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

Part 9: Family X (Greases)

*Lubrifiants, huiles industrielles et produits connexes (classe L) —
Classification —*

Partie 9: Famille X (Graisses)

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 6743 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6743-9 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 4, *Classifications and specifications*.

This second edition cancels and replaces the first edition (ISO 6743-9:1987), which has been technically revised.

ISO 6743 consists of the following parts, under the general title *Lubricants, industrial oils and related products (class L) — Classification*:

- Part 1: Family A (Total loss systems)
- Part 2: Family F (Spindle bearings, bearings and associated clutches)
- Part 3: Family D (Compressors)
- Part 4: Family H (Hydraulic systems)
- Part 5: Family T (Turbines)
- Part 6: Family C (Gears)
- Part 7: Family M (Metalworking)
- Part 8: Family R (Temporary protection against corrosion)
- Part 9: Family X (Greases)
- Part 10: Family Y (Miscellaneous)
- Part 11: Family P (Pneumatic tools)
- Part 12: Family Q (Heat transfer fluids)
- Part 13: Family G (Slideways)
- Part 14: Family U (Heat treatment)
- Part 15: Family E (Internal combustion engine oils)
- Part 3A: Family D (Compressors)
- Part 3B: Family D (Gas and refrigeration compressors)
- Part 99: General

Annex A of this part of ISO 6743 is for information only.

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

Part 9: Family X (Greases)

1 Scope

This part of ISO 6743 establishes a detailed classification of family X (Greases) which belongs to class L (Lubricants, industrial oils and related products).

It should be read in conjunction with ISO 6743-99^[1].

This classification applies to categories of greases used for lubrication of equipment, components of machines, vehicles, etc.

The greases have been classified according to the operating conditions under which they are used, because the versatile nature of grease makes it impractical to classify them according to the end use. It will therefore be necessary to consult the supplier to be certain that the grease can be used in, for example, rolling bearings or pumped supply systems, and also concerning the compatibility of products.

In this classification, a grease cannot have more than one symbol. This symbol should correspond to the most severe conditions of temperature, water contamination and load in which the grease can be used.

NOTE This part of ISO 6743 does not pretend to cover the classification of greases intended for very special applications. It is up to the end-user and the supplier to negotiate the applicability of such greases, on the basis of relevant laboratory and/or field testing.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 6743. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 6743 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 2137:1985, *Petroleum products — Lubricating grease and petrolatum — Determination of cone penetration*

ISO 8681:1986, *Petroleum products and lubricants — Method of classification — Definition of classes*

3 Explanation of symbols used

3.1 The detailed classification of family X is based on the conditions of grease use.

3.2 In accordance with ISO 8681, the complete designation of the grease includes:

- the initials ISO;
- the letter L for the class “lubricants, industrial oils and related products”;

- the category of the grease constituted by a group of five letters where each letter and the order in which it is written has a particular significance:
 - the letter X for the family grease,
 - the lower operating temperature (symbol 1),
 - the upper operating temperature (symbol 2),
 - the ability of the grease to provide satisfactory lubrication in water contamination conditions, and to provide the level of anti-rust protection (symbol 3),
 - the ability of the grease to lubricate in the presence of high loads (symbol 4);
- the NLGI consistency number¹⁾ of the grease corresponding to the measured penetration level according to ISO 2137.

3.3 In this classification system, products are designated in a uniform manner, each letter having a significance of its own. It is therefore imperative that the order of writing shown in Table 1 be used.

For instance, a grease for use under the following operating conditions:

- lower operating temperature: $- 20\text{ }^{\circ}\text{C}$;
- upper operating temperature: $+ 160\text{ }^{\circ}\text{C}$;
- water contamination: environmental conditions — water wash;
- anti-rust: none;
- extreme pressure (EP): yes;
- NLGI consistency number: 00;

will have the ISO designation: ISO-L-XBEGB 00.

4 Detailed classification

The detailed classification is as follows.

The grease characteristics are determined according to the specifications detailed in annex A. From the test results, the correct designation symbols can be determined.

The operating-temperature range of the grease is determined from Table 2 and comprises two symbols: the lowest operating temperature and the maximum continuous operating temperature.

The ability of the grease to provide satisfactory lubrication in conditions where water contamination is possible, and to provide the level of anti-rust protection is described in Table 3.

Table 4 describes the requirements for symbol 4, according to the ability of the grease to lubricate in the presence of high loads.

The NLGI consistency makes up the final digits in the designation system (see Table 5).

1) For the definition of the NLGI consistency number, see ISO 6743-99^[1].

NLGI: National Lubricating Grease Institute

The detailed classification of greases is shown in Table 6.

Table 1 — Order of letters for designation of greases

ISO	L	X	Symbol 1	Symbol 2	Symbol 3	Symbol 4	NLGI number
ISO initials	Class of lubricants	Family grease	Lower operating temperature	Upper operating temperature	Water contamination	Ability to lubricate under high loads [Extreme pressure (EP) properties]	Consistency
Example (see 3.3)							
ISO	L	X	B	E	G	B	00

Table 2 — Operating-temperature range

Symbol 1		Symbol 2	
Lower operating temperature		Upper operating temperature	
Temperature (°C)	Symbol 1	Temperature (°C)	Symbol 2
0	A	60	A
-20	B	90	B
-30	C	120	C
-40	D	140	D
< -40	E	160	E
		180	F
		> 180	G

Table 3 — Level of water resistance and protection against corrosion

Water contamination ^a	Anti-rust protection ^b	Symbol 3
L	L	A
L	M	B
L	H	C
M	L	D
M	M	E
M	H	F
H	L	G
H	M	H
H	H	I

^a L = dry; M = static; H = water wash.

^b L = no protection; M = protect in the presence of water; H = protect in the presence of salt water.

Table 4 — Ability to lubricate under high loads

Extreme pressure (EP) properties	Symbol 4
No	A
Yes	B

Table 5 — NLGI consistency number

NLGI class	Worked penetration range (60 double strokes)
000	445 to 475
00	400 to 430
0	355 to 385
1	310 to 340
2	265 to 295
3	220 to 250
4	175 to 205
5	130 to 160
6	85 to 115

Table 6 — Classification of greases

General application	Application requirements									Designation ISO-L
	Range of operating temperature				Water contamination	Symbol 3	Load (EP)	Symbol 4	Consistency	
	Lower temperature ^a (°C)	Symbol 1	Upper temperature ^b (°C)	Symbol 2						
Lubrication requiring grease	0	A	60	A	Ability of the grease to provide satisfactory lubrication in water-contamination conditions, and to provide the level of anti-rust protection described in Table 3.	A B C D E F G H I	Ability of the grease to lubricate in the presence of high loads requiring extreme pressure properties. See Table 4.	A B	Associate the appropriate NLGI number, as shown in Table 5, with the other symbols.	The designation of a grease is made by associating symbol X with other symbols 1, 2, 3 and 4 and with the NLGI consistency number as illustrated in 3.3.
			90	B						
			120	C						
			140	D						
			160	E						
180	F									
> 180	G									
	-20	B	60	A						
			90	B						
			120	C						
			140	D						
			160	E						
180	F									
> 180	G									
	-30	C	60	A						
			90	B						
			120	C						
			140	D						
			160	E						
180	F									
> 180	G									
	-40	D	60	A						
			90	B						
			120	C						
			140	D						
			160	E						
180	F									
> 180	G									
	< -40	E	60	A						
			90	B						
			120	C						
			140	D						
			160	E						
180	F									
> 180	G									

^a The lowest temperature experienced while starting or running, or while pumping the grease.

^b The highest temperature of the lubricated component when in service.

Annex A (informative)

Explanatory notice about specifications of greases

The International Standard for specifications of greases is still in the course of development, and will be referenced as ISO 12924^[12].

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^[4] or DIN 51805^[5] or ASTM D1478^[9].

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^[11] or DIN 51821-2^[7].

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^[2]. The resistance to water contamination is assessed using ISO 11009^[3] for the water wash conditions, and using DIN 51807-1^[6] 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^[8] (European conditions) or ASTM D2596^[10] (American conditions).

Bibliography

- [1] ISO 6743-99:2002, *Lubricants, industrial oils and related products (class L) — Classification — Part 99: General*
- [2] ISO 11007:1997, *Petroleum products and lubricants — Determination of rust-prevention characteristics of lubricating greases*
- [3] ISO 11009:2000, *Petroleum products and lubricants — Determination of water washout characteristics of lubricating greases*
- [4] ISO 13737, *Petroleum products Determination of low-temperature cone penetration of lubricating greases*
- [5] DIN 51805:1974, *Testing of lubricants; determination of flow pressure of lubricating greases, Kesternich method*
- [6] DIN 51807-1:1979, *Testing of lubricants; Test of the behaviour of lubricating greases in the presence of water; Static test*
- [7] DIN 51821-2:1989, *Testing of lubricants; test using the FAG roller bearing grease testing apparatus FE9; test method A/1500/6000*
- [8] IP 239/01, *Determination of extreme pressure and anti-wear properties of lubricating fluids — Four ball method (European conditions)*
- [9] ASTM D1478:1991, *Standard Test Method for Low-Temperature Torque of Ball Bearing Grease*
- [10] ASTM D2596:1997, *Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Grease (Four-ball Method)*
- [11] ASTM D3336:1997, *Standard Test Method for Life of Lubricating Greases in Ball Bearing at Elevated Temperatures*
- [12] ISO 12924, *Lubricants, industrial oils and related products (class L) — Family X (Greases) — Specifications*

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