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Standard Guide for Application of Heat Weldable Modified Bituminous Waterproofing Membranes Systems for New Concrete Decks[1]

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1. Scope

1.1 This guide presents application recommendations for the heat welding installation of multi-ply Styrene Butadiene Styrene (SBS) and Atactic Polypropylene (APP) modified bituminous systems to new, reinforced, cast in place structural concrete used as part of a horizontal waterproofing system over occupied spaces of buildings where covered by a separate wearing course.

1.2 For the purpose of this guide, the substrate shall be structurally sound, sloped to drain, able to accept the weight of the membrane and other system materials, and meet the local building code requirements. Similarly, all components of the waterproofing system are assumed to comply with any federal, state, and local environmental regulations that may be in effect at the time of installation. Expansion joints, insulation, drainage layers, filter sheets, overburden, and the wearing surfaces are beyond the scope of this guide.

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]

D41 Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

D1079 Terminology Relating to Roofing and Waterproofing

D3019 Specification for Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non-Asbestos-Fibered

D4586 Specification for Asphalt Roof Cement, Asbestos-Free

D5295 Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems

D5898 Guide for Details for Adhered Sheet Waterproofing

D5957 Guide for Flood Testing Horizontal Waterproofing Installations

D6162 Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements

D6163 Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements

D6164 Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements

D6222 Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements

D6223 Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements

D6451 Guide for Application of Asphalt Based Protection Board

D6506 Specification for Asphalt Based Protection Board for Below-Grade Waterproofing

2.2 *American Concrete Institute Standard:*[3]

ACI 301 Specifications for Structural Concrete for Buildings

[1] This guide is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.22 on Waterproofing and Dampproofing Systems.

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[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.

[3] Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, http://www.concrete.org.

2.3 *FMRC Standard:*[4]

FM 4470 Approval Standard, Class Roof Covers, latest edition, where applicable for corrosion resistant components

NRCA / MRCA Certified Roofing Torch Applicator (CERTA) Program

3. Terminology

3.1 For definitions of terms, see Terminology D1079.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *construction joint*—a butt joint formed in a structural slab in order to end one pour and start another pour later. The joint is usually a cold joint and may be held together with reinforcing steel in the slab, or the steel may be discontinuous by design.

3.2.2 *heat welding*—the adhering or joining, or both, of the modified bitumen membrane sheet to itself or the substrate, or both, with a torch, hot air, or other means of direct thermal contact.

4. Significance and Use

4.1 This guide provides general procedures, information, guidelines, and precautions for the application of heat welded modified bituminous waterproofing systems used as part of a horizontal waterproofing system.

4.2 This guide is not all-inclusive and is intended only to supplement detailed instructions from designers and system manufacturers.

4.3 The horizontal deck or substrate referred to in this guide is reinforced cast-in-place structural concrete.

5. Storage and Handling of Materials

5.1 Store materials on raised platforms or pallets. Store rolls on end with selvage ends up. Materials shall be stored in a dry, ventilated, and weatherproof location. Avoid damage or embedment of foreign materials.

5.2 Store membrane materials to prevent system supplier's markings from being destroyed.

5.3 Store primer in tightly closed original containers at temperatures recommended by the system supplier. Do not transfer contents of one container to another container. Do not mix different materials. Do not thin primer, except as directed by the system manufacturer.

5.4 Modified bituminous rolls and other materials are to be brought to the job site in good condition, handled so as not to be damaged.

6. Environmental Conditions

6.1 Do not install sheet material during inclement weather, on wet or frost-covered surfaces, during rainfall, blowing dust, or high winds that will inhibit or interfere with sheet material adhesion.

6.2 Follow recommendations of system supplier for system application procedures when ambient temperatures are below 5°C [40°F].

6.3 Surfaces to receive the membrane shall be protected from dirt and debris.

7. Materials

7.1 *Modified Bituminous Sheet*—Prefabricated modified bituminous sheets reinforced with either polyester or glass fiber fabrics or a combination of the two which use styrene butadiene styrene (SBS) or atactic polypropylene (APP) as the primary modifier and meet the requirements of Specifications D6162, D6163, D6164, D6222, D6223, or D6506.

7.2 *Primer,* asphalt primer. See Specification D41.

7.3 *Roof Cement,* asphalt roof cement. See Specifications D4586 and D3019.

7.4 *Protection Board,* asphalt based protection board. See Specification D6506.

7.5 *Mechanical Affixments*—The mechanical fasteners and stress distribution bars or strips specified for use in the system must meet the corrosion guidelines outlined in FMRC Standard 4470.

7.6 *Joint Filler,* material used to mostly fill construction joints in concrete prior to the application of a sealant.

7.7 *Sealant,* material that is used to fill and seal a crack prior to the application of a waterproofing material.

8. Substrate Preparation

8.1 The structural slab should have a finish of sufficiently rough texture to provide a mechanical bond for the membrane but not so rough to preclude achieving continuity of the membrane across the surface. The minimum finish is an ACI 301 float finish; an ACI 301 trowel finish, without the final troweling, is preferred. Refer to Guide D5295 for additional surface preparation guidelines.

8.2 Refer to the membrane manufacturer for guidelines related to the moisture content of the concrete or the appropriate methods to mitigate loss of adhesion over new concrete, or both.

8.3 Surfaces to receive modified bituminous sheets are to be frost-free and dry, clean, and free of contaminants such as dirt, debris, loose material, cracks, laitance, voids, and sharp projections which would prevent satisfactory installation. See Guide D5295, Sections 5, 6, and 7, for repairs, surface preparation, and evaluation.

8.4 Apply primer at the rate of 0.2 to 0.6 L/m^2 [0.5 to 1.5 gal/100 ft^2] or as recommended by system supplier/manufacturer. Allow to dry. Minimum drying time is one hour or as recommended by manufacturer. Drying time of primer varies with temperature and humidity conditions.

8.5 After the primer is applied and has dried, the area must be covered with the modified bituminous sheets on the same day or the substrate must be reprimed.

[4] Available from Factory Mutual Research, 11511 Boston-Providence Turnpike, P.O. Box 9102, Norwood, MA 02062–9102.

8.6 Areas that become contaminated by dust, dirt, or other foreign material that would interfere with the satisfactory installation or performance of the system shall be cleaned and reprimed.

8.7 Seal construction joints with joint filler and sealant that is compatible with the membrane. Heat weld a minimum 150-mm [6-in.] wide ply of modified bitumen sheet over joints or substrate cracks that are 2 mm [0.0625 in.] in width or greater.

9. Membrane Installation

9.1 *General:*

9.1.1 Prior to installation, it is recommended that drawings, including plans, be prepared indicating dimensions, layout, and sheet orientation. Plans shall indicate drainage patterns, drains, and other appurtenances. See Guide D5898 for typical details.

9.1.2 Drawings shall include details at drains, penetrations, internal and external corners, and other membrane terminations.

9.1.3 Do not damage the prepared substrate during installation.

9.1.4 Protect adjacent membrane or building components from damage including newly installed membrane.

9.2 *Horizontal Sheet Membrane Application:*

9.2.1 Remove packaging and labels, unroll sheets, and allow the sheet to relax then reroll.

9.2.2 Apply sheet perpendicular to the slope starting at the low point so that laps shed water. Apply all sheets with minimum 75 mm [3 in.] side and end laps. Stagger end laps 300 mm [12 in.] minimum. After the bottom layer is installed, offset succeeding (or subsequent) layers one-half sheet width from previous layer.

9.2.3 Heat weld by directing flame or heat at lower quadrant of roll to heat substrate and liquefy bitumen on the sheet without overheating. Seal laps while bitumen is molten to achieve a continuous 3 to 6 mm [0.125 to 0.25 in.] width of bituminous flow-out.

9.2.4 When installing the system, apply heat to the previously installed sheet to promote adhesion to the succeeding sheets.

9.2.5 If the end of the sheet is to be overlapped, cut the selvage edge at a 45° angle prior to installing.

9.2.6 The surface of the end of the sheet to be overlapped by the subsequent sheet should be prepared using a heated trowel.

9.2.7 Check laps with pointed or round-tip trowel and heat weld where opened or not completely bonded.

9.3 *Flashing:*

9.3.1 Prime substrate surfaces to receive modified bituminous sheets and allow to dry. Install a minimum of 2 plies of modified bituminous sheets where waterproofing membrane terminates at walls, penetrations, and curbs.

9.3.2 Lap first ply of flashing membrane onto the first ply of waterproofing membrane 75 mm [3 in.] minimum. Subsequent plies of the waterproofing membrane are lapped onto the previous layers of flashing membrane 75 mm [3 in.] minimum.

9.3.3 The subsequent plies of flashing membrane are lapped onto the previous layers of the waterproofing membrane 100 mm [4 in.] minimum. The flashing membrane shall extend vertically 200 mm [8 in.] minimum above the finished wearing surface or grade.

9.3.4 Heat the back of the sheet to liquefy bitumen. Press into place to obtain uniform adhesion. Seal laps while bitumen is molten to achieve a continuous 3 to 6 mm [⅛ to ¼ in.] width of bitumen flow-out. Check laps with pointed trowel and re-fuse where opened. Seal laps while sheet is still warm by pressing with a heated blunt-nose trowel.

9.3.5 Terminate the top of the flashing sheet with mechanical affixments. Fasteners shall be spaced 150 mm [6 in.] maximum on center. Cover flashing membrane top edge with counterflashing.

9.3.6 Apply asphalt primer to drain flanges and metal surfaces to receive modified bitumen membrane. Extend the base ply of waterproofing membrane onto the primed metal flange under the clamping ring. Set all plies in roof cement within 150 mm [6 in.] of the drain clamping ring. Install a minimum 750 mm [30 in.] primed lead flashing in roof cement over the base ply and form to turn down inside of the drain bowl. Consult the manufacturer for alternatives to lead flashing if the use is not allowed. Install a minimum 900 mm [36 in.] modified bituminous stripping sheet over the flashing. The stripping ply should extend a minimum of 75 mm [3 in.] beyond the flashing perimeter. Extend finish ply over the stripping ply and under the clamping ring.

9.3.7 *Penetrations*—Reference Guide D5898 for specific details.

10. Inspection and Repair

10.1 Inspect membrane before placement of protection board, insulation, or overburden. Repair membrane as required. Patch punctures, tears, unbonded seams, and other deficiencies with membrane. Patches shall extend 150 mm [6 in.] beyond the defect.

10.2 A flood test in accordance with Guide D5957 or use appropriate electrical conductance method is recommended to identify leaks prior to placement of protection board and overburden. Segment the test areas with temporary containment assemblies to achieve the required water depth. Record leaks and repair after membrane has dried and retest.

11. Protection

11.1 When specified, install protection board in accordance with Specification D6451. Apply board over horizontal and vertical surfaces to protect from damage.

11.2 Install protection board within 24 h after completion of inspection and flood test.

12. Keywords

12.1 heat weld; modified bituminous; waterproofing