Designation: D7564/D7564M – 16

Standard Practice for Construction of Asphalt-Rubber Cape Seal[1]

This standard is issued under the fixed designation D7564/D7564M; 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 asphalt-rubber cape seal, which is defined as the application of an asphalt-rubber seal coat placed onto an existing pavement surface, followed by the application of a conventional Type II or III slurry seal.

NOTE 1—An asphalt-rubber seal coat is also known as a stress absorbing membrane (SAM) which consists of an asphalt-rubber membrane seal followed by the application of precoated aggregate chips.

1.2 An asphalt-rubber cape seal is commonly used to extend the service life of low to medium trafficked and moderately distressed asphalt-surfaced pavements. The existing pavement condition can be used to determine the application rates for the asphalt-rubber binder and aggregate as well as the aggregate gradation. Pavements in relatively poor condition will require a coarser aggregate with a higher binder application rate.

1.3 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.

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C29/C29M Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
C117 Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
C127 Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
C128 Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate
C131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
D946 Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
D1139 Specification for Aggregate for Single or Multiple Bituminous Surface Treatments
D2196 Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscometer
D2419 Test Method for Sand Equivalent Value of Soils and Fine Aggregate
D3381 Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
D3910 Practices for Design, Testing, and Construction of Slurry Seal
D4791 Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
D5360 Practice for Design and Construction of Bituminous Surface Treatments
D5821 Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
D6114 Specification for Asphalt-Rubber Binder
D6373 Specification for Performance Graded Asphalt Binder
D6433 Practice for Roads and Parking Lots Pavement Condition Index Surveys

3. Significance and Use

3.1 The procedure described in this practice is used to design and construct an asphalt-rubber cape seal that will provide a wearing course when subjected to low to medium traffic volumes and where the pavement distress is due to block-type cracking resulting from pavement aging or reflective cracking only (not where there are clear indications of fatigue cracking due to repeated heavy axle loads).

NOTE 2—Block cracking is defined in Practice D6433. See Appendix X1 for an example of block cracking due to aging.

[1] This practice is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.24 on Asphalt Surface Treatments.

Current edition approved May 1, 2016. Published May 2016. Originally approved in 2009. Last previous edition approved in 2015 as D7564/D7564M – 09 (2015). DOI: 10.1520/D7564_D7564M-16.

[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.

***A Summary of Changes section appears at the end of this standard**

4. Materials

4.1 *Asphalt-Rubber Seal Coat (or Stress Absorbing Membrane—SAM):*

4.1.1 *Asphalt Cement*—The asphalt cement for the asphalt-rubber seal coat should comply with the requirements of Specifications D946, D3381, or D6373. Asphalt cement grade selection is based on considerations of local climatic and traffic conditions. The asphalt-rubber supplier should perform routine Q/C laboratory testing to ensure compatibility of the selected asphalt cement with the requirements of Specification D6114.

4.1.2 *Asphalt-Rubber*—The asphalt-rubber binder consists of an interacted blend of paving grade asphalt cement, ground recycled tire rubber, and other additives as needed to conform to the requirements of Specification D6114.

4.1.3 *Aggregate*—Aggregate consists of crushed materials conforming to the physical requirements of Specification D1139 for degradation, soundness, and deleterious substances and, if the –4.75 mm [–No. 4] materials exceed 2 % of the total weight of aggregate, a minimum sand equivalent value of 50 when tested in accordance with Test Method D2419 is required. At least 90 percent by weight of the coarse aggregate shall consist of crushed particles with at least two fractured faces as determined by Test Method D5821.

4.1.4 *Aggregate Gradation*—Aggregate size is often represented by one of the following gradations and determined in accordance with Test Methods C136 and C117. Other similar gradations may be used, as appropriate.

Sieve Size	Percent Passing	Percent Passing
19.5 mm [3⁄4 in.]	100	100
12.5 mm [1⁄2 in.]	95–100	95–100
9.50 mm [3⁄8 in.]	0–20	70–85
4.75 mm [No. 4]	0–5	0–15
2.36 mm [No. 8]	0–2	0–5
0.075 mm [No. 200]	0–1	0–1

NOTE 3—The two examples shown in the table above are representative of typical gradations from current state highway or transportation departments or other user agencies and from industry specifications for asphalt-rubber seal coat. Either gradation may be used for pavements with block cracking (see Appendix X1). The first (predominately 12.5 mm [1⁄2 in.]) gradation is recommended for pavements with a high degree of block cracking. The second (predominately 9.5 mm [3⁄8 in.]) gradation is recommended for pavements with a lesser degree of block cracking (see Practice D6433, Figure X1.7 through X1.9).

4.1.5 *Selection of Coarse Aggregate*—Coarse aggregate shall have abrasion values of less than 30 % in accordance with Test Method C131. Crushed gravel (if used) must have at least 90 percent particles with two faces and 95 percent particles with one face resulting from crushing in accordance with Test Method D5821. The percentage of flat and elongated particles should not exceed 10 %, with a ratio of 5:1 in maximum to minimum dimension, respectively, in accordance with Test Method D4791.

4.1.6 *Design*—Unless project documents indicate otherwise, the seal coat shall be designed in accordance with Practice D5360 in general, modified for asphalt-rubber applications as described in this practice. The asphalt-rubber binder is spray-applied using an application rate specified in Section 5.1.2, followed by the application of aggregate chips using an application rate specified in 5.3.4.

NOTE 4—For more detailed asphalt-rubber seal coat design guidelines see the Caltrans Maintenance Technical Advisory Guideline (MTAG).[3] Also shown in Appendix X2 is a suggested FHWA asphalt-rubber surface treatment design procedure.

4.2 *Emulsified Asphalt Slurry Seal*—The design and construction of the slurry seal shall conform to Practice D3910.

5. Construction of Asphalt-Rubber Cape Seal

5.1 *Application of Asphalt-Rubber Binder:*

5.1.1 The following construction recommendations are representative of the state-of-the-art practice and are not a specification.

5.1.2 It is recommended that the asphalt-rubber binder for the asphalt rubber seal coat be applied at a rate of 2.0 to 3.0 L/m^2 [0.50 to 0.75 gallons/yd^2]. For pavement classified in fair condition with a Pavement Condition Index (PCI) rating of 35 to 55 in accordance with Practice D6433, a lower application rate (generally with a finer aggregate gradation) is recommended and should generally range from 2.0 to 2.5 L/m^3 [0.50 to 0.65 gallons/yd^2]. For pavement classified in poor condition with a PCI rating of 25 to 35 in accordance with Practice D6433, a higher application rate (generally with a coarser aggregate gradation) is recommended, generally in the range of 2.5 to 3.0 L/m^3 [0.65 to 0.75 gallons/yd^2].

5.1.3 It is recommended that the Asphalt-rubber binder be placed upon a clean, dry pavement surface. The pavement surface temperature is generally limited to a minimum of 13°C [55°F] and rising when the asphalt rubber binder is applied. The recommended minimum atmospheric temperature should be 16°C [60°F] and rising.

NOTE 5—Placement of asphalt-rubber binder below the minimum temperatures may cool the material to such a degree that the aggregate may not embed and stick. This may lead to the premature loss of aggregate and bleeding or flushing of the surface.

5.1.4 Distributor bar height, distribution speed and shielding materials can be utilized to reduce the effects of wind on the spray distribution. Typically distributor bar height varies between 200 and 350 mm [8 to 14 in.].

NOTE 6—When high gusting winds or dusty conditions (or both) prevent or adversely affect binder or aggregate spreading application operations, the work should be suspended and rescheduled.

5.1.5 All necessary equipment should be in position and ready to commence placement operations before starting the work.

5.1.6 The asphalt rubber binder is applied to the pavement surface after mixing and reacting, consistent with the requirements of Specification D6114. The binder should be applied at a material temperature not less than 195°C [385°F] or more than 215°C [415°F].

5.1.7 Following the asphalt-rubber binder application, the binder should be promptly covered with the pre-coated aggregate.

NOTE 7—Experience has shown that if more than 2 minutes elapse before the covering of the asphalt-rubber binder, the cover aggregate may not properly embed into the binder. This could lead to premature raveling

[3] Caltrans, Maintenance Technical Advisory Guide (MTAG), State of California Department of Transportation, Office of Pavement Preservation, Division of Maintenance, Sacramento, California, October, 2003.

or unsuitable bleeding or flushing (or both) of the pavement surface. Pre-coated aggregate as described in 5.3.1 is preferred in order to ensure a good bond to the asphalt-rubber binder and avoid aggregate chip loss.

5.2 *Workmanship, Finish and Appearance:*

5.2.1 When joining edges against areas with aggregate, the joints should be swept clean of excess aggregate prior to the adjacent application of asphalt rubber binder. Transverse joints of this type are constructed by placing roofing paper or equivalent across and over the end of the previous asphalt rubber seal coat application. Once spraying has progressed beyond the paper, it should be removed immediately.

5.2.2 The longitudinal joint between adjacent applications of aggregate should coincide with the line between designated traffic lanes. Longitudinal joints are overlapped for complete coverage.

NOTE 8—Overlapping of longitudinal joints is recommended to ensure complete aggregate coverage. Lack of overlapping may result in exposed asphalt-rubber binder without aggregate, which may cause excessive tracking of the asphalt-rubber binder. Generally, overlapping is between 100 mm and 200 mm [4 to 8 in.].

5.2.3 At longitudinal joints with aggregate, the edges should be broomed back and blended to minimize differences in elevation, in order to provide a uniform appearance consistent with the adjacent sealed surface. Care should be taken to minimize ridges and depressions in order to enhance uniformity of appearance.

5.2.4 The application of asphalt rubber binder to areas not accessible with the distributor bar on the distributor truck is generally accomplished by using pressurized hand wands or by other appropriate means.

5.3 *Spreading Pre-coated Aggregate:*

5.3.1 Following the application of the asphalt rubber binder, the pre-coated aggregate is placed over areas receiving asphalt rubber binder. The aggregate should be pre-coated using 0.5 to 1.0 % asphalt cement by weight of aggregate, conforming to Specifications D946, D3381, or D6373.

5.3.2 Aggregate for the asphalt rubber seal coat should be pre-coated at the hot plant at a temperature between 135°C and 165°C [275 to 325°F] and then applied at a temperature not less than 105°C (225°F) after applying the asphalt rubber binder.

5.3.3 No vehicle, including construction equipment, should be driven over the asphalt rubber binder prior to the application of the pre-coated aggregate.

5.3.4 The precoated aggregate is generally applied at a rate of 10.5 to 16.0 kg/m^2 [23 to 34 lbs/yd^2] depending on the pavement condition. For pavement in fair condition with a PCI rating of 40 to 55 in accordance with Practice D6433, the finer 9.5 mm [3⁄8 in.] aggregate gradation (or a similar gradation) is recommended, with a spread rate of 10.5 to 13.5 kg/m^2 [23–30 lbs/yd^2]. For pavement in poor condition with a PCI rating of 25 to 40 in accordance with Practice D6433, the coarser 12.5 mm [1⁄2 in.] aggregate gradation (or a similar gradation) is recommended with an spread rate of 12.0 to 16.0 kg/m^2 [27 to 34 lbs/yd^2].

NOTE 9—Although an asphalt-rubber cape seal has been used on pavements in poor condition, the designer should consider many factors before such a surface treatment is employed on such a pavement. In particular, the poor pavement condition should be related to pavement aging and weathering, not traffic loads and fatigue cracking. All underlying subgrade or base failures (or both) should be corrected and any drainage problems should be rectified.

5.3.5 The spread rate is generally limited to any value within ±10 percent of the selected application rate during spreading to provide a uniform appearance.

NOTE 10—The term "uniform appearance" refers to a surface that is generally free of gaps, ridges, depressions, or other irregularities caused by the application of the asphalt rubber seal coat.

5.4 *Finishing of the Asphalt-Rubber Seal Coat:*

5.4.1 The first pass of the rollers over the new asphalt rubber seal coat consists of a minimum of one complete coverage (covering the entire width of the seal, moving forward), using the necessary number of pneumatic tired rollers. Rolling should be completed as soon as practical using three complete passes, which is defined as the first rolling pass moving forward, a second pass moving backward, and a final third pass moving forward again to the next section thus covering each point on the pavement surface three times (up, back, and up).

NOTE 11—Rolling should occur immediately after the spreading of the pre-coated aggregate and should be concluded as rapidly as practical to ensure good aggregate embedment and bonding. The distance between the rollers and the aggregate spreader generally should not exceed 60 m [200 ft] at any time during spreading operations. Rollers should be staggered in such a manner so full-width rolling coverage is ensured.

5.4.2 In addition to the pneumatic tired rolling described in Section 5.4.1, one additional roller coverage with one steel wheel roller may be needed to properly seat the aggregate. Steel wheel rolling coverage may be beneficial in reducing the amount of loose aggregate during sweeping operations. If a steel wheel roller is used, the roller should be operated in the static mode only.

NOTE 12—The purpose of rolling the pre-coated aggregate is to ensure proper aggregate embedment into the asphalt-rubber binder. Rolling needs to take place as promptly as possible since, as the asphalt-rubber cools, it becomes increasingly more difficult to embed the pre-coated aggregate. If rolling is not done promptly, there is considerable risk that the pre-coated aggregate will not embed and adhere to the asphalt-rubber. This may in turn cause premature aggregate loss with its many attendant problems. Typically, the steel wheel roller weighs between 7.25 and 9 tonnes [8 to 10 tons].

5.4.3 Sweeping is generally carried out as a multi-step operation following final rolling of the aggregate. Loose aggregate should be removed from the roadway surface and abutting adjacent areas and should be properly disposed of.

5.4.4 Initial sweeping should be completed before controlled traffic is permitted on the asphalt rubber seal coat. Removal of all excess aggregate should be completed before uncontrolled traffic is permitted on the pavement surface. Final sweeping should be carried out and all loose aggregate should be removed without dislodging the aggregate that has been properly set into the asphalt rubber binder.

5.5 *Application of Slurry Seal:*

5.5.1 The design and application of the emulsified asphalt slurry seal is carried out according to Practice D3910.

5.5.2 The asphalt-rubber seal coat should be allowed to cure before the slurry seal is applied. A curing time of 24 hours or more is required, depending on ambient weather conditions.

NOTE 13—During curing, low-speed traffic may drive on the asphalt-rubber seal coat.

6. Keywords

6.1 Asphalt-Rubber; Cape Seal; Chip Seal; Slurry Seal; Stress Absorbing Membrane (SAM)

APPENDIXES

(Nonmandatory Information)

X1. EXAMPLE OF BLOCK CRACKING DUE TO AGING

See Fig. X1.1.

FIG. X1.1 Example of Block Cracking Due to Aging

X2. FHWA-SUGGESTED GUIDE SPECIFICATION FOR THE DESIGN OF SURFACE TREATMENTS USING ASPHALT-RUBBER BINDER

NOTE X2.1—Reprinted from FHWA Report No. FHWA-SA-92-022, (**1**)[4] and updated to represent current practice.

X2.1 *Description*: This design guide evaluates the compatibility of the materials and determines the application rate for asphalt-rubber binder and cover aggregate for surface treatments.

X2.2 *Testing Standards*:
C29/C29M Test Method for Bulk Density (Unit Weight) and Voids in Aggregate
C127 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
C128 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate

X2.3 *Materials Selection*:

X2.3.1 *Aggregate*—Typically, a 9.5 mm [⅜ in.] nominal maximum aggregate gradation is specified for most applications. Other aggregate sizes such as 12.5 or 6.3 mm [½ to ¼ in.] can be considered. Suggested gradations are as shown in Table X2.1.

X2.3.2 *Asphalt Cement*: The grade of asphalt selected will be based on the desired asphalt-rubber binder properties as noted in Specification D6114. The suggested grades of asphalt cement are as shown in Table X2.2.

TABLE X2.1 Percent Passing for Various Top Size Aggregate Gradations

Sieve	12.5 mm [½ in.]	9.5 mm [⅜ in.]	6.3 mm [¼ in.]
16 mm [⅝ in.]	100		
12.5 mm [½ in.]	90–100	100	
9.5 mm [⅜ in.]	0–20	70–100	100
6.3 mm [¼ in.]	0–5	0–10	70–100
2.36 mm [No.8]	0–2	0–5	0–5
75 µm [No. 200]	0–1	0–1	0–1

[4] The boldface numbers in parentheses refer to a list of references at the end of this standard.

TABLE X2.2 Grades of Asphalt Cement for Asphalt-Rubber Binder

Climate	Asphalt Cement Grade
Cold	AC-2.5 or AC-5 / PG 52-28 **(2)**
Moderate	90–100
Hot	0–20

X2.3.3 *Crumb Rubber Modifier (CRM)*: The nominal maximum size of CRM (the recycled tire crumb rubber) is directly related to the size of aggregate selected. The nominal maximum size of CRM may be equal to or less than the values shown in Table X2.3.

X2.4 *Aggregate Design*: The quantity of aggregate required to cover the road surface can be determined using the following equations:
Formula 1—SI units:

$$S = \frac{(1 \times W)}{Q}$$

Formula 1—inch-pound units:

$$[S = (27 \times W)/Q]$$

where:

S = quantity of aggregate sq. m/cu. m [sq. yd/cu. yd],
W = dry loose unit weight kg/cu. m [lbs/cu. ft], and
Q = spread rate of aggregate kg/sq. m [lbs/sq. yd].

The aggregate spread rate is determined from the Board Test, which consists of placing a sufficient quantity of aggregate on a board with an area of 0.4 sq. m [½ sq. yd] so that full coverage one stone in depth is obtained. Convert that quantity of aggregate to units of kg/sq. m [lbs/sq. yd].

X2.5 *Binder Design*: Determining the proportions of asphalt cement is a trial and error process. Over time, the design engineer should develop an understanding of the proportions which satisfy the binder criteria knowing the common sources of materials available to the area. Some general rules of thumb include:

X2.5.1 Meeting the asphalt-rubber binder material specifications will normally require at least 15 percent CRM by weight of the asphalt consistent with Specification D6114;

X2.5.2 The typical CRM content will range from 15 to 25 percent by weight of asphalt;

X2.5.3 The standard blending/reaction temperature is 175°C [350°F];

X2.5.4 The time to achieve complete interaction (full reaction) is normally between 45 and 60 minutes.

The rotational viscometer covered by Test Methods D2196 is used to monitor the reaction and establish the limits of the CRM content. Once these limits are determined, other binder tests can be used to measure the chosen CRM content, and any necessary adjustments in the CRM content made accordingly. For field control, a hand-held, high-range rotational viscometer may also be used (with Rotor No. 1) once the chosen device is correlated with Test Methods D2196. However, in all cases Test Methods D2196 shall be the referee method. The quantity of asphalt-rubber required for the surface treatment can be determined using the following equation:
Formula 2—SI units:

$$A = (0.465 \times E \times T \times (1 - (W/(1410 \times G))) + V$$

Formula 2—inch-pound units:

$$[A = (5.6 \times E \times T \times (1 - (W/(62.4 \times G))) + V]$$

where:

A = quantity of asphalt-rubber (L/m² [gal/sq. yd] at 16°C [60°F]),
E = embedment depth from Fig. X2.1 (mm [in.]). The depth is a function of the maximum size of the aggregate. It is suggested for 12.5 mm [½ in.] top size the embedment is 5.6 mm [0.22 in.] for a surface treatment (SAM). For 9.5 mm [⅜ in.] top size the embedment is 4.3 mm [0.17 in.], and for 6.3 mm [¼ in.] top size the embedment is 3 mm [0.12 in.],
T = traffic correction factor from Table X2.4,
W = dry loose unit weight (kg/sq. m [lbs/sq. yd]),
G = dry bulk specific gravity of aggregate, and
V = surface condition correction from Table X2.5 (L/m² [gal/sq. yd]).

TABLE X2.3 Size of Recycled Crumb Rubber

Nominal maximum particle size	
Aggregate	CRM (Recycled Rubber)
12.5 mm [1/2 in.]	2.36 mm [No. 8]
9.5 mm [3/8 in.]	1.18 mm [No. 16]
6.3 mm [1/4 in.]	600 µm [No. 30]

TABLE X2.4 Traffic Correction Factor

Vehicles per day per lane	Traffic factor
Over 1000	1.00
500–1000	1.05
250–500	1.10
100–250	1.15
Under 100	1.20

TABLE X2.5 Pavement Condition Correction

Pavement Surface Condition	Asphalt Quantity Correction (V)
Flush asphalt surface	–0.24 L/m² [–0.06 gal/sq. yd.]
Smooth, non-porous surface	–0.12 L/m² [–0.03 gal/sq. yd.]
Slightly porous, oxidized	0.00
Porous, oxidized, slightly pocked	+0.12 L/m² [+0.03 gal/sq. yd.]
Porous, oxidized, badly pocked	+0.24 L/m² [+0.06 gal/sq. yd.]

X2.6 *Example Binder Design*:

X2.6.1 As an example, a 12.5 mm [½ in.] maximum-sized aggregate meeting requirements of Table X2.1 produced a board test single layer capacity result of 11.4 kg/m² [25.0 lbs/sq. yd], **(3)**. The material had a dry bulk specific gravity (G) of 2.59 and a dry, loose unit weight (W) of 53 kg/cu. m [88 lbs/cu. ft].

X2.6.2 The asphalt-rubber binder application rate using this aggregate for a SAM surface treatment according to the formula (using an average mat thickness of 11 mm [0.45 in.]) is 2.55 L/m² [0.56 gallons per square yard]. The following details this calculation:

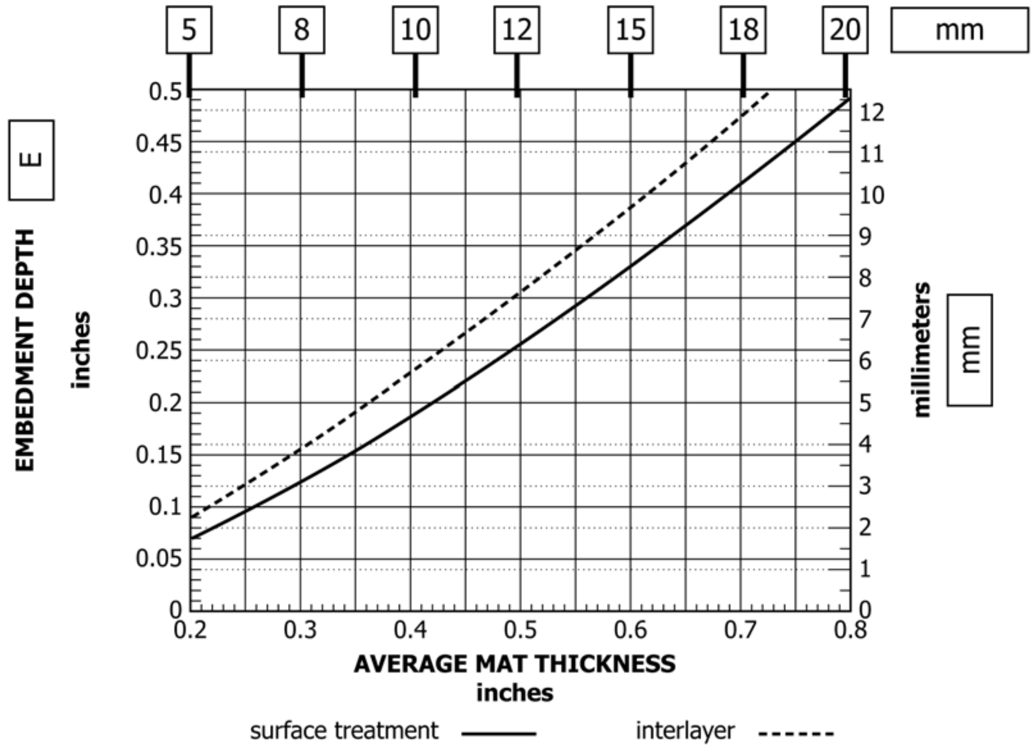

FIG. X2.1 Embedment Depth Factor

X2.6.2.1 Given an average mat thickness of 11 mm [0.45 in.], go to Fig. X2.1 and find the embedment depth for a surface treatment (SAM) which is 5.6 mm [0.22 in.]. Thus E = 5.6 mm [0.22 in.].

X2.6.2.2 Traffic Factor selected as over 1000 vehicles per day, Table X2.4.

Thus,

T = 1.00,
W = 53 kg/cu. m [88 pounds per cubic foot], and
G = 2.59 bulk specific gravity.

X2.6.3 Given a surface condition correction from Table X2.5, V = 0.0 for a slightly porous oxidized surface, then from the equation A is found to be as follows:

$$A = 2.55\ L/m^2\,[0.56\ gal/sq.\ yd]$$

X2.6.4 If this surface treatment was being used for a lower traffic volume roadway (for example, 250 to 500 vehicles per day) that was porous, slightly pocked and sealed cracks, the binder application rate should be increased to 2.92 L/m^2 [0.65 gallons per square yard]. It is noted that these application rates are determined at 16°C [60°F].

T = 1.10 from Table X2.4, 250–500 vehicles,
V = 0.12 L/m^2 [0.03 gal/sq. yd], from Table X2.5 for a very porous and slightly pocked surface, and
A = 2.92 L/m^2 [0.65 gal/sq. yd].

X2.6.5 This is a representative application rate for the condition shown in Appendix X1. Actual spray application rates at application temperatures between 150 and 205°C [300 to 400°F] should be increased by an appropriate volume correction factor to adjust for volume expansion of the asphalt-rubber binder. At 175°C [350°F], the correction factor is approximately 10 %. Conventional asphalt cement correction factors are currently being used.

REFERENCES

(1) Heitzman, M.A., " State of the Practice-Design and Construction of Asphalt Paving Materials with Crumb Rubber Modifier," Federal Highway Administration, Report No. FHWA-SA-92-022, May 1992. Available through FHWA Technology Applications Library.

(2) Arizona Department of Transportation, "Standard Specifications for Road and Bridge Construction," Pgs. 998, 2008.

(3) Chehovits, James, G., R. Gary Hicks and James Lundy, "Crumb Rubber Modifier Workshop Notes, Design Procedures and Construction Practices," Session 10.0, Pgs. 10-25, March, 1993.

SUMMARY OF CHANGES

Committee D04 has identified the location of selected changes to this standard since the last issue (D7564/D7564M – 09 (2015)) that may impact the use of this standard. (Approved May 1, 2016)

(1) Section X2.5.4: Replaced trademarked brand names with technical equivalents.