



Lubricants, industrial oils and related products (class L) — Recommendations for the choice of lubricants for machine tools

Lubrifiants, huiles industrielles et produits connexes (classe L) — Recommandations pour le choix des lubrifiants pour machines-outils

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- type 2, when the subject is still under technical development requiring wider exposure;
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ISO/TR 3498 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

The reasons which led to the decision to publish this document in the form of a technical report type 2 are explained in the Introduction.

0 Introduction

Technical Report 3498 replaces ISO 3498-1979, which has become partly outdated. There was a strong feeling in ISO/TC 28 that the document is still temporarily usable in its revised form. As a compromise, it was decided that it should be published as a technical report type 2.

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1 Scope and field of application

This Technical Report has been prepared with the following intentions :

- to establish a rationalized range of lubricants consisting of products essential for machine tools lubrication. These categories are internationally available and it is among them that machine tool manufacturers should make recommendations; this rationalized range is printed in framed type in the table giving the recommendations for the choice of lubricants for machine tools (clause 4);
- to avoid unnecessary restriction on specifications or product descriptions that would inhibit future development.

This Technical Report is not intended to cover special requirements that should be individually addressed in conjunction with machine tool manufacturers.

This Technical Report completes the rationalized range as defined above with a series of categories of products necessary for some countries according to their needs, though they do not have a common interest for every member body. This series is printed in general type in the table in clause 4.

In the future, it is intended to progressively reduce this complementary series so as to eliminate it in time.

NOTE — Lubricants for machine tools must be compatible with the materials used for the machine tool parts, particularly seals, with which they will be in contact.

2 References

ISO 2137, *Petroleum products — Lubricating grease — Determination of cone penetration.*

ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity.*

ISO 3448, *Industrial liquid lubricants — ISO viscosity classification.*

[ISO/TR 3498:1986](https://standards.iteh.ai/catalog/standards/sist/3e02315c-4481-403d-a69a-ba25824d90c8/iso-tr-3498-1986)

3 Explanation of symbols used

3.1 In the column headed "Category symbol ISO-L" in the table in clause 4, the various products are designated in an abbreviated form: the complete designation is as shown in the following examples: ISO-L-CKB 32, ISO-L-CKC 68, etc.

It is also permitted to designate a product in the form: L-CKB 32; L-CKC 68, etc.

3.2 In other respects, in the designation utilized:

the prefix letter L designates the class "lubricants, industrial oils and related products".

3.2.1 Case of oils

a) the group of letters which follows the letter L, considered as a whole, forms a code;

NOTE — The first letter of this code identifies the family of the product considered but the second letter, when it exists, and any following letters, have no particular significance.

b) the numerical group designation which appears after each code corresponds to the average kinematic viscosity of the lubricant measured in accordance with ISO 3104 at 40 °C and expressed in millimetres squared per second¹⁾ (see ISO 3448).

1) $1 \text{ mm}^2/\text{s} = 1 \text{ cSt}$

3.2.2 Case of greases

a) The category, the group of letters which follows the letter "L", forms a code constituted by 5 letters where each of them and the order in which it is written has a particular significance:

- the first letter, X, identifies the family of greases;
- the second letter, B, indicates the lower operating temperature (– 20 °C);
- the third letter, C, indicates the upper operating temperature (+ 120 °C);
- the fourth letter, E, indicates the ability of the grease to provide satisfactory lubrication in the water contamination conditions and to provide the level of anti-rust protection;
- the fifth letter, A, indicates that the grease has no extreme pressure properties.

b) The numerical group or number which appears after each code corresponds to the NLGI consistency number of the grease corresponding to the measured penetration level. These numbers are defined as follows:

NLGI number ¹⁾	Worked penetration according to ISO 2137
00	400 to 430
0	355 to 385
1	310 to 340
2	265 to 295
3	220 to 250

1) NLGI: National Lubricating Grease Institute.

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4 Recommendations for the choice of lubricants for machine tools

Letter symbol	General application	Particular application	More specific application	Product type and/or performance requirements	Category symbol ISO-L	Examples of applications	Remarks
A	Total loss systems	https://standards.iteh.ai/catalog/standards/sist/5e02315c-4489-bc2592-4d90e8-66-4-3498-1986	Refined mineral oils	AN 68 AN 100 AN 150	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 (allied bearings of headstocks, feed-boxes, carriages)	CKB 32 and CKB 38 can also be used for flood-lubricated, mechanically controlled clutches. CKB 68 may replace AN 68.
F	Spindle bearings, bearings and associated clutches	Spindle bearings, bearings and associated clutches	Spindle bearings, bearings and associated clutches	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 allied bearings	These oils can also be used for manual or centralized lubrication of lead and feed screws and lightly loaded slideways.
	Spindle bearings, bearings and associated clutches		Spindle bearings, bearings and associated clutches	Refined mineral oils with improved properties, for example, anti-corrosion and anti-oxidation which may be obtained by additives	FC 2 FC 5 FC 10 FC 22	Pressure, bath and oil mist (aerosol) lubrication of plain or rolling bearings and associated clutches	These oils are required for lubrication of systems including clutches which involve the use of oils which do not contain anti-wear or extreme pressure additives because of the risk of corrosion.
G	Slideways		Spindle bearings, 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	Pressure bath and oil mist (aerosol) 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
	Slideways		Spindle bearings, bearings	Refined mineral oils with improved lubricity and tackiness properties to prevent stick-slip	G 68 G 100 G 150 G 220	Lubrication of plain bearings 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	<p>Refined mineral oils with improved anti-rust and anti-oxidation properties</p> <p>Refined mineral oils with improved anti-rust, anti-oxidation and anti-wear properties</p> <p>Refined mineral oils with improved anti-rust, anti-oxidation, anti-wear and viscosity/temperature properties</p>	<p>HL 32 HL 46 HL 68</p> <p>HM 15 HM 32 HM 46 HM 68</p> <p>HV 22 HV 32 HV 46</p> <p>HG 32 HG 68</p> <p>XBCEA 00 XBCEA 0 XBCEA 1 XBCEA 2 XBCEA 3</p>	<p>General hydraulic systems which include highly loaded components</p> <p>Application in numerically controlled machine-tools</p> <p>Machines with combined hydraulic and plain bearings slideways, lubrication systems where vibration or intermittent sliding (stick-slip) at low speed is to be minimized</p> <p>Plain rolling bearings, open gears and general greasing of miscellaneous parts</p>	<p>These oils are also suitable for the lubrication of plain or rolling bearings and all types of gears normally loaded (worm and hypoid gears excepted).</p> <p>HM 32 and HM 68 may replace CKB 32 and CKB 68, respectively.</p> <p>In some cases, HV oils may replace HM oils.</p> <p>These oils can also be used for lubrication of separate slideways when an oil of this viscosity is required. HG 68 may replace G 68.</p> <p>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.</p>
X	Applications requiring grease	Multi-purpose greases	Hydraulic slideway systems			

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5 Bibliography

ISO 6743, *Lubricants, industrial oils and related products (class L) — Classification*

- *Part 0: General.*
- *Part 1: Family A (Total loss systems).*
- *Part 2: Family F (Spindle bearings, bearings and associated clutches).*
- *Part 4: Family H (Hydraulic systems).*
- *Part 9: Family X (Greases). ¹⁾*

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1) At present at the stage of draft.

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