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Standard Viscosity-Temperature Chart for Asphalts[1]

This standard is issued under the fixed designation D2493/D2493M; 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. ~~ε[1] NOTE—Adjunct references were corrected editorially in April 2006.~~

1. Scope

1.1 The viscosity-temperature chart covered by this standard is a convenient means of plotting data for estimating the viscosity of asphalts at any temperature within a limited range. Conversely, the chart may be used to ascertain the temperature at which a desired viscosity is attained.

1.2 The chart is suitable for original asphalt cements and for asphalts recovered from laboratory aging tests or extracted from pavements.

1.3 The chart is based on a viscosity–temperature relationship that can be plotted using any appropriate set of units. For convenience, charts based on both conventional and SI units are provided.

1.4 The range of the chart is sufficient for roofing asphalts.

~~1.5The range of the chart is sufficient for liquid asphalts (bitumens) whose viscosity exceeds 0.1 poise (10 centipoise).~~

1.5 The range of the chart is sufficient for liquid asphalts (bitumens) whose viscosity exceeds 0.01 Pa.S (10 centipoise).

1.6 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D341 Practice for Viscosity-Temperature Charts for Liquid Petroleum Products

D2170 Test Method for Kinematic Viscosity of Asphalts (Bitumens)

D2171 Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer

D3205 Test Method for Viscosity of Asphalt with Cone and Plate Viscometer

D4402 Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer

D4957 Test Method for Apparent Viscosity of Asphalt Emulsion Residues and Non-Newtonian Bitumens by Vacuum Capillary Viscometer

~~2.2 *ASTM Adjuncts:*~~

~~Viscosity-Temperature Chart for Asphalts (17 by 18 in. pad of 25 sheets)~~

3. Significance and Use

3.1 The viscosity-temperature chart is a convenient means of plotting the viscosity data for estimating the viscosity of asphalts, recovered asphalts, and roofing asphalts at any temperature within a limited range. It is also a convenient means to estimate the temperature at which a desired viscosity is attained. Charts may be constructed manually or using computer graphing software.

3.2 Kinematic viscosity-temperature charts are described in Charts D341.

4. Description

4.1 For Fig. 1~~, the chart coordinates are logarithm of the logarithm of the viscosity in centipoise as the ordinate, and logarithm of the absolute temperature in Degrees Rankine (degrees F +459.7) as the abscissa. However, the viscosity in poise and the temperature in degrees Fahrenheit is shown in the chart for convenience.[3]~~

~~4.1.1The range of the chart is 10^{-1} to 10^{24} poise and 0 to 400°F, as shown in Fig. 1. Its size is 16 by 17 in. (406 by 432 mm).~~

[1] This chart is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.44 on Rheological Tests.

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Current edition approved Dec. 1, 2009. Published January 2010. Originally approved in 1966. Last previous edition approved in 2001 as D2493 – 01 ε1. DOI: 10.1520/D2493_D2493M-09.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

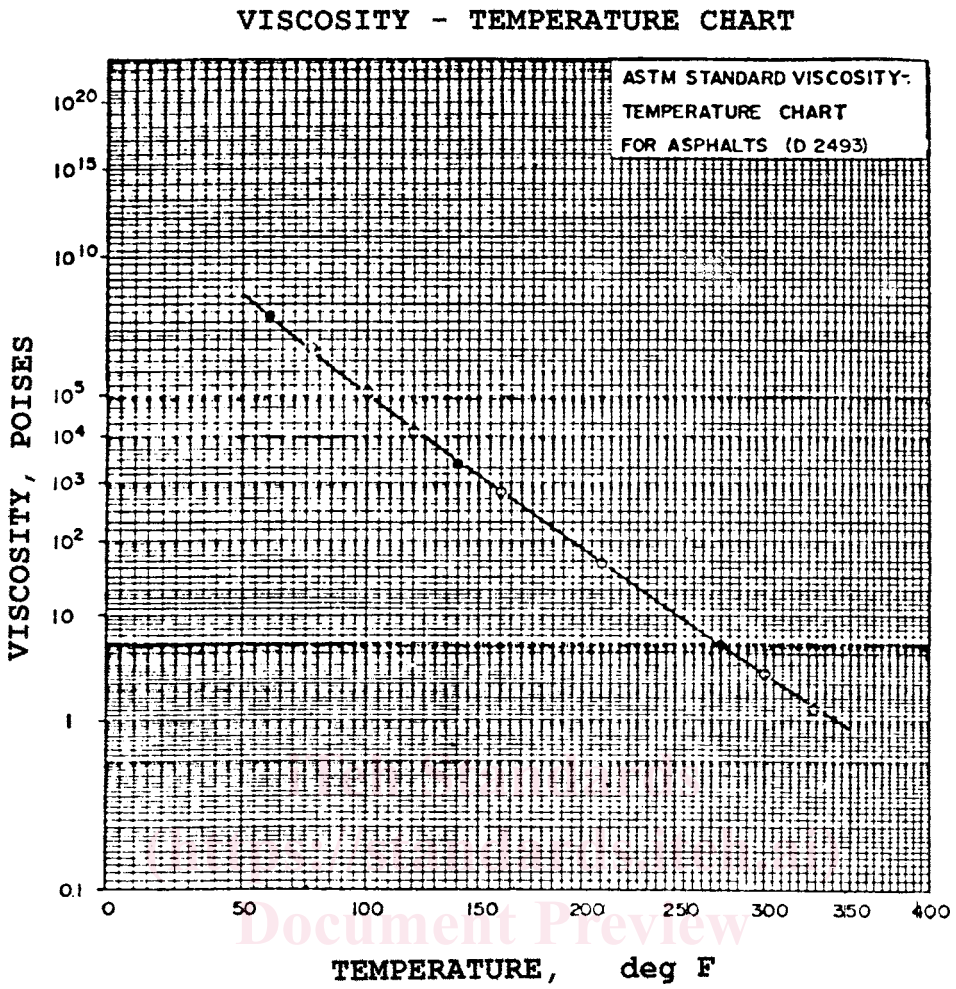

FIG. 1 ~~Facsimile of~~Viscosity-Temperature Chart for Asphalts on Which a Typical Experimental Curve Has Been Plotted

~~4.2For Fig. 2, the chart coordinates are logarithm of the logarithm of the viscosity in mPa.s as the ordinate, and logarithm of the absolute temperature in degrees Kelvin (degrees C + 273.2) as the abscissa. However, viscosity in Pascal-seconds, and the temperature in degrees Celsius is shown in the chart for convenience.~~

, the chart coordinates are logarithm of the logarithm of the viscosity in mPa.S as the ordinate, and logarithm of the absolute temperature in degrees Kelvin (degrees C + 273.2) as the abscissa. However, the viscosity in Pa.S and the temperature in degrees Celsius is shown in the chart for convenience.

~~(1) (1 Pa.s = *m*Pa.s × 103)~~

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~~4.2.1The range of the chart is 10^{-2} to 10^{23} Pa.s and −20 to 200°C, as shown in~~ D2493_D2493M-09_1

4.2 For Fig. 2.

~~4.3The temperature range of the charts may be extended to lower temperatures by renumbering the temperature scale of a second chart, according to Table 1, discarding the portion above 230°F (110°C), and placing the 230°F (110°C) axis along the 0°F (-17.8°C) axis of an original chart.~~ , the chart coordinates are logarithm of the logarithm of the viscosity in centipoise as the ordinate, and logarithm of the absolute temperature in degrees Rankine (degrees F + 459.7) as the abscissa. However, viscosity in poise, and the temperature in degrees Fahrenheit is shown in the chart for convenience.

4.3 The temperature range of the charts may be extended or abbreviated as necessary.

5. Procedure

~~5.1For temperatures above 60°C (140°F), plot two viscosity-temperature points and carefully draw a straight line through the points. Plot at least three viscosity-temperature points if the included temperature range is below 60°C (140°F). Carefully draw a straight line or curve through the points. A point on this line, within the temperature range of the points plotted, shows the viscosity at the corresponding desired temperature.~~

~~NOTE1—These charts are appropriate for use at higher temperatures, where asphalts are primarily viscous. At lower temperatures most asphalts become viscoelastic. When this occurs, viscosity alone is insufficient to describe an asphalt's flow properties. Most asphalts are primarily viscous at temperatures~~