



INDUSTRIAL LUBRICANTS STANDARD

MS1008™

JUN2021

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Revised 2007-01
Reaffirmed 2021-06

Superseding MS1008 JAN2007

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

RATIONALE

MS1008 has been reaffirmed to comply with the SAE Five-Year Review policy.

Foreword—The Society of Automotive Engineers (SAE) Industrial Lubricants Committee has developed a number of industrial, non-production lubricant performance specifications.

The purpose of these voluntary SAE specifications is to:

- Define minimum performance requirements for industrial lubricants.
- Provide lubricant suppliers with performance targets for a minimum number of key industrial lubricants.
- Improve the availability of these lubricants to member companies.
- 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.

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

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SAE WEB ADDRESS:

Full document details: SAE MS1008_202106

For more information on this standard, visit
https://www.sae.org/standards/content/MS1008_202106

Documents
Document Sharing Hub

Industrial lubricant classifications targeted:

- a. Lubricants, Industrial Oils and Related Products - Classification (SAE MS1000)
- b. Hydraulic fluids (SAE MS1004)
- c. Fire resistant hydraulic fluids (SAE MS1005)
- d. Lubricating oils (various applications – SAE MS1001, SAE MS1002, SAE MS1003 SAE MS1006, SAE MS1007, SAE MS1009, SAE MS 1010)
- e. Lubricating greases (SAE MS1011)
- f. Metal Removal Fluids (SAE MS1008)

See SAE MS1000 - Index of lubricants and symbols.

NOTE—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

1. Scope—See Tables 1A and 1B.

1.1 Rationale—The revision of SAE MS1008 was necessary to reflect changes to test limits, changes to test methods and additional standards that have been incorporated since SAE MS1008 was originally released.

TABLE 1A—SCOPE, TYPICAL APPLICATIONS AND SYMBOLS; STRAIGHT OILS

Particular Application	More Specific Application	Product Type and/or End Use Requirements	Symbol	Cutting	Abrasion	Extreme Pressure Properties, Chemically Inactive ⁽³⁾		Remarks
						Petroleum Oil ⁽¹⁾ or Other ⁽²⁾	Extreme Pressure Properties, Chemically Inactive ⁽⁴⁾	
Metal removal by cutting, abrasion or electrical discharge	Operations primarily needing lubrication, e.g., milling, drilling, tapping, grinding, hobbing, honing	Fluid having anti-corrosion properties	MHA	•		Petroleum Oil		These fluids which are used undiluted may be inhibited against oxidation or may contain fillers for particular operations
		Fluid having anti-corrosion properties and with extreme pressure (E.P.) properties, chemically active	MHB	•	•	Petroleum Oil	•	
		Fluid having anti-corrosion properties and with extreme pressure (E.P.) properties, chemically non-active	MHC	•	•	Petroleum Oil	•	
		Fluid having anti-corrosion properties	MHD	•		Other		
		Fluid having anti-corrosion properties and with extreme pressure (E.P.) properties, chemically non-active	MHE	•	•	Other	•	
		Fluid having anti-corrosion properties and with extreme pressure (E.P.) properties, chemically active	MHF	•	•	Other	•	

1. Petroleum oils include Group I, II, III, and IV oils; Group IV oils are those such as polyalphaolefins
2. Oils other than petroleum would include non-petroleum derived, such as natural fats or vegetable oils
3. Corrosive to copper
4. Not corrosive to copper

TABLE 1B—SCOPE, TYPICAL APPLICATIONS AND SYMBOLS; AQUEOUS FLUIDS

Particular Application	More Specific Application	Product Type and/or End Use Requirements	Symbol	Cutting	Abrasion	Emulsion	Micro-Emulsion	Solution	Extreme Pressure Properties	Remarks (Typical Description)
Metal removal by cutting or abrasion	Operations primarily needing cooling	Concentrates typically containing >30% petroleum ⁽¹⁾ or other ⁽²⁾ (vegetable, PAO, ester, etc.) oil, when blended with water, giving macro-emulsions	MAA	•	•	•				Soluble Oil
		Concentrates typically containing >30% petroleum or other (vegetable, PAO, ester, etc.) oil, when blended with water, giving macro-emulsions, plus extreme pressure (EP) additives	MAA-EP	•		•			•	Soluble Oil
		Concentrates containing <50% petroleum or other (vegetable, PAO, ester, etc.) oil, when blended with water, giving micro-emulsions	MAC	•	•		•			Semi-synthetic
		Concentrates containing <50% petroleum or other (vegetable, PAO, ester, etc.) oil, when blended with water, giving micro-emulsions, plus EP	MAC-EP	•			•		•	Semi-synthetic
		Concentrates containing no oil, when blended with water, giving true solutions	MAE	•	•			•		Synthetic
		Concentrates containing no oil, when blended with water, giving true solutions, plus EP	MAE-EP	•				•	•	Synthetic

1. Petroleum oils include API Group I, II and III oils.
2. Oils other than petroleum include API Group IV oils, such as polyalphaolefins, and non-petroleum oils, such as esters or vegetable oils.

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version of SAE publications shall apply.

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

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

SAE MS1001—Lubricants, Industrial Oils and Related Products Type A Lubricant for General Purposes and Total Loss Systems—Specification

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

SAE MS1003—Lubricants, Industrial Oils and Related Products Type D Compressor Oils—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 MS1009—Lubricants, Industrial Oils and Related Products Type P Pneumatic Tools—Specification

SAE MS1010—Lubricants, Industrial Oils and Related Products Type T Turbine Oils—Specification

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

2.1.2 AFNOR PUBLICATIONS—Referenced, AFNOR, 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

USA

ILI, 610 Winters Avenue, Paramus, NJ 07652, USA

Tel: 201-986-1131 Fax: 201-986-7886

Email: sales@ili-info.com

AFNOR NFT60-187—Liquides D'usinage Aqueux—Aptitude A La Mise En Emulsion Ou En Solution Et Stabilité Au Repos (Test method for Emulsion Stability)

2.1.3 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

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

ASTM D 94—Test Methods for Saponification Number of Petroleum Products

ASTM D 97—Test Methods for Pour Point Of Petroleum Products

ASTM D 128—Test Methods for Analysis of Lubricating Grease

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 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 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 808—Test Method for Chlorine in New and Used Petroleum Products (Bomb Method)

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

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

ASTM D 1126—Test Method for Water Hardness

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

ASTM D 1662—Test Method for Active Sulfur in Cutting Oils

ASTM D 1833—Test Method for Odor of Petroleum Wax

ASTM D 2068—Test Method for Filter Blocking Tendency of Distillate Fuel Oils

ASTM D 2070—Standard Test Method for Thermal Stability of Hydraulic oils

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 2622—Test Method for Sulfur in Petroleum Products by X-Ray Spectrometry

ASTM D 2711—Test Method for Demulsibility Characteristics of Lubricating Oils

ASTM D 2783—Method for Measurement of Extreme-Pressure Properties of Lubricating Fluids (Four-Ball Method)

ASTM D 2893—Test Method for Oxidation Characteristics of Extreme Pressure Lubrication Oils

ASTM D 2896—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 3519—Test Method for Foam in Aqueous Media (Blender Test)

ASTM D 3946—Test Method for Evaluating the Bacteria Resistance of Water-Dilutable Metalworking Fluids

ASTM D 4052—Test Method for Density and Relative Density of Liquids by Digital Density Meter

ASTM D 4294—Test Method for Sulfur in Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry

ASTM D 4627—Test Method for Iron Chip Corrosion Test for Water-Dilutable Metalworking Fluids

ASTM D 4927—Test Method for Elemental Analysis of Lubricant and Additive Components—Barium, Calcium, Phosphorus, Sulfur and 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 5185—Standard 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 Spectrometry (ICP-AES)

ASTM D 5619—Test Method for Comparing Metal Removal Fluids Using the Tapping Torque Test Machine

ASTM E 70—Test Method for pH of Aqueous Solutions with the Glass Electrode

ASTM E 618—Standard Test Method for Evaluating Machining Performance of Ferrous Metals Using an Automatic Screw-Bar Machine

ASTM E 1131—Test Method for Compositional Analysis by Thermogravimetry

ASTM E 1687—Standard Test Method for Determining Carcinogenic Potential of Virgin Base Oils in Metalworking Fluids

ASTM F 1110—Test Method for Sandwich Corrosion Test (Corrosive Effect on Aluminum)

2.1.4 BS PUBLICATIONS—Available from ILI as referenced in 2.1.2.

BS 188—Determination of the Viscosity of Liquids
BS 903: PTA 35—Physical Testing of Rubber—Temperatures, Humidities and Times for Conditioning and Testing of Test Pieces
BS 4231—Classification for Viscosity Grades of Industrial Liquid Lubricants
BS 4385—Methods for Determination of Water in Crude Petroleum, Petroleum Products and Bituminous Materials by Distillation (Superseded by ISO 9029)
BS 4450—Determination of Ash from Petroleum Products (Superseded by ISO 6245)
BS 4459—Petroleum Products—Calculation of Viscosity Index from Kinematic Viscosity
BS 4832—Determination of the Behavior of Rubber and Elastomers when Exposed to Liquids, Vapors and Gases (Superseded by ISO 6072)

2.1.5 CETOP PUBLICATIONS—Hard copies of referenced Standards are not in the ILI database but may be special ordered by contacting ILI as referenced in 2.1.2 or by contacting the European Oil Hydraulic and Pneumatics Committee (Website: <http://www.cetop.org>) at:

British Fluid Power Association, Cheriton House, Cromwell Business Park, Banbury Road, Chipping Norton, GB-Oxfordshire OX7 5SR, Tel: +44 (1608) 647900, Fax: +44 (1608) 647919, E-Mail: enquiries@BFPA.co.uk, <http://www.BFPA.co.uk>.

CETOP RP110H—Hydraulic Fluids for Hydraulic Transmission—Fire Resistant Fluids—Group HFA—Specifications

2.1.6 DIN PUBLICATIONS—Available from ILI as referenced in 2.1.2.

DIN 38 405/9—German Standard Methods for the Examination of Water, Sewage and Sludge; Anions (Group D), Determination of Nitrate Ions (D9)
DIN 38 406/3—German Standard Methods for the Examination of Water, Sewage and Sludge; Cations (Group E), Determination of Calcium and Magnesium (E3)
DIN 38 409/7—German Standard Methods for the Examination of Water, Sewage and Sludge; Summary of Indices of Actions and Substances (Group H), Determination of Acid and Base Capacity (H7)
DIN 51 360/2—Testing of Cooling Lubricants; Determination of Corrosion Preventing Characteristics of Cooling Lubricants Mixed with Water; Chip/Filter Paper Method
DIN 51 369—Testing of Cooling Lubricants; Determination of the pH Value of Water-Mixed Cooling Lubricants
DIN 51 519—Lubricants; ISO Viscosity Classification for Industrial Liquid Lubricants
DIN 51 558/1—Testing of Mineral Oils; Determination of the Neutralization Number, Colour Indicator Titration
DIN 51 561—Testing of Mineral Oils, Liquid Fuels and Related Liquids; Measurement of Viscosity Using the Vogel-Ossag Viscometer; Temperature Range: Approximately 10 to 150-Deg C (CANCELLED)
DIN 51 562/1—Viscometry - Determination of Kinematic Viscosity Using the Ubbelohde Viscometer—Part 1: Apparatus and Measurement Procedure
DIN 51 566—Testing of Lubricants; Determination of Foaming Characteristics (CANCELLED)
DIN 51 569—Determination of Viscosity of Mineral Oils, Liquid Fuels and Related Liquids at Temperatures from -55 °C To Approximately 10 °C Using the Vogel-Ossag Viscometer
DIN 51 585—Testing of Lubricants; Testing of Corrosion Protection Properties of Steam Turbine Oils and Hydraulic Oils Containing Additives
DIN 51 757—Testing of Mineral Oils and Related Materials; Determination of Density
DIN 51 759/1—Testing of Liquid Mineral Oil Products; Method of Test for Copper Corrosion; Copper Strip Test (SUPERSEDED BY ISO 2160)
DIN 53 505—Testing of Rubber, Elastomers, and Plastics; Shore Hardness Testing A and D