

Specification for

Lubricants for refrigerant compressors

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Petroleum Standards Policy Committee (PTC/-) to Technical Committee PTC/7, upon which the following bodies were represented:

- Ball and Roller Bearing Manufacturers' Association
- British Coal Corporation
- British Fluid Power Association
- British Gear Association
- British Lubricants Federation Limited
- British Railways Board
- British Steel plc
- Department of Transport
- Electricity Industry in United Kingdom
- Engineering Equipment and Materials Users' Association
- Institute of Petroleum
- London Regional Transport
- Ministry of Defence

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Refrigeration Association
- Institute of Refrigeration

This British Standard, having been prepared under the direction of the Petroleum Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 June 1992

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Foreword

This British Standard has been prepared under the direction of the Petroleum Standards Policy Committee. It supersedes BS 2626:1975, which is withdrawn. In preparing this revision the Committee noted the effect that the “Montreal Protocol on Substances that deplete the Ozone layer” will have on the development of refrigerants and suitable lubricants. The Committee was aware that the refrigerant used in the method for determination of material insoluble in Refrigerant 12 at -40°C has been shown to be among those compounds believed to have a significant depleting effect on the ozone layer. However, it was agreed to retain this refrigerant in the absence of a suitable equivalent substance that is not harmful in the same sense.

This British Standard defines lubricants suitable for use in systems containing commonly used refrigerants. No attempt has been made to recommend lubricants for specific applications as it is considered that this is the responsibility of the plant manufacturer or designer.

The lubrication of compressors in vapour compression refrigerating systems generally demands special or enhanced properties that are not normally possessed by, or necessary in, mineral oils used for the lubrication of other types of plant. This is because the lubricant may be transferred from the compressor to other parts of the refrigerating system where it will be exposed to extremes of temperature and may also come into contact with varying amounts of liquid or gaseous refrigerants.

These refrigerants may be fully miscible, partly miscible or practically immiscible with lubricants. The intimate contact of oil and refrigerant under varying conditions of pressure and temperature may determine the choice of lubricant and the test methods used to evaluate its performance.

For particular combinations of specific refrigerants and extreme temperatures, the use of special lubricants may be necessary and such lubricants are outside the scope of this standard.

CAUTION. In relation to potential health hazards and to precautions recommended for persons regularly in contact with mineral oils over long periods, attention is drawn to the following advisory notices:

- MC (B4) Skin cancer caused by pitch and tar
- MC (B5) Skin cancer caused by oil
- MC (B6) Save your skin. Occupational contact dermatitis
- MC (B9) Save your skin. Advice to employers
- MC (B10) Save your skin. Wear gloves

available from the Employment Medical Advisory Service (EMAS) of the Health and Safety Executive and from whom further advice may be obtained.

Attention is drawn to the Health and Safety at Work etc. Act 1974 and the need for ensuring that the methods specified in this British Standard are carried out with suitable precautions.

The principal differences between BS 2626:1975 and this standard are as follows:

- a) the extension of the scope from mineral oils without additives (type A lubricants) to cover, as type B lubricants, mineral oils containing additives, and lubricants wholly or partially containing synthetic lubricants;
- b) the addition of viscosity grades VG 100, VG 150, VG 220, VG 320 and VG 460;
- c) the reduction in acid number limit from 0.1 mg KOH per gram to 0.05 mg KOH per gram; and
- d) the introduction of optional requirements concerning the integrity of containers based on the requirements of Defence Standard 91-60/1(OM-70).

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.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies requirements for a range of 10 viscosity grades of two types of lubricants that are suitable for the lubrication of compressors for refrigerating systems operated with refrigerants as defined in BS 4434.

NOTE 1 This British Standard does not specify requirements for the compatibility or miscibility of lubricants with refrigerants. However, it is essential that care is taken in the selection of a lubricant/refrigerant combination.

NOTE 2 Appendix A gives explanatory notes on refrigerant compressor lubricants and is for information only.

NOTE 3 The titles of the publications referred to in this standard are listed on the inside back cover.

2 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 3195-1.

3 Composition

The lubricants shall be one of the following types:

- a) *type A lubricants*, consisting of petroleum products free from additives;
- b) *type B lubricants*, consisting of either petroleum products containing additives, or wholly or partially of synthetic lubricants which may contain additives.

NOTE Lubricants should not be mixed unless their compatibility has been established.

4 Appearance

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

5 Physical and chemical characteristics

When tested in accordance with the methods given in Table 1, the lubricants shall comply with the limiting requirements given in that table for the appropriate viscosity grade.

Table 1 — Physical and chemical requirements for refrigerant compressor lubricants

		Viscosity grade ISO VG										Test method
		15	22	32	46	68	100	150	220	320	460	
Kinematic												
viscosity at 40 °C,	min.	13.5	19.8	28.8	41.4	61.2	90	135	198	288	414	BS 2000-71
in cSt^a	max.	16.5	24.2	35.2	50.6	74.8	110	165	242	352	506	
Pour point, in °C	max.	− 39	− 39	− 30	− 30	− 24	− 21	− 21	− 21	− 21	− 21	BS 2000-15
Flash point, by Pensky-Martens closed tester, in °C	min.	147	147	156	156	171	180	210	225	225	225	BS 2000-34
Total acid number, in mg KOH/g^{bc}	max.	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	BS 2000-139
Free water content		No audible crackle in two out of three tests										Appendix B
Type A												
Type B,												
in mg/kg	max.	40	40	40	40	40	40	40	40	40	40	BS 6725
Content of material insoluble in Refrigerant 12 at − 40 °C, % (m/m)	max.	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Appendix C
Copper corrosion classification (3 h at 100 °C)	max.	1	1	1	1	1	1	1	1	1	1	BS 2000-154

^a 1 cSt = 1 mm²/s = 1 × 10^{−6} m²/s.

^b The provisions of clause 8 do not apply as the limit is below the range provided for by the precision of the method.

^c There are certain formulated lubricants blended with additives that have a total acid number up to 0.5 mg KOH/g which are commercially available. Information should be sought from the manufacturer regarding their use.