BRITISH STANDARD

BS 4475:2000

Incorporating
Corrigendum No. 1

Specification for

Straight mineral lubricating oils

ICS 75.100

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PTI/7, Lubricants and process fluids, upon which the following bodies were represented:

Agricultural Engineers' Association
Ball and Roller Bearing Manufacturers' Association
British Fluid Power Association
British Gear Association
British Lubricants Federation Ltd.
Institute of Petroleum
Ministry of Defence
Society of Motor Manufacturers and Traders

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Amendments issued since publication

Amd. No.	Date	Comments
12089	January 2001	Correction to title of Table 2.

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Foreword

This British Standard has been prepared by Technical Committee PTI/7, Lubricants and process fluids, and supersedes BS 4475:1991, which is withdrawn.

This standard is intended to assist users concerned with the selection of lubricants for industrial equipment, machine designers, lubricant suppliers, and those responsible for the use and maintenance of equipment.

The requirements specified are those essential for a lubricant, namely viscosity in terms of the classification in BS 4231, viscosity/temperature characteristics, flashpoint, pour point and freedom from acidic constituents. An additional requirement is given for demulsibility, i.e. the ability of an oil to permit separation of water, which is important in certain applications where water is liable to occur in service.

This British Standard specifies requirements for two types of straight mineral lubricating oils, each containing 13 viscosity grades.

One type of oil is intended primarily for use in total loss systems, i.e. those in which the oil is run to waste after performing its function.

The other type of oil is intended for use in circulating systems in which the oils are retained or recirculated.

A number of preferred viscosity grades are indicated in an attempt to rationalize oil stocks. It is hoped that equipment manufacturers will select these preferred viscosity grades when designing new equipment and will recommend their use, thus providing a progressive reduction in the number of grades required.

This British Standard does not cover lubricating oils containing additives which enhance the properties of the lubricant. Pour point depressants are, however, permitted to ensure compliance of the oil with this standard.

This edition introduces the current editorial format and updates the methods of test, but does not reflect a full review or revision of BS 4475:1991, which will be undertaken in due course.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 5 and a back cover.

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1 Scope

This British Standard specifies requirements for two types of straight mineral lubricating oil, with one type suitable for use in total loss systems and the other in circulating systems.

2 Normative references

The following normative documents contain provisions which, through reference in the text, constitute provisions of this British Standard. For dated references subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 2000-15, *Methods of test for petroleum and its products — Part 15: Petroleum products — Determination of pour point.*

BS 2000-139, *Methods of test for petroleum and its products — Part 139: Petroleum products and lubricants — Determination of acid or base number — Colour-indicator titration method.*

BS 2000-182, *Methods of test for petroleum and its products — Part 182: Determination of inorganic acidity of petroleum products — Colour indicator titration method.*

BS 2000-226, *Methods of test for petroleum and its products — Part 226: Petroleum products — Calculation of viscosity index from kinematic viscosity.*

BS 2000-412, *Methods of test for petroleum and its products — Part 412: Petroleum products — Determination of water separability of petroleum oils and synthetic fluids.*

BS 4231, *Classification for viscosity grades of industrial liquid lubricants.*

BS 6413-1, *Lubricants, industrial oils and related products (class L) — Part 1: Classification for family A (total loss systems).*

BS EN ISO 3104:1996, *Methods of test for petroleum and its products — Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity.*
(BS 2000-71:1)

BS EN 22719, *Methods of test for petroleum and its products — Petroleum products and lubricants — Determination of flash point — Pensky-Martens closed cup method.*
(BS 2000-404:1994)

BS EN ISO 3170, *Petroleum liquids — Manual sampling.*

BS EN ISO 4259, *Petroleum products — Determination and application of precision data in relation to methods of test.*
(BS 2000-367:1996)

NOTE Copies of the BS 2000 series of standards are available from the Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

3 Sampling

For the purposes of this British Standard, all sampling shall be carried out in accordance with the relevant procedures and precautions described in BS EN ISO 3170.

4 Composition

The oils shall be pure mineral oils free from additives, except that when the pure mineral oils cannot comply with the pour point requirement (see Table 1), it is permissible to add a pour point depressant.

On visual inspection, the oils shall be clear and free from water, suspended matter, dirt and sediment.

NOTE Oils of the same quality level [i.e. bearing the same designation (ISO-L-AN or CS] conforming to this standard are compatible with one another and may be mixed in any proportion.

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5 Requirements

5.1 General

When tested in accordance with the methods shown in Tables 1 or 2 as appropriate, the oils shall conform to the limiting requirements given in the relevant table for the grade concerned.

5.2 Grade designations

5.2.1 *General*

Oils supplied to this standard shall be designated type (ISO-L-AN or CS) and viscosity grade number.

5.2.2 *Type designation*

Oils for total loss systems (see Table 1) shall be designated according to the classification in BS 6413-1 for defined mineral oils, i.e. ISO-L-AN.

Oils for circulating systems (see Table 2) shall be designated CS.

5.2.3 *Viscosity grade*

All types of oil shall additionally be designated according to their viscosity in accordance with the ISO viscosity classification given in BS 4231, i.e. a number corresponding to the mid-point kinematic viscosity at 40 °C, e.g. ISO VG 150.

NOTE The viscosity designation may be abbreviated in the full designation, e.g. CS 150.

5.3 Demulsibility

If required, the demulsification number for a circulating system oil shall be determined in accordance with BS 2000-412.

If an oil conforming to the additional requirement for demulsibility is specified, the grade designation shall be identified by the addition of the letter X following the viscosity number.

For viscosity grades up to and including CS 100, the limit shall be 40/40/0 in 5 min.

For viscosity grades CS 150 to CS 1 000, the limit shall be 40/40/0 in 20 min.

5.4 Precision and interpretation of results

Most of the methods given in Tables 1 and 2 contain a statement of the precision, i.e. the repeatability and reproducibility to be expected from them but, in cases of dispute, the procedure described in BS EN ISO 4259, which uses precision data in the interpretation of the results, shall be used.

6 Packaging and marking

The oils shall be supplied in bulk or in clean, sound and dry containers as agreed between the purchaser and supplier. Each container shall be legibly and durably marked with the following:

a) the number and date of this British Standard, i.e. BS 4475:2000[1)];

b) the type and grade designation, e.g. ISO-L-AN 150, CS 68;

c) the name or mark of the supplier or vendor and the batch or consignment number.

[1)] Marking BS 4475:2000 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

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Table 1 — Straight mineral lubricating oils for total loss systems (Type ISO-L-AN)

Viscosity grade no. (see BS 4231)	**10**	**15***	**22**	**32***	**46**	**68***	**100**	**150***	**220**	**320***	**460**	**680***	**1 000***	**Test method**	
														BS reference	**Technically identical with**
Viscosity kinematic (at 40.0 °C, cSt)[a]															
min.	9.0	13.5	19.8	28.8	41.4	61.2	90	135	198	288	414	612	900	BS EN ISO 3104	IP 71: Section 1
max.	11.0	16.5	24.2	35.2	50.6	74.8	110	165	242	352	506	748	1 100		
Flashpoint Pensky-Martens closed (°C)															
min.	120	132	150	165	171	183	192	192	204	216	228	237	237	BS EN 22719[b]	IP 404
Pour point (°C)															
max	−9	−9	−9	−9	−9	−6	−6	−3	−3	−3	−3	−3	6	BS 2000-15	IP 15
Total acidity (mg KOH/g)															
max.	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5	BS 2000-139	IP 139
Inorganic acidity (mg KOH/g)															
max.	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	Below 0.01	BS 2000-182	IP 182

NOTE The grades indicated by an asterisk are preferred grades (see Foreword, paragraph 7).

[a] 1 cSt = 1 mm^2/s = 1 × 10^{-6} m^2/s.

[b] Any determination above 250 °C, the precision statement given in BS EN 202719 does not apply.

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Table 2 — Straight mineral lubricating oils for circulating systems (Type CS)

Viscosity grade no. (see BS 4231)	10	15*	22	32*	46	68*	100	150*	220	320*	460	680*	1 000*	Test method	
														BS reference	Technically identical with
Viscosity kinematic (at 40.0 °C, cSt)[a]															
min.	9.0	13.5	19.8	28.8	41.4	61.2	90	135	198	288	414	612	900	BS EN ISO 3104	IP 71: Section 1
max.	11.0	16.5	24.2	35.2	50.6	74.8	110	165	242	352	506	748	1 100		
Viscosity index															
min.	80	80	90	90	90	90	90	90	90	90	90	80	70	BS 2000-226	IP 226
Flashpoint Pensky-Martens closed (°C)															
min.	132	150	165	171	183	192	204	216	228	237	237	249	261	BS EN 22719[b]	IP 404
Pour point (°C)															
max.	−18	−18	−9	−9	−9	−9	−9	−9	−6	−6	−6	−3	6	BS 2000-15	IP 15
Total acidity, (mg KOH/g)															
max.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	BS 2000-139	IP 139

NOTE The grades indicated by an asterisk are preferred grades (see Foreword, paragraph 7).

[a] 1 cSt = 1 mm^2/s = 1×10^{-6} m^2/s.

[b] Any determination above 250 °C, the precision statement given in BS EN 22719 does not apply.

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Bibliography

BS 2000-19, *Methods of test for petroleum and its products — Part 19: Determination of demulsifibility characteristics of lubricating oil.*

BS 2000-306, *Methods of test for petroleum and its products — Part 306: Determination of oxidation stability of straight mineral oil.*

NOTE Copies of the BS 2000 series of standards are available from the Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

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