASTM D 4951 Test Method for the Determination of Additive Elements in Lubricating Oils by Inductively Coupled Plasma Atomic Emission Spectrometry
- ASTM D 5182 Test Method for Evaluating the Scuffing (Scoring) Load Capacity of Oils (FZG Visual Method)
- ASTM D 5185 Test Method for Determination of Additive Elements, Wear Metals, and Contaminants in Used Lubricating Oils and Determination of Selected Elements in Base Oils by Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES)
- ASTM D 5621 Test Method for Sonic Shear Stability of Hydraulic Fluid
- ASTM D 6046 Standard Classification of Hydraulic Fluids for Environmental Impact
- ASTM D 6278 Standard Test Method for Shear Stability of Polymer Containing Fluids Using a European Diesel Injector Apparatus
- ASTM D 6304 Test Method for Determination of Water in Petroleum Products, Lubricating Oils and Additives by Coulometric Karl Fischer Titration