
Lubricants, industrial oils and related products (class L) — Machine-tool lubricants — Categories and specifications

ICS 75.100

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ISO 12925-1:1996, *Lubricants, industrial oils and related products (class L) — Family C (Gears) — Part 1: Specifications for lubricants for enclosed gear systems*

ISO 12925-1:1996, Technical Corrigendum 1:2002

XP T 60-183:1994, *Lubricants, industrial oils and related products — Lubricants for slideways — Anti-slick slip lubricating ability*

ASTM D4172-94, *Standard test method for wear preventive characteristics of lubricating fluid (Four-ball method)*

3 Sampling

Unless otherwise specified in a commodity specification, samples of lubricants shall be taken in accordance with ISO 3170.

4 Categories of products for the lubrication of machine tools — Criteria for the choice

The various mechanical parts of machine tools shall be lubricated with certain families of products defined and described in ISO 6743-1, ISO 6743-2, ISO 6743-4, ISO 6743-6, ISO 6743-9, ISO 6743-13 and ISO 6743-99.

Each part of ISO 6743 defines categories inside a lubricant family. Within each category, all the grades defined in accordance with ISO 3448 for liquid lubricants or ISO 6743-9 for greases are possible. For the lubrication of machine tools, all the categories of products and all the possible grades in each category are not useful. Therefore, to facilitate the selection by the manufacturers or the users of machine tools, it is advisable to limit the number of categories and grades of products.

Table 1 gives criteria for the applications and defines a limited range of products appearing underlined. It is recommended to the manufacturers of machine tools, whenever possible, to select the lubricants in the limited range.

Table 1 does not cover special applications requiring the use of specific lubricants. These special applications should be examined separately, case by case, by the manufacturers or users of machine tools.

5 Specifications of products

The products of Family H, classified in ISO 6743-4, are specified in ISO 11158 and the products of Family C, classified in ISO 6743-6, are specified in ISO 12925-1.

There is presently no specification covering the products of Family X, classified in ISO 6743-9.

NOTE At the time of publication of this International Standard, an International Standard for specifications of greases is in the course of development at the preliminary stage (see Annex A).

Table 2 gives the requirements of the categories of lubricants L-AN (ISO 6743-1), L-FC and L-FD (ISO 6743-2) and L-G (ISO 6743-13) covered by Table 1.

The properties are those applying to the products at the time of their delivery. The application of the accuracy in interpreting the results of tests is described in ISO 4259. This procedure shall be applied in case of dispute.

6 Packaging and labelling

6.1 Packaging

The lubricants shall be packed in suitable packaging and according to the regulations in use.

6.2 Labelling

The labelling shall comprise at least the following information:

- a) the commercial name of the product;
- b) the ISO designation code (including the viscosity grade);
- c) the batch number;
- d) the date of manufacturing;
- e) the legal labelling (transportation, safety) if the product is liable for this labelling.

Table 1 — Range of machine-tool lubricants

Code letter	General application	Particular application	More specific application	Product type and/or performance requirements	Symbol ISO L ^a	Typical applications	Remarks
A	Total loss systems			Refined mineral oils	<u>AN 32</u> <u>AN 68</u> <u>AN 220</u>	Lightly loaded parts	
C	Gears	Enclosed gears	Continuous lubrication: splash lubrication, lubrication by circulation or spray	Refined mineral oils exhibiting improved properties of oxidation stability, corrosion protection (ferrous and non-ferrous metals), and foaming	<u>CKB 32</u> <u>CKB 68</u> <u>CKB 100</u> <u>CKB 150</u>	Enclosed gears, operating under moderate loads (see ISO 6743-6) Bearings, headstocks, feed-boxes, carriages	CKB 32 and CKB 68 oils can also be used for flood-lubricated, mechanically controlled clutches CKB 68 may replace AN 68
F	Spindle bearings, bearings and associated clutches			Refined mineral oils exhibiting improved properties of oxidation stability, corrosion protection (ferrous and non-ferrous metals), extreme-pressure, anti-wear and foaming	<u>CKC 68</u> <u>CKC 100</u> <u>CKC 150</u> <u>CKC 220</u> <u>CKC 320</u> <u>CKC 460</u>	Enclosed gears, whose stabilized temperature of oil in service remains normal or average, and operating under high loads (see ISO 6743-6) All types of enclosed gears (except hypoid gears) Heavily loaded plain and roller bearings	These oils can also be used for manual or centralized lubrication of lead and feed screws and slideways operating under light loads, or whose conditions of use do not require any particular anti-stick-slip properties
				Refined mineral oils exhibiting improved properties of oxidation stability and corrosion protection	<u>FC 2</u> <u>FC 5</u> <u>FC 10</u> <u>FC 22</u>	Lubrication by recirculation, splash or oil mist of plain bearings, roller bearings and associated clutches	These oils are intended for the lubrication of parts including clutches. Oils containing extreme-pressure and anti-wear agents are not allowed
				Refined mineral oils exhibiting improved properties of oxidation stability, corrosion protection and anti-wear	<u>FD 2</u> <u>FD 5</u> <u>FD 10</u> <u>FD 22</u>	Lubrication by recirculation, splash or oil mist of plain bearings and roller bearings	These oils can also be used in applications requiring the use of particularly low viscosity oils, such as fine mechanisms, hydraulic or hydropneumatic mechanisms, electro-magnetic clutches, airline lubricators and hydrostatic bearings
G	Slideways	Lubrication	Lubrication of slideways systems in which the contacting surfaces are both metallic	Refined mineral oils exhibiting improved properties of wear protection, corrosion preventing discontinuous or intermittent motion of the slider (stick-slip)	<u>GA 68</u> <u>GA 100</u> <u>GA 150</u> <u>GA 220</u>	Lubrication of machine-tool parts including plain slideways, nut-screw systems, ball nut-screw systems, plain bearings, in which anti-stick-slip and friction-reduction properties are essential	The GA oils may be replaced by HG oils (ISO 6743-4) of the same viscosity grade, provided that requirements of anti-stick-slip properties are met

Table 1 (continued)

Code letter	General application	Particular application	More specific application	Product type and/or performance requirements	Symbol ISO L ^a	Typical applications	Remarks
			Lubrication of slideways systems in which one of the two contacting surfaces is constituted by a non-metallic material (pigmented polymer, resin, etc...)	Refined mineral oil exhibiting improved properties of wear protection, corrosion protection, tackiness and preventing discontinuous or intermittent motion of the slider (stick-slip)	<u>GB 68</u> GB 100 GB 150 <u>GB 220</u>	Lubrication of machine-tool parts including plain slideways with one non-metallic material sensitive to pollution by aqueous cutting fluids, nut-screw systems, ball nut-screw systems, plain bearings, in which anti-stick-slip and friction-reduction properties are essential	The considered compatibility is between the non-metallic sliding material and the slideways lubricant, in the presence of aqueous coolants
			Lubrication of slideways systems in which the contacting surfaces are both metallic	Synthetic lubricants exhibiting improved properties of wear protection, corrosion protection, tackiness and preventing discontinuous or intermittent motion of the slider (stick-slip)	<u>GS 68</u> <u>GS 220</u>	Lubrication of machine-tool parts including plain slideways, nut-screw systems, ball nut-screw systems, plain bearings, in which anti-stick-slip and friction-reduction properties and aqueous coolant compatibility are essential	The considered compatibility is between the slideways lubricant and the aqueous coolant ; the contamination of the coolant by the slideways lubricant has a minimum impact on the coolant performance (the slideways lubricant is either emulsified or solubilized)
H	Hydraulic systems	Hydrostatic systems		Refined mineral oils with improved anti-rust and anti-oxidation properties	<u>HL 32</u> HL 46 <u>HL 68</u>	Lubrication of hydraulic systems not requiring any particular anti-wear properties Splash or injection lubrication of lightly loaded gears, bearings and roller bearings	HL 32 and HL 68 oils may replace, in the same applications, CKB 32 and CKB 68 oils
				Refined mineral oils with improved anti-rust, anti-oxidation and anti-wear properties	HM 15 <u>HM 32</u> HM 46 <u>HM 68</u>	General hydraulic systems including highly loaded components	These oils are also suitable for the lubrication of plain and roller bearings, gears with light to average loading (except hypoid and worm gears). HM 32 and HM 68 oils may replace, in the same applications, CKB 32 and CKB 68 oils, except clutches.

Annex A

(informative)

Preliminary information about the future International Standard for specifications of greases

For product category X, the relevant International Standard (ISO 6743-9:1987) dealing with classification has been revised and will be published in 2003. The application of this classification, which defines the products in terms of high- and low-temperature operability, anti-rust protection, water resistance and ability to lubricate under high loads [Extreme-pressure properties (EP)], is tied up to the existence of specification limits for each of the properties mentioned.

The International Standard for specifications of greases is still in the course of development, and will be referenced as ISO 12924, *Lubricants, industrial oils and related products (class L) — Family X (Greases) — Specifications*.

At present, these specification limits are being established to determine how to evaluate the following properties:

- lower operating temperature — for symbol 1;
- upper operating temperature — for symbol 2;
- water contamination — for symbol 3;
- anti-rust protection — for symbol 3;
- ability to lubricate under high loads — for symbol 4.

Symbol 1: The applicability of greases at the various temperatures listed in Table 2 is defined by a flowability criterion at the said temperature, using one of the following methods: ISO 13737[3], or DIN 51805[4] or ASTM D1478[8].

Symbol 2: The applicability of greases at the various temperatures listed in Table 2 is defined by a life test in a bearing running at the said temperature, using either of the following methods: ASTM D3336[10] or DIN 51821-2[6].

Symbol 3: This defines the level of water resistance and protection against corrosion; it corresponds to the combination of two properties, e.g. the resistance to water contamination and the level of anti-rust protection. The level of anti-rust protection is assessed using ISO 11007[1]. The resistance to water contamination is assessed using ISO 11009[2] for the water wash conditions, and using DIN 51807-1[5] for the static conditions.

Symbol 4: The ability to lubricate under high loads is defined by setting limits for the four-ball weld load using either IP 239[7] (European conditions) or ASTM D2596[9] (American conditions).

Bibliography

- [1] ISO 11007:1997, *Petroleum products and lubricants — Determination of rust-prevention characteristics of lubricating greases*
- [2] ISO 11009:2000, *Petroleum products and lubricants — Determination of water washout characteristics of lubricating greases*
- [3] ISO 13737:—²⁾, *Petroleum products — Determination of low-temperature cone penetration of lubricating greases*
- [4] DIN 51805:1974, *Testing of lubricants; determination of flow pressure of lubricating greases, Kesternich method*
- [5] DIN 51807-1:1979, *Testing of lubricants; Test of the behaviour of lubricating greases in the presence of water; Static test*
- [6] DIN 51821-2:1989, *Testing of lubricants; test using the FAG roller bearing grease testing apparatus FE9; Test method A/1500/6000*
- [7] IP 239/01, *Determination of extreme pressure and anti-wear properties of lubricating fluids — Four ball method (European conditions)*
- [8] ASTM D1478-97, *Standard test method for low-temperature torque of ball bearing grease*
- [9] ASTM D2596-02, *Standard test method for measurement of extreme-pressure properties of lubricating grease (Four-ball method)*
- [10] ASTM D3336-97, *Standard test method for life of lubricating greases in ball bearings at elevated temperatures*

2) To be published.

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