

ISO viscosity classification of industrial liquid lubricants

DIN
51519

ICS 75.100

Supersedes July 1976 edition.

Schmierstoffe – ISO-Viskositätsklassifikation für flüssige
Industrie-Schmierstoffe

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Foreword

This standard has been prepared by Technical Committee *Anforderungen an Schmieröle und sonstige Öle* of the *Normenausschuss Materialprüfung* (Materials Testing Standards Committee). It conforms in substance with ISO 3448.

A classification system should cover the full viscosity range of liquid lubricants in normal use, without including too many individual grades. The present classification system is therefore not continuous, with each grade range extending no more than 10 % from the mid-point viscosity value. This results in a similar degree of uncertainty to that given by the usual tolerances in parts manufacturing. The reference temperature is 40 °C, being a compromise between the internationally most frequently used temperatures (37,8 °C and 50 °C), and being a preferred working temperature in oil circulation systems. The designation of the viscosity classes is identical to that in the ASTM and BSI classification systems. Lubricants which cannot be classified according to this standard may, by agreement, continue to be used, provided their viscosity is given at the new reference temperature, 40 °C. Some natural or synthetic lubricants, such as diester oil, cannot be classified (cf. clause 1). The international SAE classification of automobile motor and gear lubricants is not affected by this standard.

Amendments

This standard differs from the July 1976 edition in that it has been brought into line with ISO 3448 and has been editorially revised.

Previous edition

DIN 51519: 1976-07.

1 Scope

This standard sets out a viscosity classification system for industrial liquid lubricants and related fluids. The usual method of determining viscosity is described in DIN EN ISO 3104, but may produce anomalous results when applied to non-Newtonian fluids (i.e. those whose viscosity coefficient varies significantly with the rate of shear). The method used to determine viscosity should therefore be stated.

It should be noted that certain synthetic and natural products are used as lubricants, but cannot be classified using this system.

Continued on pages 2 to 4.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- DIN 51562-1 Determination of kinematic viscosity using the Ubbelohde viscometer – Apparatus and measurement procedure
- DIN EN ISO 3104 Petroleum products – Determination of kinematic viscosity and calculation of dynamic viscosity of transparent and opaque liquids (includes Corrigendum AC : 1999)
(ISO 3104 : 1994 + Corr. 1 : 1997)
- ISO 2909 : 1981 Petroleum products – Calculation of viscosity index from kinematic viscosity
- ISO 3448 : 1992 Industrial liquid lubricants – ISO viscosity classification

3 Classification

3.1 This classification system defines 20 viscosity grades in the range from 2 mm²/s to 3 200 mm²/s at 40 °C. In the case of petroleum-based liquids, this range covers kerosine to engine oils.

3.2 Each viscosity grade is designated by the nearest whole number to its mid-point kinematic viscosity at 40 °C, in mm²/s, with its limits being ± 10 % of this value. Table 1 gives the viscosity grades and their limits.

Table 1: ISO viscosity classification

ISO viscosity grade	Mid-point kinematic viscosity at 40 °C, in mm ² /s	Kinematic viscosity limits at 40 °C, in mm ² /s	
		Min.	Max.
ISO VG 2	2,2	1,98	2,42
ISO VG 3	3,2	2,88	3,52
ISO VG 5	4,6	4,14	5,06
ISO VG 7	6,8	6,12	7,48
ISO VG 10	10	9,00	11,0
ISO VG 15	15	13,5	16,5
ISO VG 22	22	19,8	24,2
ISO VG 32	32	28,8	35,2
ISO VG 46	46	41,4	50,6
ISO VG 68	68	61,2	74,8
ISO VG 100	100	90,0	110
ISO VG 150	150	135	165
ISO VG 220	220	198	242
ISO VG 320	320	288	352
ISO VG 460	460	414	506
ISO VG 680	680	612	748
ISO VG 1 000	1 000	900	1 100
ISO VG 1 500	1 500	1 350	1 650
ISO VG 2 200	2 200	1 980	2 420
ISO VG 3 200	3 200	2 880	3 520

3.3 Classification is based on the assumption that the mid-point kinematic viscosity of a grade is 50 % greater than that of the preceding grade. Dividing each decade into six equal logarithmic stages enables smooth progression from decade to decade. The logarithmic series has been rounded off in order to provide simple numbers. The maximum deviation of the mid-point viscosity values from the logarithmic series is 2,2 %.

3.4 This classification does not evaluate quality, giving only information on kinematic viscosity at 40 °C. Viscosity at other temperatures will depend on the viscosity/temperature characteristics of the lubricants, which are usually given in terms of a viscosity index (cf. ISO 2909).