



INDUSTRIAL LUBRICANT STANDARD

MS1000™

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Lubricants, Industrial Oils, and Related Products - Classification

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

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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 documents is to:

- a. Define minimum performance requirements for industrial lubricants, where tests are available.
- b. Provide lubricant suppliers with performance targets for key industrial lubricants.
- c. Promote the availability of these lubricants to member companies and others who may wish to use these specifications.
- d. Provide a 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 properties, requirements, and test procedures are specified.
- b. For information, equivalent ISO, DIN, CEN, BSI, ASTM, AFNOR, CETOP, VDMA, and IP test methods are referenced.

See References, Section 2.

Industrial lubricant classifications targeted:

¹International Standards Organization, (ISO)

Deutsches Institut für Normung e. V. (DIN)

European Committee for Standardization (CEN)

American Society for Testing and Materials (ASTM)

Association Française de Normalisation (AFNOR)

The Energy Institute, formerly 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 Oil Hydraulic Pneumatic Committee (CETOP)

German Association of Machine and Plant Construction (VDMA)

- 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 (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 – Specification (SAE MS1007)
- i. Metal removal fluids (SAE MS1008)
- j. Pneumatic Tool Oils (SAE MS1009)
- k. Turbine Oils (SAE MS1010)
- l. Lubricating Greases (SAE MS1011)

NOTE 1: Environmental and/or health and safety regulations will present additional specifications to these standards. Contact individual end users regarding requirements in these areas.

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

1. SCOPE

1.1 Designation of Lubricants, and Marking of Containers and Equipment Lube Points

This index provides an overview of lubricants and symbols for the purpose of assisting the user in the identification of the appropriate product and relevant SAE specification. The aim is to better determine the best lubricant to be used for a particular application.

If containers used for shipping lubricants are also to be marked, the same identification and symbols should be used.

See also ISO 5169 Machine tools - Presentation of lubrication instructions.

1.1.1 Examples for the Marking of Lubrication Points on Equipment and/or Shipping Containers

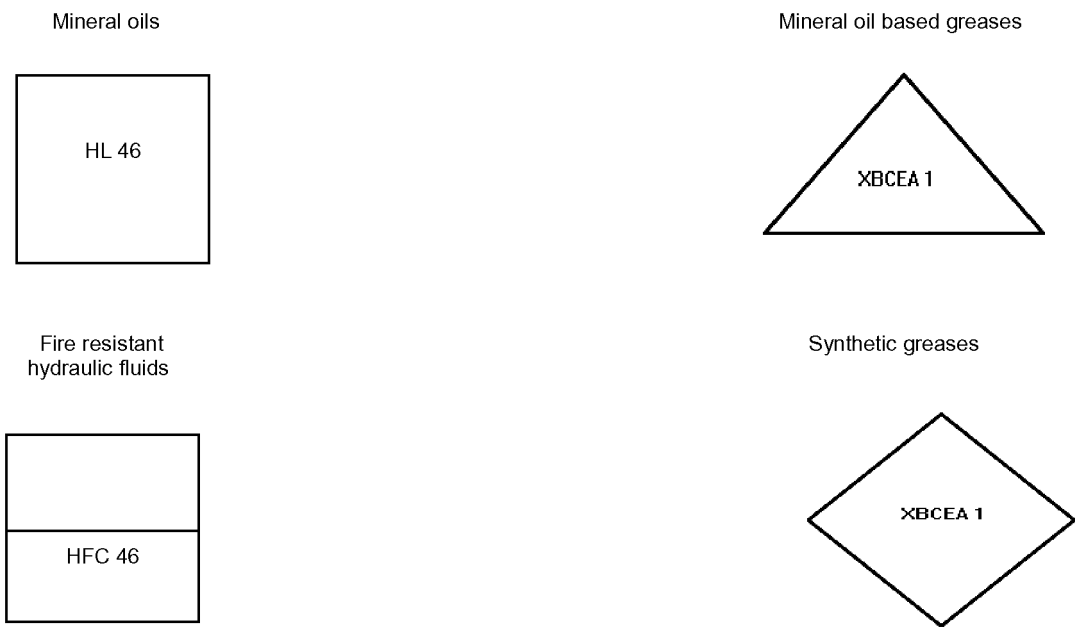


FIGURE 1 - EXAMPLES FOR THE MARKING OF LUBRICATION POINTS ON EQUIPMENT AND/OR SHIPPING CONTAINERS

1.2 Index of Lubricants and Symbols

See Table 1.

TABLE 1 - INDEX OF LUBRICANTS AND SYMBOLS

Item	Type of Lubricant	Symbol	SAE Specification	Type(s) Specified	Marking Symbol
Mineral oils	General purpose lubricating oils for total loss systems	A	SAE MS1001	AB, AN	
	Spindle bearings	F	SAE MS1006	FD	
	Slideways	G	SAE MS1007	G	
	Pneumatic tools	P	SAE MS1009	PAA, PAB, PAC, PBA, PBB, PBC	
	Turbines	T	SAE MS1010	TSA, TSC, TSE	
	Compressors	D	SAE MS1003 SAE MS1003-2	DAA, DAB, DAC, DAG, DAH, DAJ DPA, DPB, DPC, DPG, DPH, DPJ, DEA, DEB, DEC, DEG, DEH, DEJ	
	Gears	C	SAE MS1002	CKB, CKC, CKE	
	Hydraulic Fluids	H	SAE MS1004	HL, HM, HR, HV	
	Fire resistant hydraulic fluids	HF	SAE MS1005	HFAE, HFB, HFC, HFDR, HFDU	
	Metal Removal Fluids	M	SAE MS1008	MAA, MAB, MAC, MAD, MAE, MAF, MAG, MAH MHA, MHB, MHC MHD, MHE, MHF	
	Greases	X	SAE MS1011	Based on operating conditions	

1.3 Recommendations for the Choice of Lubricants for Machine Tools

See Table 2

TABLE 2 - RECOMMENDATIONS FOR THE CHOICE OF LUBRICANTS FOR MACHINE TOOLS

Symbol	General Application	Particular Application	More specific Application	Product type and/or performance requirements	SAE classification	Examples of applications	Remarks
A	Total loss systems			Refined mineral oils	AN 68 AN 220	Lightly loaded parts	
C	Gears	Enclosed gears	Continuous lubrication by splash, circulation or spray	Refined mineral oils with oxidation stability, anti-corrosion (ferrous and non-ferrous metal) and anti-foam properties	CKB 32 CKB 68 CKB 100 CKB 150	Enclosed gears operating under light load (bearings associated with headstocks, feed-boxes, carriages)	CKB 32 and CKB 68 can also be used for flood lubricated, mechanically controlled clutches. CKB 68 may replace AN 68
				Refined mineral oils with oxidation stability, anti-corrosion (ferrous and non-ferrous metal) anti-foam, extreme pressure and anti-wear properties	CKC 100 CKC 150 CKC 220 CKC 320 CKC 460	Enclosed gears operating at a stabilized temperature of oil that remains normal or medium and under high load. Enclosed gears of any type (except hypoid gears) and associated bearings	These oils can also be used for manual or centralized lubrication of lead and feed screws and lightly loaded slideways.
				Refined mineral oils with oxidation stability, anti-corrosion (ferrous and non-ferrous metal), anti-foam and anti-wear properties with friction modifier	CKE 320 CKE 460 CKE 680 CKE 1000	Worm gears	
D	Air compressors			Refined mineral oil, polyalpha olefins or esters with oxidation stability, anti-corrosion (ferrous and non-ferrous metal) antifoam and demulsibility	DAA, DAB, DAC, DAG, DAH, DAJ, DPA, DPB, DPC, DPG, DPH, DPJ, DEA, DEB, DEC, DEG, DEH, DEJ	Reciprocating and rotary compressors	

Symbol	General Application	Particular Application	More specific Application	Product type and/or performance requirements	SAE classification	Examples of applications	Remarks
F	Spindle bearings		Spindle bearings, and associated bearings	Refined mineral oils with improved properties, for example: anti-corrosion, anti-oxidation, anti-wear, which may be obtained by additives	FD 2 FD 5 FD 10 FD 22 FD 32	Pressure bath and oil/air lubrication of plain or rolling bearings	These oils can also be used for applications requiring particularly low viscosity oils, such as fine mechanisms, hydraulic or hydropneumatic mechanisms, electromagnetic clutches, air line lubricators and hydrostatic bearings.
G	Slides & Ways			Refined mineral oils with improved lubricity and tackiness properties to prevent stick-slip	G 68 G 100 G 150 G 220	Lubrication of plain bearing slideways. They should be particularly useful at low traverse speeds to minimize vibrations due to discontinuous sliding (stick-slip).	These oils can be used for the lubrication of all sliding parts such as lead and feed screws, cams, ratchets, and lightly loaded worm gears with intermittent service.
H	Hydraulic systems	Hydrostatic systems		Refined mineral oils with improved anti-rust and anti-oxidation properties	HL 32 HL 46 HL 68		
				Refined mineral oils with improved anti-rust, anti-oxidation and anti-wear properties	HM 15 HM 32 HM 46 HM 68		
				Refined mineral oils with improved anti-rust, anti-oxidation, anti-wear and viscosity/temperature properties	HV 22 HV 32 HV 46		

Symbol	General Application	Particular Application	More specific Application	Product type and/or performance requirements	SAE classification	Examples of applications	Remarks
			Applications where fire-resistant fluids are required	Oil-in-water emulsions Water-in-oil emulsions Water polymer (glycol) solutions Synthetic fluids containing no water and consisting of phosphate esters Synthetic fluids containing no water and of other compositions	HFAE HFB HFC HFDR HFDU		ISO 7745 shall be used for providing operational characteristics, advantages, disadvantages and factors affecting the choice among fire resistant fluids.
M	Metal Removal	Metal Removal by Cutting, Abrasion	Applications Mainly Needing Lubrication - (Straight Oils) Applications Mainly Requiring Cooling - (Soluble) (Semi –synthetic) (Synthetic)	Fluids differing in anti-corrosion, friction reducing, or E.P. properties (chemically active or non-active) Milky emulsions differing in anti-corrosion, friction reducing, or E.P. properties (chemically active or non-active) Micro-emulsions differing in E.P. Transparent Solutions differing in E.P.	MHA, MHB, MHC, MHE, MHD, MHF MAA, MAB, MAC, MAD MAE, MAF . MAG, MAH .	Milling, Drilling, Tapping, Grinding, Honing, Hobbing	
P	Pneumatic tools and machinery	Rotary pneumatic tools and air-driven machines	Automatic or manual lubrication	Mineral oil with anti-corrosion properties Mineral oil with anti-corrosion and anti-wear, emulsifying and foam inhibiting properties.	PBB-15 PBB-22 PBB-32 PBC-15 PBC-22 PBC-32	Tools operating under low to moderate load conditions and with condensate present in the air. Tools subject to extended service cycles, operating under moderate to severe load conditions and with condensate present in the air.	

Symbol	General Application	Particular Application	More specific Application	Product type and/or performance requirements	SAE classification	Examples of applications	Remarks
T	Turbines			Refined mineral oils with oxidation stability, anti-corrosion (ferrous and non-ferrous metal), anti-foam and demulsibility	TSA, TSC, TSE	Steam turbine oils	
X	Applications requiring grease	Multi-purpose grease		Greases with improved anti-oxidation and anti-corrosion properties	XBCEA 00 XBCEA 0 XBCEA 1 XBCEA 2 XBCEA 3	Plain rolling bearings, open gears and general greasing of miscellaneous parts	Grease XBCEA 1 is used in centralized systems, while greases XBCEA 2 and XBCEA 3 are dispensed preferably by cup or hand gun. The equipment manufacturer should identify the grease used for the initial filling of each item to ensure that the grease subsequently introduced is compatible with it.