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USACE / NAVFAC / AFCEC **UFGS-07 56 00.60 (August 2025)**

Preparing Activity: NAVFAC **NEW**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2025
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SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 56 00.60

MESH REINFORCED ELASTOMERIC COATING (MREC) ROOFING

08/25

-- End of Section Table of Contents --

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SECTION 07 56 00.60

MESH REINFORCED ELASTOMERIC COATING (MREC) ROOFING

08/25

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NOTE: This guide specification covers the requirements for MREC roofing applied over existing roofing systems in accordance with recommendations contained in UFC 3-110-03, Roofing.

This product can be used over existing roof systems and eliminate removal and replacement. Use caution with this product over existing roofing system. Ensure existing roof system and substrate is structurally sound, properly attached, and dry in order to receive MREC system. Acceptable systems include Built-Up, Metal, Modified Bitumen, and Single Ply Roofing Systems.

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).

****

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.

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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.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-22	(2022; Supp 1 2023; Supp 2 2023; Supp 3 2025) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM C957/C957M	(2017; R 2024) Standard Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface
ASTM C1305	(2008) Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane
ASTM D412	(2016; R 2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D522/D522M	(2017; R 2021) Mandrel Bend Test of Attached Organic Coatings
ASTM D570	(2022) Standard Test Method for Water Absorption of Plastics
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 D2240	(2015; R 2021) Standard Test Method for Rubber Property - Durometer Hardness

ASTM D4541	(2022) Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D4798/D4798M	(2011; R 2021) Standard Practice for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Xenon-Arc Method)
ASTM D5034	(2009; R 2017) Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D5602/D5602M	(2018; R 2022) Standard Test Method for Static Puncture Resistance of Roofing Membrane Specimens
ASTM D6694/D6694M	(2015; R 2023) Standard Specification for Liquid-Applied Silicone Coating Used in Spray Polyurethane Foam Roofing Systems
ASTM D6947/D6947M	(2016; R 2023) Standard Specification for Liquid Applied Moisture Cured Polyurethane Coating Used in Spray Polyurethane Foam Roofing System
ASTM E108	(2025) Standard Test Methods for Fire Tests of Roof Coverings
ASTM G154	(2023) Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials

FM GLOBAL (FM)

FM 4470	(2022) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 9001	(2015) Quality Management Systems-Requirements
ISO 14001	(2015) Environmental Management Systems — Requirements with Guidance for Use

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 3905	(2022) Repair Manual for Low-Slope Membrane Roof Systems
NRCA 5102	(2024) Guidelines for the Application of Roof Coatings
NRCA CONDET	(2025) Construction Details Manual

1.2 SEQUENCING

****
NOTE: The following paragraph contains tailoring for ARMY and NAVY. Select the applicable tailoring option for the project.
****

Coordinate the work with other trades to ensure that components which are secured to, or stripped into, the roofing system are available and that permanent flashing and counter flashing, in accordance with NRCA CONDET, are installed as the work progresses. Ensure temporary protection measures are in place to preclude moisture intrusion or damage to installed materials.[Apply roofing immediately following application of insulation as a continuous operation. Coordinate roofing operations with insulation work so that all roof insulation applied each day is covered with roof membrane the same day.][Inspect the existing roof membrane for any damaged or defective material. Complete any necessary repairs to the existing roof membrane, flashing, subsurface insulation, or other roof components prior to installing the MREC system.]

1.3 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 and Air Force 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.
****

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. Submittals not having a "G" or "S" classification are 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-02 Shop Drawings

Field Inspection and Existing Conditions Report; G, [_____]

SD-03 Product Data

****

NOTE: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the Contract requires extended product warranties.

****

Construction Grade Caulk; G, [_____]

Basecoat and Intermediate Coatings; G, [_____]

Finish Coat; G, [_____]

Reinforcing Fabric; G, [_____]

Cant Strips; G, [_____]

Primers; G, [_____]

Traffic Coating; G, [_____]

Biodegradable Cleaner; G, [_____]

Sample Warranty Certificates; G, [_____]

SD-07 Certificates

****

NOTE: Statements signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project Contract and clearly name the project.

Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

****

Manufacturer Qualifications; G, [_____]

Installer Qualifications; G, [_____]

Qualification of Inspector; G, [_____]

SD-08 Manufacturer's Instructions

****

NOTE: Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

****

Manufacturer's Written Instructions

SD-09 Manufacturer's Field Reports

****

NOTE: Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

****

Field Tests; G, [_____]

[Manufacturer's Field Inspection Report; G, [_____]

] SD-11 Closeout Submittals

Information Card

Warranty; G, [_____]

1.4 QUALITY CONTROL

****

NOTE: All projects with more than 1400 square meters 15,000 square feet of roof area or that is defined as critical use or mission critical in the project DD Form 1391 must have a Registered Roof Consultant (RRC), registered professional engineer (PE), or registered architect (RA) on the design team experienced in roof system design and quality assurance services.

****

1.4.1 Manufacturer Qualifications

Submit information documenting Manufacturer is ISO 9001 and ISO 14001 certified and Manufacturer of the MREC system has proven 10-year track record of successful installations using advanced elastomeric technology in the roofing industry.

Provide Manufacturer's written instructions for installation, including

details.

1.4.2 Installer Qualifications

Submit information certifying the installer is approved by the coatings manufacturer and has a minimum of 5 years experience in the application of elastomeric roof coatings and has applied five installations with the same warranty as required herein from the manufacturer being submitted of similar size, scope, and the same system as this project within the previous 3 years.

Provide proof of this qualification in written form from the manufacturer of the roofing system. Submit a signed certificate from the Manufacturer stating that the Contractor is an approved installer of the Manufacturer's Complete MREC System and that each member of the installation crew has been trained in the system's proper installation and is certified by the Manufacturer's Technical Representative. Submit the names of the certified installers to Contracting Officer and only employees that are certified installers are allowed on the project. Provide a list of five project references, including contact name and telephone numbers.

1.4.3 Inspector Qualifications

An Approved Inspector (as designated by manufacturer) must be on site during all applications of any manufacturer's products. Submit Qualification of Inspector documenting approval by manufacturer that the inspector is licensed or approved for the installation of their system.

1.4.4 Product Standards

****
NOTE: The following paragraph contains tailoring for ARMY and NAVY. Select the applicable tailoring option for the project.
****

Ensure the coating system supplied is approved and listed by Factory Mutual as an acceptable Class I-4470 Roofing System Class I-4470 Roof Coating System over existing roof substrates.

1.4.5 Codes and Standards

The Contractor must be thoroughly familiar with all codes, regulations, and standards governing the specified work. Any contradiction between the manufacturer's requirements and these specifications must be brought to the attention of the Manufacturer and the Contracting Officer.

1.4.6 Deviations

Do not deviate from these specifications unless the deviation is submitted in writing in accordance with the General Conditions along with a letter from the roofing manufacturer's technical department approving the details of the deviation.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery of Materials

Deliver materials to the jobsite in manufacturer's original, sealed

containers with labels legible and intact.

a. Deliver materials bearing the following information:

(1) Name of manufacturer.

(2) Name of contents and products code.

(3) Factory Mutual logo.

(4) Net volume of contents.

(5) Lot or batch number.

(6) VOC content.

(7) Storage temperature limits.

(8) Shelf life expiration date.

(9) Mixing instructions and proportions of contents.

(10) Safety information and instructions.

1.5.2 Storage of Materials

Store materials in an area specifically designated for that purpose, in accordance with manufacturer's recommendations, where temperatures are not less than 10 degrees C 50 degrees F or higher than 37.8 degrees C 100 degrees F. If a more restrictive temperature range is stated on the material product data sheet, use the manufacturer's range.

1.5.3 Material Handling

Handle, store, and install materials in accordance with manufacturer's instructions and all applicable safety regulation requirements. Do not store materials in quantities that exceed design loads, damage substrate materials, hinder installation, or drainage.

1.5.4 Damaged Materials

Reject contaminated, damaged, or unsealed materials, or materials not conforming to the specifications and immediately remove from the jobsite and replace at no additional cost to the Government.

Materials that have been installed and damaged prior to issuance of warranty will be rejected and removed from the jobsite. This includes materials not protected from unprotected foot traffic, materials that were unprotected and used as a staging platform or storage area, materials that have been polluted with dirt, debris, metal shavings and other roofing materials, and materials damaged by water intrusion.

1.6 ENVIRONMENTAL CONDITIONS

Install all materials in strict accordance with manufacturer's published safety requirements and weather precautions, and the following work restrictions:

a. Do not apply materials over dirt, oil, grease, or other pollutants

(this includes foot traffic or markings caused by hoses, electrical cords, flexible conduits on roof, or tires). Remove all dirt or markings prior to the installation of the various applications of coating used to produce the MREC roof system.

b. Do not apply elastomeric coating system components when the Ambient temperature is below 4.4 degrees C 40 degrees F or above 43.3 degrees C 110 degrees F, if any surface moisture is present, when the dew point is within minus 15 degrees C 5 degrees F of the surface temperature or when there is a possibility of temperatures falling below 0 degrees C 32 degrees F within a 24 hour period.

c. Do not apply MREC system components if existing and forecasted weather conditions do not permit complete cure before rain, dew, fog, or freezing temperatures occur.

d. Do not spray-apply if the wind velocity exceeds 10 mph without taking precautions.

e. Take all measures necessary to protect unrelated surfaces from coating overspray or spillage.

f. Contractor is responsible for any adverse conditions, which may result from applying coatings while the temperature is rising during the morning hours, which might result in moisture being pulled upwards from the deck, and can result in vapor pockets forming.

1.7 WARRANTY

****
NOTE: NAVFAC and Army facilities do not allow MREC systems on new roofs. Do not select anything greater than 10 years on an installation over an existing roof substrate. If 20 years is desired, revise minimum thickness in PART 2 to a 60 mil system.
****

Provide MREC system material and workmanship warranties meeting specified requirements. Provide revision or amendment to standard membrane manufacturer warranty to comply with the specified requirements. Minimum manufacturer warranty is required to have no dollar limit, cover full system water-tightness, and have a duration of [5][10][20][_____] years. Submit sample warranty certificates during the pre-construction phase to prove all warranty requirements will be achieved.

1.7.1 Liquid-Applied Roof Membrane Manufacturer Warranty

****
NOTE: Specify a 10- year manufacturer warranty on facilities of small roof area and of minor importance where interiors and contents are not severely impacted by water intrusion and any time a 10-year dry film thickness is specified. Environmentally controlled interiors with one-ply membrane require a minimum 10-year warranty.
****

Provide the liquid-applied roof membrane manufacturer's [10][15][20]-year

no dollar limit roof system materials and installation workmanship warranty, including flashing, insulation[in compliance with ASTM D5034], and accessories necessary for a watertight roof system construction. Write warranty directly to the Government, commencing at time of Government's acceptance of the roof work. The warranty is required to state that:

a. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, blisters, splits, tears, delaminates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the roof system assembly and correction of defective workmanship are the responsibility of the MREC system manufacturer. All costs associated with the repair or replacement work are the responsibility of the MREC system manufacturer.

b. When the manufacturer or their approved applicator fail to perform the repairs within 72 hours of notification, emergency temporary repairs performed by others does not void the warranty.

c. Damage to the roofing system caused by sustained winds determined by ASCE 7-22 or less is covered by the warranty.

d. Upon completion of installation, and acceptance by the Contracting Officer, the manufacturer is required to supply the appropriate warranty to the Owner.

1.7.2 Contractor's Warranty

****
NOTE: Select 5 years for Army and Air Force projects and 2 years for all other projects.
****

The Contractor is required to warrant for a period of [2][5] years that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Write the warranty directly to the Government. The Contractor is responsible for correction of defective workmanship and replacement of damaged or affected materials. The Contractor is responsible for all costs associated with the repair or replacement work.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

2.1.1 Summary

Provide Mesh Reinforced Elastomeric Coating (MREC) roofing system complete as specified over existing[Built-Up, Metal, Single ply membrane, or Modified Bitumen Roofing Systems] [_____]. Apply MREC only after patching and repairs of existing roof such as removing deteriorated and wet roof membrane and insulation has been accomplished and the roof has been accepted by the Government. Repairs of low-slope roofs are to comply with

the latest edition of NRCA 3905 and NRCA 5102.

Provide[Polyurethane,][Silicone] coatings complying with[ASTM D6947/D6947M][or][ASTM D6694/D6694M] in the application of the MREC system. Ensure all work is in compliance with the NRCA Roofing Manual, latest edition (NRCA RoofMan). Coatings found to contain banned ingredients must be removed from the property or resurfaced with a complete roof system that meets the roofing specifications.

2.1.2 Manufacturers

ISO 9001 and ISO 14001 Manufacturer that meets all of the requirements of this specification.

2.1.3 System Description

****

NOTE: The following paragraph contains tailoring for ARMY and NAVY. Select the applicable tailoring option for the project.

****

Over existing[Built-Up, Metal, Single-ply membrane, or Modified Bitumen Roofing Systems] [_____] roof system: A seamless, 50 mil (minimum (not minimum average - dry) liquid-applied[Polyurethane][Silicone] elastomeric monolithic membrane system with a dry thickness in accordance with manufacturer's instructions, designed for application over existing[Built-Up, Metal, Single-ply membrane, or Modified Bitumen] roofing Systems meeting FM 4470 Approval.

2.1.4 Elimination, Prevention of Fall Hazards

****

NOTE: Incorporate in the design fall prevention methods or techniques to eliminate fall hazards from any part or component of the building, facility, structure, or equipment requiring future maintenance work, in accordance with ANSI/ASSE A1264.1. Fall prevention methods may include identifying, designing, and installing anchorages (hard points) for safe use of fall arrest equipment and systems. Select materials for metal compatibility in order to minimize corrosion, type 316 stainless steel is recommended. Based on the design, include specifics of the system(s) and material(s) in the following subsection.

****

2.1.4.1 Fall Protection Systems

[_____]

2.1.5 Cool Roofs

****

NOTE: Facilities with dominant cooling loads or in mild or warm climate zones are required to meet "cool roofing" requirements of FEMP. Cool roof design must follow the requirements in UFC 3-110-03

"Roofing" and ASHRAE 90.1 Chapter 5, for the design of insulation and energy performance of the building. If a cool roof is not selected in climate zones 1-3, meet one of the exception requirements listed in ASHRAE 90.1 Chapter 5 or provide thermal insulation above the deck with an R value of 33 or greater.

Designers should be aware of the possible negative impacts of using cool roofing that may result in unintended consequences. Mechanically-fastened single-ply roof systems must comply with the requirements for mechanically-fastened single-ply systems in UFC 3-110-03, Chapter 2. Condensation on the underside of mechanically-fastened systems can result in ice build-up in winter, mold growth on the facers, moisture dripping into the interior, and replacement of the roofs with less than 4 years of service. See UFC 3-110-03 for more information.

Poor design of cool roofs in ASHRAE climate zones 4 and higher have resulted in the unintended consequence of condensation below the membrane - a result of the material's inability to warm and drive moisture downward. Roofs that experience this condensation have had to be replaced. Other unintended consequences include the overheating of masonry walls, interior spaces, roof top piping and mechanical equipment because of the reflected UV rays.

****

2.1.6 Field Inspection and Existing Conditions Report

****

NOTE: This represents a Contractor's Field Survey to confirm conditions shown in design documents.

****

Submit a field Survey report including moisture survey report and drawing on applicable roof assemblies illustrating any existing roof area containing entrapped moisture using Infrared survey, nuclear moisture survey, capacitance meters or other means as determined necessary to identify all wet materials.

2.2 MATERIALS

2.2.1 Construction Grade Caulk

Single package[polyurethane][or][silicone] sealant, as approved by roofing coating manufacturer for use in filling cracks, splits or voids, and for sealing reglet counter flashings.

2.2.2 Basecoat and Intermediate Coatings

****

NOTE: For polyurethane systems, some manufacturers may offer an aromatic basecoat. Although less expensive, ultraviolet rays can deteriorate an

aromatic urethane base coat if the topcoat is missing or becomes damaged. Aliphatic base and intermediate coats should be chosen when available to reduce risk of premature UV degradation of the system.

****

High solids elastomeric[[aliphatic]polyurethane],[or][silicone] coating to provide a permanently flexible, waterproof base coat and intermediate coat and will be tested as part of a FM 4470 roof assembly.

2.2.3 Finish Coat

High solids elastomeric[aliphatic polyurethane],[or][silicone] coating to provide a permanently flexible, waterproof finish coat and will be tested as part of a FM 4470 roof assembly.

Install the base coat(s) as a contrasting color to the finish coat application(s); color selected by Architect.[Color to meet cool roof requirements, or as determined by Contracting Officer.]

2.2.4 Roof System's Material Properties

****

NOTE: Properties for urethane and silicone materials are provided. Delete properties that do not apply.

Select the applicable tailoring option, NAVY or ARMY in the following paragraph.

****

Dry film thickness in accordance with manufacturer's instructions Minimal dry mil thickness of 50 mils with polyester fabric:

Urethane Properties

Property	Test	Test Result
Tensile Strength (cured)	ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension	Minimum 1.86 MPa 270 lb/in2 without reinforcement
Tear strength	ASTM D624	Minimum 155 lbf/in
Elongation	ASTM D638 Standard Test Method for Tensile Properties of Plastics or ASTM D412	Minimum 200 percent without reinforcement
Flexibility	ASTM D522/D522M	Pass, no cracking or flaking
Accelerated Weathering	ASTM G154	5000 Hours, ASTM G154, No cracking or checking
Fire Rating	ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings and FM 4470	Class A
Hail (severe impact) Resistance	FM 4470	Severe Hail Resistant

Property	Test	Test Result
Puncture Resistance	ASTM D5602/D5602M	greater than 55 lbf
Impact Resistance	ASTM D2240	Minimum 65, Shore A
Foot Traffic Resistance	FM 4470	Yes
Susceptibility to Leakage	FM 4470	No, Pass the leakage test
Solids by Volume		Min 69 percent
Low Temperature Crack Bridging (Reflect White Only)	ASTM C957/C957M / ASTM C1305	Pass

Silicone Properties

Property	Test	Test Result
Tensile Strength (cured)	ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension	greater than 240 PSI
Tensile Strength	ASTM D2370 Standard Test Method for Tensile Properties of Organic Coatings	greater than 244 psi at 23C 73F
Tear strength	ASTM D624	greater than 24 lbf/in at 23C 73F
Elongation	ASTM D638 Standard Test Method for Tensile Properties of Plastics or ASTM D412	Minimum 125 percent
Flexibility	ASTM D522/D522M	Pass, no cracking or flaking
Low Temp. Flexibility	ASTM D522/D522M Procedure B	Pass at -26C -15F
Weathering	ASTM G154	No degradation after 8,760 hours
Accelerated Weathering	ASTM D4798/D4798M	Pass (5,000 hrs)
Fire Rating	ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings and FM 4470	Class A
Impact Resistance	ASTM D2240	50 Shore A
Solids by Volume		MIN 69 percent
Water Absorption	ASTM D570	less than 2 percent

2.2.5 Reinforcing Fabric

****

NOTE: Reinforcement type and weight will vary depending on manufacturer, length of warranty, traffic loads and resin type. Delete selections not applicable. Some silicone-based systems may not require a reinforcing fabric; if utilizing a silicone system, confirm all components and system properties required to obtain a 20-year warranty and edit as appropriate.

****

[Non-woven][Random Oriented],[100 percent polyester][glass fiber] [_____],[stitch bonded,][and heat set] fabric. Ensure fabric bears the Factory Mutual label (FM) printed on the fabric surface. The fabric is required to meet the following characteristics:

a. [55 g/m2] [101.73 g/m2] [120 g/m2] [135 g/m2] [140 g/m2] [165 g/m2] [170 g/m2] [200 g/m2][1.62 oz/sq. yd] [3 oz/sq. yd] [3.54 oz/sq. yd] [3.98 oz/sq. yd] [4.13 oz/sq. yd] [4.87 oz/sq. yd] [5.01 oz/sq. yd] [5.90 oz/sq. yd]

2.2.6 Flashings

Provide composite flashing of the same resin material as field membrane with continuous embedded reinforcement. Reinforcement fleece of fabric may be reduced in thickness to promote improved workability for installation on intricate shapes and profiles.

2.2.7 Cant Strips

Cant strips, where applicable, can be made from EPS, polyisocyanurate, or wood.

2.2.8 Primers

****

NOTE: Select the appropriate primer for the prepared substrate.

****

[Single component][Two component], premium quality exterior primer,[low VOC][moisture mitigating][bleed blocking][rubber polymer-based][epoxy] as approved by the manufacturer applied in between the existing substrate and the new liquid applied roof membrane system. For promoting adhesion on[concrete][masonry][single-ply membrane][bituminous membrane][asphalt substrates][cover boards] [_____] substrates.[For promoting adhesion and corrosion protection, flash rust resistance and enhanced adhesion over all metal surfaces.] Color of primer must be slightly different from other coats to distinguish primed areas from the intermediate or finish coats.

2.2.9 Traffic Coating

****

NOTE: A non-skid may be required for slip resistance. Remove bracketed option if not required.

****

Provide traffic resistant coating where applicable. Traffic coating to be of the same resin material as field membrane with continuous embedded

reinforcement for enhanced impact resistance.[Provide Non-skid granules during application for added slip resistance.]

2.2.10 Biodegradable Cleaner

****
NOTE: Cleaner type and concentrate varies by roof type and manufacturer. Edit as required.
****

Supply biodegradable cleaners mixed at rate of one part cleaner to[nine][ten][undiluted] [_____] parts water, unless otherwise directed by manufacturer.

Material Properties:

a. Biodegradable: Allows proper cleaning of substrates where washing with hazardous cleaning products would not be permitted prior to (re)coating.

b. Open Dry Time: Removes dirt, pollutants, and other contamination build-up even if the product dries prior to rinsing.

c. Environmentally Safe: Does not harm ground vegetation, water collection ponds, septic tanks, or treatment plants even in its concentrated form, nor cause adverse side effects when accidentally ingested by animal life.

d. Agency Approvals: Meets all the requirements of U.S.D.A. and FDA standards, and is also OSHA compliant.

PART 3 EXECUTION

3.1 EXAMINATION

****
NOTE: The following paragraphs contains tailoring for ARMY and NAVY. Select the applicable tailoring option for the project.
****

Do not begin installation until the following are completed:

a. Substrate Existing roof membrane has been properly prepared.

b. Verify substrate existing roof membrane surfaces are durable, free of frozen matter, dampness, loose particles, cracks, pits, projections, or foreign matter detrimental to adhesion or application of waterproofing system.

c. Verify that substrate existing roof membrane surfaces are smooth and not detrimental to full contact bond of waterproofing materials.

d. Verify items that penetrate surfaces to receive waterproofing are securely installed.

e. Verify that substrate existing roof membrane areas are adequately supported and firmly fastened in place.

****
NOTE: Select paragraphs below if this work is included in Contractor's scope. Delete otherwise.
****

[f. Verify that roof deck has a minimum slope of 21 mm/m 0.25 inch/foot.

][g. Verify that roof does not have ponding water areas.

][h. Verify that all attached vertical walls are properly waterproofed.

][i. Verify all defects in the existing roof or substrate are corrected. Areas of deteriorated deck/substrate, porous or other affected materials must be removed and replaced with new to match existing prior to application.

][j. Verify the existing membrane is free of trapped moisture with a moisture scan and infrared scan.

]3.2 PREPARATION

****
NOTE: The following paragraphs contains tailoring for ARMY and NAVY. Select the applicable tailoring option for the project.
****

Perform the following preparation activities:

a. Make all necessary repairs to existing substrate existing roof membrane. Contact manufacturer's technical representative for assistance.

b. Ensure all surfaces are clean and dry, and free of any loose, spalled or weak material including aggregates, surfacing, dirt, dust, gravel, oil, grease, surface chemicals or other contaminants that may interfere with optimum adhesion.

c. Power tool clean per SSPC SP3 requirements any metal that has signs of rust, solvent wipe and coat with a corrosion resistant primer (5.0 mils dry) prior to covering the insulation.

d. Sand/degloss/abrade metal surfaces to receive application following by solvent wipe. Coat metal with a corrosion resistant primer (5.0 mils dry) prior to encapsulating with a MREC roof system.

e. Repair or replace any damaged or structurally unsound metal, lumber, or concrete.

f. Apply cleaner referenced in Part 2 and Pressure wash to clean all dust, dirt, biological growth, and debris from surface. Control nozzle as necessary to ensure pressure does not damage the roof. Apply cleaner referenced in PART 2 with broom or brush to remove oil, grease, or other contaminants. Rinse all residual cleaners.

****
NOTE: Edit tests and measurements as required by manufacturer.
****

g. Perform at least three adhesion tests on each type of roof surface after preparation in representative areas.[Cut minimum 2.54 cm 1 in wide by 30.48 cm 12 in long strips of reinforcement. Apply primer and allow to dry. Embed 20.32 to 22.86 cm 8 to 9 in long section of the reinforcement into first coat of the[polyurethane][or][silicone] coating and leave 7.62 to 10.16 cm 3 to 4 in long un-adhered for gripping. After proper cure, measure the resistance of the un-adhered reinforcement. Measurement should exceed [2 lb/in][_____] when tested.][Perform adhesion test in accordance to ASTM D4541 and record results]. Do not proceed if required adhesion is not achieved.

h. Remove all paint and loose material from the vertical wall surface to the minimum height shown on the drawings.

i. Protect adjacent surfaces not designated to receive waterproofing. As a minimum, clean and prepare surfaces to receive waterproofing by removing all loose and flaking particles, grease, and laitance with the use of a stiff bristle push broom or washing. Take care not to inject water into the substrate existing roof membrane during washing. In some cases, additional drying time may be required after the cleaning process. Consult the roofing manufacturer's technical representative for additional advice on cleaning various roofing substrates.

j. Do not apply waterproofing to surfaces unacceptable to manufacturer.

3.3 PRIMER APPLICATION

Apply Surface Primer according to system manufacturer for all surfaces to receive Mesh Reinforced Elastomeric Coating.

a. Mix and apply[single][two] component primer in strict accordance with written instructions of manufacturer. Use only proprietary materials, as supplied by the membrane manufacturer.

b. The surface must be dry, with any remaining dust or loose particles removed using dry, oil-free compressed air, industrial vacuum, cloth wipe or a combination of methods.

c. Do not install primer to any substrate containing newly applied or active asphalt, coal-tar pitch, or penta-based materials unless approved by manufacturer.

d. Allow to cure in accordance with manufacturer's instructions.

3.4 MEMBRANE INSTALLATION

3.4.1 Reinforcement of Cracks, Joints, and Transitions

Provide reinforcement of cracks, laps, and joints prior to applying the specified membrane system. For moving cracks and joints, create a minimum 2.54 cm 1-inch wide bond break centered over the crack or joint by applying bond break tape centered over each crack, lap, or joint. Repair non-moving cracks, laps, and joints: rout, clean and fill cracks with manufacturers recommended sealant or mastic material. For all horizontal to vertical transitions, provide a cant joint of sealant. Apply a 10 cm 4-inch wide strip of reinforcement and resin to cracks, laps, and joints in strict accordance with manufacturer's instructions. Ensure

reinforcement is not in tension during embedment.

3.4.2 Base and Intermediate Coat and Fabric Components

Mix and apply fluid-applied membrane in strict accordance with written instructions of membrane manufacturer. Consists of one base coat applied to the primed substrate, one ply of the fabric (sizes vary) laid into the wet base coat, and finally a second (intermediate) coat saturating the fabric from above. Apply pressure to the fabric with roller to fully embed and saturate the fabric into liquid roofing/waterproofing material. Smooth down proud fibers and remove air pockets from under the membrane by rolling them out. Apply additional liquid material as required to ensure the membrane reinforcement is fully embedded and has conformed to the substrate without tenting, visible pinholes, air pockets, fish mouths or wrinkles. Ensure that adjacent runs of fabric are overlapped a minimum of 101.6 mm 4 inchesand 152.4 mm 6 inches at end laps. In general, apply detail reinforcing around flashings, penetrations, or complicated forms first, and follow with field membranes second. Base and intermediate coats are applied over a smooth surface at a minimum rate specified by the manufacturer. Coverage rate varies depending on surface texture and porosity). Apply base coat with the use of approved[roof brushes][roller] [_____] evenly onto the surface. Only apply liquid to an area suitable for reinforcing and the subsequent coating of liquid membrane within the curing time. Cover one working area at a time, between 1.4-1.9 sm 15-20 sf. The dry mil thickness of membrane produced with the base and intermediate coat and fabric must be a minimum thickness of 25 mils (dry).

3.4.3 Protection of Foundation Coat and Polyester Fabric Membrane

It is the Contractor's responsibility to protect the membrane produced by the foundation and intermediate coat and fabric from damages. Reject all membranes that are damaged and remove from the job site. Damages include, but are not limited to, coatings being marked with pollutants that may act as a bond-breaker between the various applications of coating. These pollutants include (but are not limited to) foot traffic residue, metal shavings, tire tracks, markings caused by hoses and electrical cords, insulation adhesive, sealants, and cementitious materials. Remove all pollutants prior to the application of any coatings. Walking on the coating while the coating and fabric is wet is forbidden. Walking on the membrane with shoes that are not covered with protective shoe coverings (example: painter's booties) is forbidden. Using the membrane as a staging platform without laying plywood on the surface to protect the membrane is forbidden. Do not allow pools of water to sit on the coating during the first seven days (brush off pools of water each morning).

3.4.4 Encapsulation of Roof Perimeter

Using [304.8 mm] [12-inch] [_____] fabric and the base components (described above), waterproof entire roof perimeter. Continue waterproofing up vertical surfaces and onto deck a minimum of 152.4 mm 6 inches in each direction.

3.4.5 Encapsulation of Roof Penetrations

Using [304.8 mm] [12-inch] [_____] fabric and the base components, seal items projecting through waterproofing material watertight. Waterproof up penetrations a minimum of 203.2 mm 8 inches. Extend flashing a minimum of 101.6 mm 4 in. onto the field substrate surface.

3.4.6 Roof Drains

Clean, prepare and prime surfaces ready to receive membrane applications. Block drain bowl opening to avoid roofing/waterproofing material from entering the drainage system. Extend the liquid roofing/ waterproofing material and membrane fabric directly into the bowl of the prepared drain a minimum of 101.6 mm 4 in. Remove drain blocks and allow the roofing/waterproofing system to fully cure dry prior to re-connecting the drain bowl assembly.

3.4.7 Encapsulation of Roof Field

Using [1.0 m] [40-inch] [_____] fabric and the base components (as described above), seal the entire roof field. Overlap adjacent runs of fabric 101.6 mm 4 inches and 152.4 mm 6 inches at end laps minimum.

3.4.8 Encapsulation of Walls and Curbs

Using [1016 mm] [40-inch] [_____] or 508 mm 20-inch fabric and the foundation components (as described above), seal all identified wall areas and all curbs (vertical and horizontal surfaces). Overlap adjacent runs of fabric 101.6 mm 4 inches and 152.4 mm 6 inches at end laps minimum.

3.4.9 Installation of Finish Coat

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NOTE: Depending on the type of reinforcing fabric used, the finish coat application may need to be applied wet on wet or after the base and intermediate coat is fully cured. Edit as required depending on fabric used.

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3.4.9.1 Finish Coat Component

Apply finish coat at the manufacturer's recommended rate[wet on wet][after the base and intermediate coat are cured and within the recommended recoat window] to achieve a finish coat dry-film thickness of [0.380 mm] [15.0 mil] [_____]. Combined base coat(s) and finish coat to achieve a minimum of [1.27 mm] [50.0 mil] [_____] dry film thickness. The final coating should be smooth and uniform. At all reinforcing seams provide a 50.8 mm 2 inch overlap of the top coat resin for all side joints and a 101.6 mm 4 inch overlap for all end joints.

3.4.9.2 Protection of Finish Coat

It is the Contractor's responsibility to protect the finish coat from damages. Reject and remove damaged finish coats from the job site. Damages include (but are not limited to) coatings being marked with pollutants that may act as a bond-breaker between the various applications of coating. These pollutants include (but are not limited to) foot traffic residue, metal shavings, tire tracks, markings caused by hoses and electrical cords, insulation adhesive, sealants, and cementitious materials. Remove all pollutants prior to the application of any coatings. Furthermore, walking on the coating while the coating is wet is forbidden. Walking on the coating with shoes that are not covered with protective coverings (example: painter's booties) is forbidden. Using the coating or the coating membrane system as a staging platform without laying plywood on the surface to protect the membrane is forbidden. Do

not allow pools of water to sit on the coating during the first seven days (brush off pools of water each morning).

3.4.10 Roof System Mil Thickness

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NOTE: The following paragraphs contains tailoring for ARMY and NAVY. Select the applicable tailoring option for the project.
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Installed roof system is required to have a minimum 50 mil total cured thickness dry thickness meeting the manufacturer's recommendations and instructions.

Dry mil thickness test: The coating manufacturer's representative, Contracting Officer and Contractor are required to make a final inspection to determine the dry film thickness of the system and to verify that the system meets the manufacturer's requirements for warranty. The Contractor is to notify all interested parties in advance of scheduled inspection. The Government requires three dry mil sample cuts per roof section of 50.8 mm by 25.4 mm 2-inch by 1-inch and the Government may elect to select the areas where the samples are removed. Contractor is required to immediately repair the sample areas with the complete MREC System using a 52.4 mm by 152.4 mm 6-inch by 6-inch fabric. Cut samples in half and give the Government half of each sample. Measure the samples with a micrometer or measure by microscopy to determine that the mil thickness of the roof system meets specified thickness. If the mil thickness is not correct, apply additional finish coating.

3.4.11 Installation of Protective Traffic Coat

Provide protective Traffic Coat at areas where daily foot traffic occurs and at the top and bottom of all access ladders, hatches, and stairs. Apply painter's tape to the surface of the roof system to designate walkways. Set the tape a minimum of 0.92 meters 3 feet apart to produce a 0.92 meters 3-foot wide footpath. Remove all pollutants from the surface of the roof system. Protect the roof surface while mixing the Traffic Coat. Mix the Traffic Coat with an electric drill for a minimum of 3 minutes. Apply one coat of Traffic Coat at a rate of 0.05 liters/square meter 1 gallon per 100 square feet.[Broadcast sand to refusal into wet resin layer and allow to cure. Remove all loose sand/aggregate.] Wait 3 to 6 hours and apply a second application of Traffic Coat.[Broadcast sand into the wet resin layer and backroll to encapsulate the sand.] Allow to cure. Remove painter's tape.

3.4.12 Correction of Deficiencies

Where any form of deficiency is found, take additional measures as deemed necessary by the Contracting Officer to determine the extent of the deficiency and perform corrective actions as directed by the Contracting Officer.

3.4.13 Clean Up

Maintain work and work areas in a clean, safe condition at all times during coating installation. Remove excess materials, trash, and debris from the jobsite daily.

At the completion of the project, clean area of any spills and containers, and clean up all roofing debris, leaving jobsite in a clean and orderly condition.

3.5 FIELD QUALITY CONTROL

Perform field tests in the presence of the Contracting Officer. Notify the Contracting Officer one day before performing tests.

3.5.1 Construction Monitoring

During progress of the roof work, Contractor is required to make visual inspections as necessary to ensure compliance with specified parameters. Additionally, verify the following:

a. Materials comply with the specified requirements.

b. Materials are not installed in adverse weather conditions.

c. All materials are properly stored, handled, and protected from moisture or other damages.

d. Equipment is in working order. Metering devices are accurate.

e. Substrates are in acceptable condition and, in compliance with specification, prior to application of subsequent materials.

[3.5.1.1 Manufacturer's Inspection

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NOTE: Include this paragraph when manufacturer's inspection of work is required. Use bracketed option in second paragraph to specify minimum number of required visits. The minimum and default is three visits during installation. To help determine if more than three visits should be specified, divide the total project roof area in squares by 100 and round to the nearest whole number. Coordinate this requirement with Section 01 45 00 QUALITY CONTROL paragraph QUALITY CONTROL (QC) SPECIALISTS - Experience Matrix.
****

The roofing material manufacturer's technical representative must visit the work site to inspect ongoing work. Inspections are to include observing installation technique and verifying the quality of work-in-place for compliance with the manufacturer's instructions. Deficiencies identified by the manufacturer's technical representative must be corrected and re-inspected by the manufacturer's technical representative.

3.5.1.1.1 Frequency

The manufacturer's technical representative must visit the work site to inspect and document ongoing work a minimum of [three][_____] separate occasions during the course of the installation. One visit must occur during the first 20 squares of installation, one at substantial completion of the roof work, and all others during different periods of installation. Notify the Contracting officer a minimum of 5 working days

prior to each visit by the manufacturer's technical representative.

3.5.1.1.2 Field Inspection Report

Document inspection results in a report prepared and signed by the manufacturer's technical representative for each visit. Submit the report to the Contracting Officer with the contractor's daily Quality Control report. The manufacturer's field inspection report must include a description of ongoing work observed and whether the inspected work was satisfactory or unsatisfactory. The final report must include certification by the manufacturer's technical representative that the work was performed in accordance with the manufacturer's instructions and contains no deficiencies. Submit the final manufacturer's field inspection report to the Contracting Officer within five working days of the final visit.

]3.6 PROTECTION

Protect installed products until completion of project. Touch-up, repair or replace damaged products before Substantial Completion.

3.7 CLOSEOUT ACTIVITIES

3.7.1 Information Card

Provide a typewritten information card for facility records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved 1 mm 0.039 inch thick aluminum card for exterior display. Provide a card measuring 215 mm by 275 mm 8 1/2 by 11 inch minimum. Information card is required to identify facility name and number; location; Contract number; approximate roof area; detailed roof system description (as applicable), including deck type, membrane, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, date of completion; installing Contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information. Install card at roof top or access location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

-- End of Section --