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USACE / NAVFAC / AFCEC / NASA | UFGS-07 13 53 (February 2016)
Change 1 - 08/17

Preparing Activity: NAVFAC | Superseding
UFGS-07 13 53 (April 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 07 13 53

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02/16, CHG 1: 08/17

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SECTION 07 13 53

ELASTOMERIC SHEET WATERPROOFING
02/16, CHG 1: 08/17

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NOTE: This guide specification covers the requirements for sheet applied elastomeric waterproofing.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
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NOTE: This guide specification is intended for use where local practice and experience indicates, or where International Code Council (ICC), International Building Code (IBC), section Dampproofing and Waterproofing allows, that protection against hydrostatic pressure or conditions of excessive dampness can be achieved by using elastomeric waterproofing. Typical applications include, but are not limited to, wall and foundation waterproofing, waterproofing promenades and parking decks, waterproofing beneath shower pans, kitchens, toilet facilities, janitorial rooms, and indoor swimming pools.

NOTE: Where groundwater investigation required by IBC Section 1803.5.4 indicates that if a hydrostatic

pressure condition exists, and the design does not include a groundwater control system as described in Section 1805.1.3, waterproof walls and floors in accordance with this section.

NOTE: Where concrete vault magazines are designed below ground, provide butyl rubber, or elastomeric composite, thermoplastic waterproof sheeting.

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NOTE: On the drawings, show:

1. Extent of membrane waterproofing, substrates, termination details,termination details, flashing, and counterflashing, pipe and conduit penetrations, and junctions at walls and floors.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1305	(2008) Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane
ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

ASTM D146/D146M	(2004; E 2012; R 2012) Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
ASTM D297	(2015; R 2019) Rubber Products - Chemical Analysis
ASTM D412	(2016; R 2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D429	(2014) Rubber Property-Adhesion to Rigid Substrates
ASTM D471	(2016a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D573	(2004; R 2019) Standard Test Method for Rubber - Deterioration in an Air Oven
ASTM D624	(2000; R 2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D746	(2014) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D751	(2006; R 2011) Coated Fabrics
ASTM D903	(1998; R 2017) Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
ASTM D1004	(2013) Initial Tear Resistance of Plastic Film and Sheeting
ASTM D1149	(2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM D1204	(2014; R 2020) Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
ASTM D1876	(2008; R 2015; E 2015) Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)
ASTM D2136	(2002; R 2012) Coated Fabrics - Low-Temperature Bend Test
ASTM D2240	(2015; E 2017) Standard Test Method for

	Rubber Property - Durometer Hardness
ASTM D3045	(1992; R 2010) Practice for Heat Aging of Plastics Without Load
ASTM D5385/D5385M	(1993; R 2014; E 2014) Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
ASTM E96/E96M	(2022a; E 2023) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E154/E154M	(2008a; R 2019) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2021) International Building Code

1.2 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Standard Details; G[, [_____]]

Elastomeric Waterproofing Sheet Material; G[, [_____]]

Protection Board; G[, [_____]]

Primers, Adhesives, and Mastics; G[, [_____]]

SD-06 Test Reports

Elastomeric Waterproofing Sheet Material; G[, [_____]]

Field Quality Control documentation; G[, [_____]]

Protective Covering; G[, [_____]]

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NOTE: Certificates are required for verification of materials complying with UFC 1-200-02 HIGH PERFORMANCE AND SUSTAINABLE BUILDING REQUIREMENTS; edit as necessary.

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SD-07 Certificates

Elastomeric Waterproofing Sheet Material; G[, [_____]]

Primers, Adhesives, and Mastics; G[, [_____]]

[Protective Coverings; G[, [_____]]

] Draft Special Warranties; G[, [_____]]

Final Special Warranties; G[, [_____]]

Certificates Of Compliance; G[, [_____]]

SD-08 Manufacturer's Instructions

Primers, Adhesives, and Mastics; G[, [_____]]

SD-11 Closeout Submittals

Certificates Of Compliance with sustainable requirements for items listed in SD-07; G[, [_____]]

1.3 MANUFACTURER'S DETAILS

Submit manufacturer's standard details indicating methods of attachment and spacing, transition and termination details, and installation details. Include verification of existing conditions.

1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf life, requirements for protective coverings, and manufacturer's Safety Data Sheets (SDS) for primers, adhesives, and mastics.

****

NOTE: Choose bracketed option if this project is required to comply with ICC IBC Section 1805 Dampproofing and Waterproofing.

****

[1.5 CODE REQUIREMENTS

Provide membrane waterproofing system in accordance with ICC IBC Section 1805 Dampproofing and Waterproofing.

]1.6 DELIVERY, STORAGE, HANDLING, IDENTIFICATION

Deliver and store materials in accordance with manufacturer's printed instructions, out of the weather, in manufacturer's original packaging with brand name and product identification clearly marked. Keep materials wrapped and separated from off-gassing materials (such as drying paints and adhesives). Do not use materials that have visible moisture or biological growth. Do not permit unidentified materials in the work area or in the project.

1.7 ENVIRONMENTAL CONDITIONS

****

NOTE: When waterproofing will be installed indoors protected from the weather, delete the bracketed requirements for outdoor environmental conditions. Also, in geographical areas where the specifier determines it is routine to utilize artificial means of maintaining the surface and ambient temperatures above 4 degrees C 40 degrees F, include the conditions for waiver in the project specifications.

****

Do not apply waterproofing during inclement weather or when there is ice, frost, surface moisture, or visible dampness on the surface to receive waterproofing for when ambient and surface temperatures are 4 degrees C 40 degrees F or below. [The restriction on the application of waterproofing materials when ambient and surface temperatures are below 4 degrees C 40 degrees F will be waived if the Contractor devises a means, approved by the Contracting Officer in writing, of maintaining the surface and ambient temperatures above 4 degrees C 40 degrees F.]

1.8 SPECIAL WARRANTIES

1.8.1 Guarantee

Guarantee waterproofing membrane installation against failure due to leaks for a period of two years from the date of Beneficial Occupancy. Submit draft and final guarantees in accordance with Sections 01 78 00 CLOSEOUT SUBMITTALS [and 01 78 23 OPERATION AND MAINTENANCE DATA].

1.8.2 Warranty

Provide manufacturer's material warranty for all system components for a period of ten years from the date of Beneficial Occupancy. Submit draft and final warranties in accordance with Sections 01 78 00 CLOSEOUT SUBMITTALS [and 01 78 23 OPERATION AND MAINTENANCE DATA].

PART 2 PRODUCTS

2.1 SUSTAINABILITY CRITERIA

Where allowed by performance criteria:

2.1.1 Reduced Volatile Organic Compound (VOC) Content

Provide products with reduced VOC content and provide certificates of compliance in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING paragraph REDUCE VOLATILE ORGANIC COMPOUNDS.

2.1.2 Recycled Content

Provide products with recycled content and provide certificates of compliance in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING paragraph RECYCLED CONTENT.

2.2 MATERIALS

Provide one of the types of elastomeric waterproofing sheet material and related primers, adhesives, and mastics as specified herein. Ensure compatibility of waterproofing materials with each other, and with materials on which they are applied. Provide materials that comply with applicable requirements cited below when tested in accordance with the referenced ASTM publications.

****

NOTE: Where concrete vault magazines are designed below ground, specify membrane sheeting. Do not apply primer or mastic until concrete has cured not less than 7 days, or as required by the manufacturer, remove all moisture, form oil and non-fungi curing agents.

NOTE: Specify a higher puncture resistance if waterproofing will be subject to abuse. Commercial membranes are available which exceed 890 N 200 pounds in puncture resistance.

****

2.3 BUTYL RUBBER SHEETING

Not less than 1.5 mm 60 mils minimum thickness.

2.3.1 Butyl Rubber Sheeting Performance Requirements

a. Thickness Tolerance, ASTM D412: Plus or minus 10 percent.

b. Specific Gravity, ASTM D297: 1.20, plus or minus 0.05.

c. Tensile Strength, ASTM D412: 7.7 MPa 1200 psi minimum.

d. Tensile Stress at 300 percent elongation, ASTM D412: 3.85 MPa 600 psi minimum.

e. Elongation, ASTM D412: 300 percent minimum.

f. Tear Resistance, Die C, ASTM D624: 26.3 Newtons per millimeter (N/mm) 150 pound force per inch (lbf/inch) minimum.

g. Shore A Hardness, ASTM D2240: 5-second interval before reading; 60 plus or minus 10.

h. Ozone Resistance, ASTM D1149: No cracks, 7 days - 50 pphm - 37.8 degrees C 100 degrees F, 20 percent elongation.

i. Heating Aging-Accelerated, ASTM D573: Tensile retention, 60 percent of minimum original elongation retention; 60 percent of minimum original requirement; 7 days, 115.6 degrees C 240 degrees F.

j. Butyl Identification, ASTM D471 REV A, Tricresyl Phosphate Immersion: Maximum volume swell 10 percent, 70 hrs, 100 degrees C 212 degrees F.

k. Low Temperature Flexibility, ASTM D746: No failure at minus 40 degrees C minus 40 degrees F.

l. Water Absorption, ASTM D471 REV A: Plus 1 percent maximum. 7 days,70 degrees C 158 degrees F.

m. Exposure to Fungi and Bacteria in Soil, ASTM E154/E154M REV A, Minimum 16 Weeks: Unaffected.

n. Water Vapor Transmission, 26.7 degrees C 80 degrees F Permeance, ASTM E96/E96M, Procedure B or BW: 8.58 by 10-7 g/Pa.s.m2 0.15 perms maximum.

2.3.2 Adhesive, Cement, and Tape for Use with Butyl Rubber

As recommended by the butyl rubber waterproofing membrane manufacturer.

2.4 THERMOPLASTIC MEMBRANE: POLYVINYL CHLORIDE (PVC)

Polyvinyl chloride (PVC) flexible sheets with non-woven fiberglass reinforcing not less than 1.5 mm 60 mils minimum thickness.

2.4.1 Thermoplastic Membrane Performance Requirements

a. Overall thickness, ASTM D751: 1.50 mm .059 inches minimum

b. Tensile strength, ASTM D638: 11.03 MPa 1600 psi minimum

c. Elongation at break, ASTM D638: 250 percent minimum

d. Seam strength, ASTM D638: 90 percent minimum of tensile strength

e. Retention of properties after heat aging, ASTM D3045

f. Tensile strength, ASTM D638: 95 percent of original

g. Elongation, ASTM D638: 95 percent of original

h. Tear resistance, ASTM D1004: 7.7 Kilogram Force 17 lbf

i. Low Temperature Bend, ASTM D2136: minus 40 degrees C minus 40 degrees F

j. Liner Dimensional Change, ASTM D1204: 0.002 percent

k. Weight Change After Immersion in Water, ASTM D570: 2.0 percent maximum

2.4.2 Adhesives

a. Adhesive for thermoplastic flashings as recommended by manufacturer.

b. Adhesive for Sub-Membrane Grid: 100 percent solids, two part urethane, with minimum tensile strength of 1.04 MPa 150 psi, in accordance with ASTM D412 and adhesion to concrete of 12 ply in accordance with ASTM D429 as recommended by manufacturer.

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NOTE: Where recommended by the manufacturer for below ground membrane sheeting, provide securement strip at perimeter and at any penetrations(s) as well as any elevation changes.

****

2.4.3 Accessories

Securement Strip: 14 gauge stainless steel metal bar 2.54 cm 1 inch wide, pre-punched 2.54 cm 1 inch on center for securement.

2.5 COMPOSITE, SELF-ADHERING MEMBRANE SHEETING

Cold applied composite sheet consisting of rubberized asphalt and cross laminated, high density polyethylene film. Not less than 1.5 mm 60 mils minimum thickness is required.

2.5.1 Composite, Self-Adhering Sheeting Performance Requirements

a. Tensile Strength ASTM D412, Die C: 1.6 MPa 250 psi minimum.

b. Ultimate Elongation, ASTM D412, Die C: 200 percent minimum.

c. Water Vapor Transmission, ASTM E96/E96M 26.7 degrees C 80 degrees F Permeance, Procedure B: 5.72 by 10-7 g/Pa.s.m2 0.1 perm maximum.

d. Pliability degrees, ASTM D146/D146M: (180 degrees Bend Over 25 mm 1 Inch Mandrel): No cracks at minus 32 degrees C minus 25 degrees F.

e. Provide test report data for crack bridging ability: Either in accordance with ASTM C1305 as modified for a dry film thickness specified by the manufacturer and conducted at low temperature; or in accordance with a cycling over crack test also conducted for the specified dry film thickness at low temperature. Using either test, verify crack bridging up to 6 mm 1/4 inch without damage to the membrane system.

f. Puncture Resistance, ASTM E154/E154M REV A: 18 kg 40 lb minimum.

g. Lap Adhesion at Minimum Application Temperature, ASTM D1876 Modified, 880 N/m 5 lbs/in..

h. Peel Strength, ASTM D903: Modified 1576 N/m 9 lbs/in.

i. Resistance to Hydrostatic Head, ASTM D5385/D5385M: 70 m 231 ft of water.

j. Water Absorption, ASTM D570; 0.1 percent maximum.

2.5.2 Primers

Asphalt composition, ASTM D41/D41M, or synthetic polymer in solvent as recommended by the membrane manufacturer.

2.5.3 Mastics

Polymer modified asphalt in suitable solvent of trowel grade consistency and as recommended by the membrane manufacturer.

2.6 Protection Board

****

NOTE: Always require protection material separating waterproofing from fill material. Delete protection board option and require the polymeric grid option for earth covered magazines or facilities with routine ground water exposure.

NOTE: Fiberboard will not provide protection after it becomes wet. Do not use bituminous-impregnated protection board when in contact with polyvinyl chloride (PVC), which may be in composite membranes. Polystyrene is not compatible with petroleum products. The membrane and protection board must be compatible.

****

[Provide protection board that is compatible with the waterproofing membrane. Use a minimum 13 mm 1/2 inch thick fir bitumen impregnated board 25 mm 1 inch for polystyrene 3 mm 1/8 inch thick for vertical and 6 mm 1/4 inch for horizontal premolded bituminous protection board as recommended by the manufacturer.

][Three dimensional, high impact resistant polymeric grid with woven monofilament drainage fabric bonded to the grid.

]PART 3 EXECUTION

****
NOTE: Do not install this system on top of waterlogged soils. Add requirements for drying/dewatering and written verification of dryness (moisture testing) prior to installation of sheet waterproofing; coordinate with Division 31 dewatering requirements.
****

3.1 VERIFICATION OF CONDITIONS

Before starting the work, verify surfaces that must be waterproofed are in satisfactory condition. Notify the Contracting Officer of defects or conditions anticipated to prevent a satisfactory application. Do not start application until defects and conditions have been corrected.

3.2 SURFACE PREPARATION

****
NOTE: Add a paragraph to Section 03 30 00 CAST-IN-PLACE CONCRETE requiring curing compound containing wax or oil to be removed prior to application of waterproofing.
****

Ensure surfaces to receive treatment are clean, dry, smooth, and free from deleterious materials and projections. [Thoroughly wet holes, joints, cracks, and voids in [masonry] [concrete] with water and fill with Portland cement mortar, strike flush, and permit to dry.] Cut off high spots or grind smooth. Finish top surfaces of projecting masonry or concrete ledges below grade, except footings, to a steep bevel with Portland cement mortar. Sweep surfaces to receive covering before applying waterproofing to remove dust and foreign matter. Cure concrete by a method compatible with the waterproofing system.

3.3 APPLICATION

****
NOTE: Delete requirements for cant strips if cant strips are not required.
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3.3.1 Building Envelope Requirements

Provide a continuous waterproofing system at all material and building transitions. Lap, wrap, fasten and seal products in accordance with manufacturer's printed instructions. Envelope assembly variations are not permitted without written approval from the Contracting Officer's Representative.

3.3.2 General Installation Requirements

Provide sheet waterproofing in accordance with manufacturer's printed installation instructions. Ensure the surface to receive membrane is clean, smooth and dry without surface irregularities; correct deficiencies prior to installation. [Where indicated, mop continuous cant strips in place at vertical and horizontal corners before installing the

waterproofing membrane. Do not use untreated wood or wood fiber cants.] When using solvent welding liquid, avoid prolonged contact with skin and breathing of vapor and provide adequate ventilation. Carry waterproofing of horizontal surfaces up abutting vertical surfaces and adhere solid to the substrate. Avoid wrinkles and buckles in applying membrane and joint reinforcement.

3.3.2.1 Non-Self-Adhering Membrane

Unroll membrane and allow to remain flat for at least one-half hour before application. Apply an asphalt concrete primer prior to application of asphaltic adhesive. Where solvent adhesive is applied, allow major portion of solvent to evaporate so that bonding adhesive does not stick to a dry finger touching it. Apply elastomeric waterproofing membrane in a full bed of adhesive at a uniform coverage rate in accordance with the membrane manufacturer's printed instructions. [Where membrane on horizontal surfaces are to receive concrete fill, apply adhesive in 100 mm 4 inch wide strips at 600 mm 2 feet on center.] Pull membrane tight without stretching. As soon as adhesive is fully set and dry, recheck lap splices. Where openings or fishmouths appear, reseal and reroll lap splices.

3.3.2.2 Self-Adhering Membrane

Apply composite, self-adhering membrane on surfaces primed at a uniform coverage rate in accordance with membrane manufacturer's printed instructions. Remove release sheet and apply with tacky surface in contact with dried primer.

3.3.2.3 Protection

Protect membrane over horizontal surfaces from traffic during installation. Use only equipment with rubber tires. Provide walkway protection where heavy traffic from other trades is expected. Do not store material on membrane.

3.3.3 Butyl Rubber

Lap sheets at sides and ends a minimum of 150 mm 6 inches over the preceding sheet. Apply lap splicing cement over entire 150 mm 6 inches splice area prior to application of sealant. Make sealant continuous along the entire length of the splice. Maintain a continuous bead of sealant at all membrane splices or as required by the manufacturer. Provide a tongue and groove cemented splice a minimum of 150 mm 6 inches wide with factory made heat vulcanized seam of not less than 50 mm 2 inches or as required by the manufacturer, when membrane is below water table.

3.3.4 Thermoplastic Membrane (PVC)

Consult with membrane manufacturer prior to grid application. Install 30.48 cm 12 inches wide sub-membrane containment grid as required by manufacturer. Provide the containment grid at intervals across the width and length of the substrate, at the base of all transitions, walls, curbs, penetrations, and at the perimeter of each deck/substrate section. Fully adhere strips to the deck in a full bedding of two-part urethane adhesive. Weld adjacent sheets in accordance with manufacturer's instructions. Hot-air weld all side and end lap joints. Provide lap area a minimum of 7.62 cm 3 inch wide when machine welding, and a minimum of 10.16 cm 4 inch wide when hand welding but not less than recommended by

the manufacturer. Orient overlaps with the direction of flow of water.

3.4 COMPOSITE, SELF-ADHERING MEMBRANE

Lap sheets at edges and ends a minimum of 65 mm 2-1/2 inches over the preceding sheet. Provide all side laps a minimum 65 mm 2-1/2 inches and end laps 127 mm 5 inches. Provide self-adhesive, mastic laps in accordance with manufacturer's recommendation. Roll or firmly press to adhere membrane to substrate. Cover corners and joints with two layers of reinforcement by first applying a 300 mm 12 inch width of membrane centered along the axis. Flash drains and projections with a second ply of membrane for a distance of 150 mm 6 inches from the drain or projection. Finish exposed, terminated edges of membrane on horizontal or vertical surfaces with a toweled bead of mastic. Apply mastic around edges of membrane, and drains and projections. Apply mastic at end of each work day.

3.5 FLASHING

Flash penetrations through membrane. Seal all penetrations where reinforcing bars penetrate a waterproofing membrane with the appropriate sealant or mastic flashing component. Embed elastomeric membrane in a heavy coat of adhesive, except for self-adhering membrane. Position continuous metal reglets horizontally on footing and vertically on intersecting and connecting walls, and as specified in Section 07 60 00 FLASHING AND SHEET METAL. Metal reglets are to receive exposed edges of membrane waterproofing. Secure membrane into reglets by lead wedges and fill with cement as recommended in writing by manufacturer of waterproofing materials. Counterflash upper edge of membrane waterproofing and protective covering as specified in Section 07 60 00 FLASHING AND SHEET METAL.

****

NOTE: Coordinate and specify field test protocol in accordance with UFC 3-110-03 Roofing. Electric field vector mapping (EFVM) is recommended for roofing systems covered by other materials that make them inaccessible for subsequent roof inspections. Systems that would benefit from EFVM are assemblies such as vegetative, paver, and ballasted roofs. EFVM is not required on all roofing projects and due to cost, may increase roof total ownership cost. Evaluate costs versus benefits for the project and specify field test protocol accordingly.

****

3.6 FIELD QUALITY CONTROL

Notify the Contracting Officer 5 working days prior to date of performing tests. Before concealment, cover elastomeric waterproofing on horizontal surfaces over finished spaces with [75][100] mm [3][4] inches of ponded water for 24 hours. Do not add water after start of 24 hour period. Accurately measure water level at beginning and end of 24 hour period. If water level falls, remove water and inspect waterproofing membrane. Make repairs or replacement as directed, and repeat test. Do not proceed with work that conceals membrane waterproofing before receiving approval and acceptance of the Contracting Officer.

3.7 PROTECTIVE COVERING

After installation has been inspected and approved by the Contracting Officer, apply a protective covering to the membrane waterproofing prior to backfilling. Protect vertical membrane waterproofing with a 13 mm 1/2 inch minimum thickness of asphalt plank; 13 mm 1/2 inch minimum thickness of fiberboard; or 3 mm 1/8 inch minimum thickness of compatible water resistant bitumen type protection board with edges abutting adjacent edges and exposed surfaces covered by a taping system recommended by manufacturer of protection board. Cover horizontal membrane waterproofing with similar protection board and Portland cement mortar not less than 20 mm 3/4 inch thick; place uniformly and allow to set before installing subsequent construction.

-- End of Section --