



Standard Specification for Graded Trinidad Lake Modified Asphalt Binder¹

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1. Scope

1.1 This specification covers graded Trinidad Lake modified asphalt binders. Grading designations are related to the average seven-day maximum pavement design temperature, °C, the intermediate pavement design temperature, °C, and minimum pavement design temperature, °C.

NOTE 1—For asphalt cements graded by penetration at 25 °C, see Specification D 946. For asphalt cements graded by viscosity at 60 °C, see Specification D 3381.

NOTE 2—AASHTO Guide PP5 provides information on the evaluation of modified asphalt binders.

1.2 The values stated in SI units are to be regarded as standard.

2. Referenced Documents

2.1 ASTM Standards:

- D 8 Terminology Relating to the Materials for Roads and Pavements²
- D 92 Test Method for Flash and Fire Points by Cleveland Open Cup³
- D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation³
- D 140 Practice for Sampling Bituminous Materials²
- D 946 Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction²
- D 1754 Test Method for Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)²
- D 2042 Test Method for Solubility of Asphalt Materials in Trichloroethylene²
- D 2170 Test Method for Kinematic Viscosity of Asphalts (Bitumens)²
- D 2171 Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer²
- D 2872 Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)²
- D 3381 Specification for Viscosity—Graded Asphalt Cement for Use in Pavement Construction²
- D 4402 Test Method for Viscosity Determinations of Un-

- filled Asphalts Using the Brookfield Thermosel Apparatus⁴
- D 6521 Standard Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)²
- P 245 Proposed Test Method for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)⁵
- P 246 Proposed Test Method for Determining the Rheological Properties of Asphalt Binder for Specification Purposes Using a Dynamic Shear Rheometer (DSR)⁵
- P 252 Proposed Test Method for Determining the Fracture Properties of Asphalt Binder in Direct Tension (DT)⁵
- 2.2 AASHTO Standards:
 - PP5 Guide for the Laboratory Evaluation of Modified Asphalt Systems⁶

3. Terminology

3.1 Definitions:

3.1.1 Definitions for many terms common to asphalt cement are found in Terminology D 8.

4. Ordering Information

4.1 When ordering under this specification, include in the purchase order the grade of Trinidad Lake modified asphalt binder required from Table 1 (for example, TLG 52-16 or TLG 64-34).

5. Materials and Manufacture

5.1 Trinidad Lake modified asphalt binder shall be prepared by the addition of Trinidad Lake Asphalt modifier to base asphalt produced from the refining of petroleum crude, with or without the inclusion of organic or inorganic modifiers.

5.2 Modifiers may be any suitable form of Trinidad Lake Asphalt that may include also organic or inorganic modifiers of suitable manufacture and preparation, and that is dissolved, dispersed or reacted in asphalt cement to enhance its performance.

5.3 The base asphalt binder shall be homogeneous, free from water and deleterious materials, and shall not foam when heated to 175 °C.

5.4 The base asphalt binder shall be at least 99.0 % soluble in trichloroethylene as determined by Test Method D 2042.

¹ This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.45 on Modified Asphalt Specifications.

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² *Annual Book of ASTM Standards*, Vol 04.03.

³ *Annual Book of ASTM Standards*, Vol 05.01.

⁴ *Annual Book of ASTM Standards*, Vol 04.04.

⁵ Discontinued; see 1995 *Annual Book of ASTM Standards*, Vol 04.03.

⁶ Available from the American Association of State Highway and Transportation Officials, 444 N. Capitol St. NW., Washington, DC 20001.

TABLE 1 Graded Trinidad Lake Modified Asphalt Binder Specification

Performance Grade	TLG 46-			TLG 52-			TLG 58-			TLG 64-			TLG 70-			TLG 76-			TLG 82-					
	34	40	46	10	16	22	28	34	40	10	16	22	28	34	40	10	16	22	28	34	10	16	22	28
Average 7-day maximum Pavement design Temperature, °C	<46			<52			<58			<64			<70			<76			<82					
Intermediate Viscosity, °C	10 7 4			25 22 19 16 13			25 22 19 16 13			31 28 25			34 31 28			37 34 31 28 25			40 37 34 31 28					
Maximum Pavement Design Temperature, °C ^A	> -34 > -40 > -46			> -10 > -16 > -22 > -28 > -34 > -40 > -46			> -16 > -22 > -28 > -34 > -40			> -10 > -16 > -22 > -28 > -34 > -40			> -10 > -16 > -22 > -28 > -34 > -40			> -10 > -16 > -22 > -28 > -34			> -10 > -16 > -22 > -28 > -34					
Original Modified Asphalt Binder																								
Flash Point Temp, Test Method D 92; min, °C	230																							
Solubility, Test Method D 2042, %	77-90																							
Viscosity, Test Method D 4402 ^B ; max, 3 Pas, Test Temp, °C	135																							
Dynamic Shear, P 246; °C G'/sinδ, min, 1.00 kPa Test Temp at 10 rad/s, °C	46			52			58			64			70			76			82					
Rolling Thin Film Oven (Test Method D 2872)																								
Mass loss, max, percent	1.00																							
Dynamic Shear, P 246; G'/sinδ, min, 2.20 kPa Test Temp at 10 rad/s, °C	46			52			58			64			70			76			82					
Pressure Aging Vessel Residue (Practice D 6521)																								
PAV Aging Temp, °C ^D	90			90			100			100			100 (110)			100 (110)			100 (110)					
Dynamic Shear, P 246; G' ^E /sinδ, Maximum, 5000kPa Test Temp at 10rad/s, °C	10 7 4			25 22 19 16 13			25 22 19 16 13			31 28 25			34 31 28			37 34 31 28 25			40 37 34 31 28					
Physical Hardening ^F	Report																							
Creep Stiffness, P 245; ^F S ₁ Maximum, 300 mPa m-value, min, 0.300 Test Temp at 60 s, °C	-24 -30 -36			0 -6 -12 -18 -24 -30 -36			-6 -12 -18 -24 -30			0 -6 -12 -18 -24 -30			0 -6 -12 -18 -24 -30			0 -6 -12 -18 -24 -30			0 -6 -12 -18 -24 -30					
Direct Tension, P 252; ^F Failure Strain, min, 1% @ 1.0mm/min, °C	-24 -30 -36			0 -6 -12 -18 -24 -30 -36			-6 -12 -18 -24 -30			0 -6 -12 -18 -24 -30			0 -6 -12 -18 -24 -30			0 -6 -12 -18 -24 -30			0 -6 -12 -18 -24 -30					

^A Pavement temperatures are estimated from air temperatures using an algorithm contained in the SUPERPAVE software program, or are provided by the specifying agency.
^B This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

^C For quality control of unmodified asphalt cement production, measurement of the viscosity of the original asphalt cement may be substituted for dynamic shear measurements of G'/sinδ at test temperatures where the asphalt is a Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary or rotational viscometry (Test Method D 2170 or D 2171).
^D The PAV Aging temperature is based on simulated climatic conditions and is one of the three temperatures 90°C, 100°C or 110°C. The PAV aging temperature is 100°C for TLG 64- and above except in desert climates, where it is 110°C.

^E Physical Hardening - P 245 is performed on a set of asphalt beams according to section 13.1, except the conditioning time is extended to 24-h ± 10 min at 10 °C above the minimum performance temperature. The 24-h stiffness and m-value are reported for information purposes only.

^F If the Creep stiffness is below 300 Mpa, the direct tension test is not required. If the creep stiffness is between 300 and 600 Mpa the direct tension failure strain requirement can be used in lieu of the creep stiffness requirement. The m-value requirement must be satisfied in both cases.

5.5 The grades of asphalt binder shall conform to the requirements given in Table 1.

6. Sampling

6.1 The materials shall be sampled in accordance with Practice D 140.

7. Test Methods

7.1 The properties outlined in 5.3-5.5 shall be determined in accordance with Test Methods D 92, D 95, D 1754, D 2042, D 2872, D 4402, D 6521, and Proposed Test Methods P 245, P 246, and P 252.

8. Inspection and Certification

8.1 Inspection and certification of the material shall be

agreed upon between the purchaser and the seller. Specific requirements shall be made part of the purchase contract.

9. Rejection and Rehearing

9.1 If the results of any test do not conform to the requirements of this specification, re-testing to determine conformity is performed as indicated in the purchase order or as otherwise agreed upon between the purchaser and the seller.

10. Keywords

10.1 asphalt binder; asphalt cement; direct tension; flash point; graded specifications; modifier; pressure aging; rheology

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