



# Standard Guide for Selection of Asphalt Used in Built-Up Roofing Systems<sup>1</sup>

This standard is issued under the fixed designation D 6510; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 The purpose of this guide is to provide advice for the selection of asphalt used in the construction of built-up roofing (BUR). This guide does not address the use of asphalt in waterproofing, cold-applied, or modified bituminous roofing.

1.2 Reinforcements considered for use with roofing asphalt include ply sheets, (see Specifications D 226, D 2178, and D 5726), base sheets (see Specifications D 2626, D 4601, and D 4897), and cap sheets (see Specification D 3909). They consist of glass, organic, or synthetic fibers.

1.3 The use of asphalt in the placement of vapor retarders and rigid roof insulation also is addressed.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- D 92 Test Method for Flash and Fire Points by Cleveland Open Cup<sup>2</sup>
- D 226 Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing<sup>3</sup>
- D 312 Specification for Asphalt Used in Roofing<sup>3</sup>
- D 1079 Terminology Relating to Roofing, Waterproofing, and Bituminous Materials<sup>3</sup>
- D 1863 Specification for Mineral Aggregate Used in Built-Up Roofs<sup>3</sup>
- D 2178 Specification for Asphalt Glass Felt Used in Roofing and Waterproofing<sup>3</sup>
- D 2626 Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing<sup>3</sup>
- D 3791 Practice Evaluating the Effects of Heat on Asphalts<sup>3</sup>
- D 3909 Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules<sup>3</sup>
- D 4601 Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing<sup>3</sup>
- D 4897 Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing<sup>3</sup>
- D 5726 Specification for Thermoplastic Fabrics Used in Hot-Applied Roofing and Waterproofing<sup>3</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this guide, see Terminology D 1079.

3.2 For a discussion of EVT, refer to NRCA Bulletin 2-91 (or the current edition of the NRCA Roofing and Waterproofing Manual).<sup>4</sup>

## 4. Significance and Use

4.1 This guide supersedes the slope guidelines of Appendix X1 of Specification D 312.

4.2 Hot-applied roofing asphalt serves both as the waterproofing agent and adhesive for construction of built-up roofing membranes. There are many variables that may affect the performance of BUR membranes. This guide provides general specification guidelines for the asphalt only.

## 5. General Considerations

5.1 *Durability*—Specification D 312 describes four types of asphalt. In general, the softest (least oxidized) asphalt is considered most durable. The accepted rule is to select the softest bitumen commensurate with the slope, consistent with the other variables.

5.2 When the EVT guidelines are followed the asphalt application rate can be expected to fall within the ranges of 1.0 to 2.0 kg/m<sup>2</sup> (20 to 40 lb/100 ft<sup>2</sup>).

5.3 Table 1 provides general recommendations for the use of the various types of Specification D 312 asphalt.

5.3.1 In hotter climates, harder (higher viscosity) bitumens are chosen to minimize slippage potential. Table 2 provides some general guidance for proper asphalt selection whenever solar exposure is considered.

5.4 Recommended slope guidelines for the respective Specification D 312 asphalts are as follows:

5.4.1 Type I asphalts are relatively susceptible to flow. They generally are used in aggregate-surfaced roofs on inclines up to 2 % (¼ in./ft) slope.

5.4.2 Type II asphalts are moderately susceptible to flow at roof temperatures. They are sometimes used in built-up roof construction on inclines from approximately 2 % (¼ in./ft) slope to 8.3 % (1 in./ft) slope.

5.4.3 Type III asphalts are relatively nonsusceptible to flow. They are used in built-up roof construction on inclines from

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D-8 on Roofing, Waterproofing, and Bituminous Materials and is the direct responsibility of Subcommittee D08.20 on Roofing Membrane Systems.

Current edition approved Jan. 10, 2000. Published March 2000.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 05.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.04.

<sup>4</sup> NRCA Roofing and Waterproofing Manual, Current Edition, *Use of EVT* (or NRCA Bulletin 2-91), available from the National Roofing Contractors Association, Rosemont, IL.

**TABLE 1 Asphalt Types Used<sup>A</sup>**

Between	Roof Deck	Thermal Insulation	Base Sheet <sup>B</sup>	Ply Sheet <sup>C</sup>	Aggregate <sup>D</sup>	Vapor Retarder
Roof deck	-	II, III, or IV	II, III, or IV	II, III, or IV <sup>E</sup>	-	II, III, or IV
Thermal insulation	II, III or IV	II, III, or IV	II, III, or IV	II, III, or IV <sup>F</sup>	-	II, III, or IV
Base sheet <sup>B</sup>	II, III, or IV	II, III, or IV	-	II, III, or IV <sup>F</sup>	-	-
Ply sheet <sup>C</sup>	II, III, or IV <sup>E</sup>	II, III, or IV <sup>F</sup>	II, III, or IV <sup>E</sup>	II, III, or IV <sup>F</sup>	I thru IV <sup>F</sup>	-
Aggregate <sup>D</sup>	-	-	-	I thru IV <sup>F</sup>	-	-
Vapor retarder	II, III, or IV	II, III, or IV	-	-	-	II, III, or IV

<sup>A</sup> See precautions in 5.5.

<sup>B</sup> Base sheets as described in Specifications D 2626, D 4601, and D 4897.

<sup>C</sup> Ply sheets as described in Specifications D 226, D 2178, and D 5726.

<sup>D</sup> Aggregate as described in Specification D 1863.

<sup>E</sup> Concrete decks only.

<sup>F</sup> Softer material preferred in accordance with 5.1; however, in hot climates, see the climate guide in 5.3.1 and Table 2.

**TABLE 2 Interply Asphalt<sup>A</sup>**

	Sunshine Hours, % (average per year) <sup>B</sup>		
Average Daily Maximum Air Temperature	<40	40 to 80	>80
Approximately 25°C (77°F)	II, II, or III	II or III	III or IV
Approximately 35°C (95°F)	III or IV	III or IV	IV

<sup>A</sup> Softer bitumens applied as thin [ $<1 \text{ kg/m}^2$  (20 lb/100 ft<sup>2</sup>)] glaze coatings may be selected as slippage (flow) is less problematical than when used as an interply mopping.

<sup>B</sup> For information on the climate format used in Table 2, refer to the RILEM/CIB, Performance Testing of Roofing Membrane Materials, Recommendations of RILEM 75-SLR/CIB W. 83, Joint Committee on Elastomeric, Thermoplastic and Modified Bitumen Roofing, November 1988.

approximately 2 % (1/4 in./ft) slope to 25 % (3 in./ft) slope. They are also used in vertical flashings when the flashings are top-nailed to resist slippage.

5.4.4 Type IV asphalts generally are nonsusceptible to flow. They are used in built-up roof construction on inclines from approximately 2 % (1/4 in./ft) slope to 50 % (6 in./ft) slope. They also are used in vertical flashings when the flashings are

top-nailed to resist slippage. These asphalts are useful in areas where relatively high year-round temperatures are experienced.

### 5.5 General Precautions (See Note 1):

5.5.1 Limit aggregate-surfaced roof membranes to a maximum slope of 25 % slope (3 in./ft).

5.5.2 Require backnailing of ply felts on slopes above 16.7 % (2 in./ft) slope for smooth surfaced roofs and cap sheets, and above 8.3 % (1 in./ft) for aggregate-surfaced roofs.

5.5.3 Run felts parallel to slope when inclines exceed 8.3 % (1 in./ft).

5.5.4 Areas of steeper slope will be found at tapered roof edges, sumped root drains, and crickets.

NOTE 1—Recommendations of material manufacturer may differ from these general precautions.

## 6. Keywords

6.1 asphalt; built-up roofing; equiviscous temperature; glaze coat; interply bitumen; slippage; slope

## APPENDIX

### (Nonmandatory Information)

#### X1. CAUTIONARY NOTES

##### X1.1 Asphalt Heating:

X1.1.1 Asphalt properties can be altered by overheating (as determined by Practice D 3791). Softening point generally elevates and penetration decreases (hardens) in the presence of air. When air is excluded (anaerobic overheating), the material becomes softer and more fluid.

X1.1.2 Degradation of asphalt during storage is a function of both time and temperature. Overnight storage of asphalt should be below the EVT.

X1.1.3 The temperature of asphalt drawn from the kettle should be below the reported flash point (Test Method D 92) for that particular batch of material.

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