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Standard Classification of Industrial Fluid Lubricants by Viscosity System[1]

This standard is issued under the fixed designation D 2422; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This classification is applicable to all petroleum-base fluid lubricants and to those nonpetroleum materials which may be readily blended to produce fluid lubricants of a desired viscosity, that is, lubricants for bearings, gears, compressor cylinders, hydraulic fluids, etc.

1.2 This classification is applicable to fluids ranging in kinematic viscosity from 2 to 3200 cSt (mm^2/s) as measured at a reference temperature of 40°C. In the category of petroleum-base fluids, this covers the range from kerosine to heavy cylinder oils.

1.3 Fluids of either lesser or greater viscosity than the range described in 1.2 are at present seldom used as industrial lubricants. Should industrial practices change, then this system, based on a mathematical series of numbers, may be extended to retain its orderly progression.

2. Referenced Documents

2.1 *ASTM Document*:

D341 Viscosity-Temperature Charts for Liquid Petroleum Products[2]

2.2 *SAE Standard:*[3]

J 300 Engine Oil Viscosity Classification

2.3 *ISO Standard:*[4]

ISO 3448 Industrial Liquid Lubricants—ISO Viscosity Classification

3. Significance and Use

3.1 This classification establishes a series of definite viscosity levels so that lubricant suppliers, lubricant users, and equipment designers will have a uniform and common basis for designating, specifying, or selecting the viscosity of industrial fluid lubricants.

3.2 This classification is used to eliminate unjustified intermediate viscosities, thereby reducing the total number of viscosity grades used in the lubrication of industrial equipment.

3.3 This system provides a suitable number of viscosity grades, a uniform reference temperature, a uniform viscosity tolerance, and a nomenclature system for identifying the viscosity characteristics of each grade.

3.4 This system implies no evaluation of lubricant quality and applies to no property of a fluid other than its viscosity at the reference temperature. It does not apply to those lubricants used primarily with automotive equipment and identified with an SAE number.

4. Basis of Classification

4.1 Twenty viscosity grades are given in Table 1.

4.2 Each grade shall be designated by its nominal viscosity at 40°C.

4.3 The permissible variance in viscosity of each grade shall be as shown in the two right-hand columns of Table 1. These limits are based upon a ±10 % deviation from the mathematical values which were used as the basis of construction of this system.

4.4 The lubricant supplier may choose to exert a manufacturing control on a given product that is closer than this ±10 % tolerance. It is to be understood that any different percentage variation that he uses will still guarantee maximum and minimum values that are not outside the limits of the standard viscosity grade limits. However, the lubricant purchaser or the equipment designer shall not normally specify control closer than the maximum and minimums established herein for a given grade. Any exception to this rule shall be handled outside the scope of this system and on a direct consumer-supplier relationship.

5. Adoption of System

5.1 Adoption of this viscosity system is to be voluntary on the part of all persons or organizations. The system will be effective only if used widely by designers, producers, and consumers. There is nothing to prohibit use of a viscosity grade not listed in the system if the producer and consumer mutually agree. It may be expected, however, that viscosity grades not in accordance with this classification will be less readily available to the purchaser than those grades which do conform.

5.2 For the sake of world-wide uniformity of nomenclature in identifying the viscosity characteristics of fluid lubricants the following wording shall be used to designate a particular viscosity grade:

ISO viscosity grade ...

which may be abbreviated to:

[1] This classification is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.L on Industrial Lubricants.

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[2] *Annual Book of ASTM Standards*, Vol 05.01.

[3] Available from the Society of Automative Engineers, 400 Commonwealth Dr., Warrendale, PA 15096.

[4] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

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TABLE 1 Viscosity System for Industrial Fluid Lubricants[A]

Viscosity System Grade Identification	Mid-Point Viscosity, cSt (mm^2/s) at 40.0°C	Kinematic Viscosity Limits, cSt (mm^2/s) at 40.0°C[B,C]	
		min	max
ISO VG 2	2.2	1.98	2.4
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 1000	1000	900	1100
ISO VG 1500	1500	1350	1650
ISO VG 2200	2200	1980	2420
ISO VG 3200	3200	2880	3520

[A]This system implies no evaluation of quality.
[B]This system is used in ISO 3448.
[C]If 40°C is not the temperature used when determining the viscosity (as is sometimes the case with very viscous fluids) then the related viscosity at 40°C shall be established by using Viscosity Temperature Charts D341.

ISO VG ...

The wording would be followed by the nominal viscosity at 40°C expressed in centistokes (millimetres squared per second) units of measurement.

5.3 The establishment of standardized viscosity grades as has been done herein shall not imply nor require that every viscosity grade be made available by all lubricant suppliers for each and every type of fluid which he markets. The availability will be dictated by the demand that exists in any one locality at any given point in time.

6. Keywords

6.1 classification; lubricant; viscosity

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