



INDUSTRIAL LUBRICANTS STANDARD

MS1003™

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Lubricants, Industrial Oils, and Related Products
Type D Compressor Oils - Specification

RATIONALE

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

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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.¹

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 MS 1010)
- l. Lubricating greases (SAE MS1011)

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.

1. SCOPE

See Table 1. DAx fluids are mineral oil based, DPx fluids are polyalphaolefin based, and DEx are ester based.

TABLE 1 - SCOPE AND FIELD OF APPLICATIONS

Code Letter	General Application	Particular Application	More Specific Application	Product Type	Symbol	Typical Application	Remarks
D	Air compressors	Positive displacement air compressors with oil lubricated compression chambers	Reciprocating crosshead and trunk pistons or Rotary drip feed (vane)		DAA DPA DEA	Light duty	See Table 2
					DAB DPB DEB	Medium duty	
					DAC DPC DEC	Heavy duty	
					DAG DPG DEG	Light duty	
					DAH DPH DEH	Medium duty	
					DAJ DPJ DEJ	Heavy duty	
		Positive displacement air compressors with oil-free compression chambers	Liquid ring compressors and water-flooded vane and screw compressors		—	—	Lubricants suitable for gears, bearings, and transmissions
			Reciprocating oil-free compressors				
			Rotary oil-free compressors				
		Dynamic compressors	Radial and axial turbocompressors		—	—	Lubricants suitable for bearings, and gears

1.1 Information Concerning Duties of Compressors

1.1.1 Introduction

The following guidelines are given to help interested parties in differentiating between

light duty
medium duty
heavy duty

(see also ISO 5388)

1.1.2 Reciprocating Oil-Lubricated and Rotary Drip-Feed Air Compressors

Whether the duty of reciprocating and rotary drip feed compressors is to be classified as light, medium, or heavy depends on many parameters, for example

- The compressor design, i.e., type of cooling, number of stages, valve velocities, oil retention time, etc.;
- Ambient conditions, i.e., intake air temperature, coolant temperature, presence of catalytic dust or gases, etc.;

- c. Operating conditions, i.e., continuous or intermittent service, layout of the pressure system, maintenance, oil change intervals, etc.

The ultimate criterion is satisfactory, reliable air compressor operation with the prevention of excessive oil retention or the formation of coke deposits in the hot discharge air system.

1.1.3 Rotary Oil-Flooded Air Compressors

Whether the duty of rotary oil-flooded air compressors is to be classified as light, medium, or heavy depends on many parameters, for example

- a. The compressor design, i.e., air discharge pressure and pressure ratio, number of stages, oil recirculation rate, oil separating system, etc.;
- b. Ambient conditions, i.e., intake air temperature and humidity, presence of contaminants (dust or gases), etc.;
- c. Operating conditions, i.e., continuous or intermittent service, maintenance, oil change intervals, discharge temperature, etc.

NOTE: Conditions such as air humidity or low circulating air volume may recommend an oil for heavier duty.

TABLE 2 - RECIPROCATING OIL-LUBRICATED AIR COMPRESSORS

Duty	Symbol	Operating Conditions	
Light	DAA DPA DEA	Intermittent operation	Sufficient time to allow cooling between periods of operation -compressor stop and start -variable discharge capacity
		Continuous operation	a) discharge pressure < 1000 kPa (10 bar) discharge temperature < 160 °C stage pressure ratio < 3: 1 or b) discharge pressure > 1000 kPa (10 bar) discharge temperature < 140 °C stage pressure ratio < 3: 1
Medium	DAB DPB DEB	Intermittent operation	Sufficient time to allow cooling between periods of operation
		Continuous operation	a) discharge pressure < 1000 kPa (10 bar) discharge temperature > 160 °C or b) discharge pressure > 1000 kPa (10 bar) discharge temperature > 140 °C but < 160 °C or c) stage pressure ratio > 3: 1
Heavy	DAC DPC DEC	Intermittent or continuous operation	As for "medium" when conditions a), b), or c) above are fulfilled and where severe coke formation in a discharge might be anticipated as a result of previous experience with a medium duty oil.

TABLE 3 - ROTARY OIL-FLOODED AIR COMPRESSORS

Duty	Symbol	Operating Conditions
Light	DAG	Air and air/oil discharge temperature < 90 °C Discharge pressure < 800 kPa (< 8 bar)
	DPG	
	DEG	
Medium	DAH	Air and air/oil discharge temperature < 100 °C Discharge pressure 800 to 1500 kPa (8 to 15 bar)
	DPH	
	DEH	
		Or
		Air and air/oil discharge temperature between 100 and 110 °C Discharge pressure < 800 kPa (< 8 bar)
Heavy	DAJ	Air and air/oil discharge temperature > 110 °C Discharge pressure < 800 kPa (< 8 bar)
	DPJ	
	DEJ	
		Or
		Air and air/oil discharge temperature > 110 °C Discharge pressure 800 to 1500 kPa (8 to 15 bar)
		Or
		Discharge pressure > 1500 kPa (> 15 bar)

1.2 Concept

The lubricants defined by this specification are high quality oils formulated with additives to provide good oxidation resistance, corrosion protection, demulsibility, and foam stability. They are types DAA, DPA, DEA, DAB, DPB, DEB, DAC, DPC, DEC, DAG, DPG, DEG, DAH, DPH, DEH, and DAJ, DPJ, DEJ, intended for use in air compressor applications.

- a. DAx fluids are mineral oil based, DPx fluids are polyalphaolefin based, and DEx are ester based.
- b. Properties of lubricants used for vacuum pumps (ISO 6743-3A) or gas and refrigeration compressors (ISO 6743-3B) are not addressed in this document.

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.

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| SAE MS1000 | Lubricants, Industrial Oils, and Related Products—Classification |
| SAE MS1001 | Lubricants, Industrial Oils, and Related Products Type A Lubricant for General Purpose and Total Loss Systems—Specification |
| 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 |