



Designation: D6816 – 21

Standard Practice for Determining Low-Temperature Performance Grade (PG) of Asphalt Binders¹

This standard is issued under the fixed designation D6816; 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 practice covers the calculation of low-temperature properties of asphalt binders using data from the bending beam rheometer (see Test Method [D6648](#)) (BBR) and the direct tension tester (see Test Method [D6723](#)) (DTT). It can be used on data from unaged material or from material aged using Test Method [D2872](#) (RTFOT), Practice [D6521](#) (PAV), or Test Method [D2872](#) (RTFOT) and Practice [D6521](#) (PAV). It can be used on data generated within the temperature range from +6 °C to –36 °C. This practice generates data suitable for use in binder specifications such as Specification [D6373](#).

1.2 This practice is only valid for data on materials that fall within the scope of suitability for both Test Method [D6648](#) and Test Method [D6723](#).

1.3 This practice can be used to determine the following:

1.3.1 Critical cracking temperature of an asphalt binder, and

1.3.2 Whether or not the failure stress exceeds the thermal stress in a binder at a given temperature.

1.4 This practice determines the critical cracking temperature for a typical asphalt binder based on the determination of the temperature where the asphalt binder's strength equals its thermal stress as calculated by this practice. The temperature so determined is intended to yield a low-temperature PG grade of the sample being tested. The low-temperature PG grade is intended for use in purchase specifications and is not intended to be a performance prediction of the HMA (Hot Mix Asphalt) in which the asphalt binder is used.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. In cases where units have been omitted, SI units are implied.

NOTE 1—The algorithms contained in this standard require implementation by a person trained in the subject of numerical methods and viscoelasticity. However, due to the complexity of the calculations they must, of necessity, be performed on a computer. Software to perform the

¹ This practice 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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calculation may be written, purchased as a spreadsheet, or as a stand-alone program.²

1.6 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:³

[C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials](#)

[D8 Terminology Relating to Materials for Roads and Pavements](#)

[D2872 Test Method for Effect of Heat and Air on a Moving Film of Asphalt \(Rolling Thin-Film Oven Test\)](#)

[D6373 Specification for Performance-Graded Asphalt Binder](#)

[D6521 Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel \(PAV\)](#)

[D6648 Test Method for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer \(BBR\)](#)

² The sole source of supply of the software package TSAR known to the committee at this time is Abatech, Incorporated. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

³ 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.