JOINT BASE LEWIS McCHORD DESIGN STANDARDS

 DIVISION 07 - THERMAL AND MOISTURE

 PROTECTION SECTION 07 55 00

 PROTECTED MEMBRANE ROOFING

07/18

PART 1 GENERAL

* 1. REFERENCES

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 C1177/C1177M (2017) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing

ASTM C1396/C1396M (2017) Standard Specification for Gypsum Board

ASTM C29/C29M (2017a) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

ASTM C578 (2017a) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

ASTM C726 (2017) Standard Specification for Mineral Wool Roof Insulation Board

ASTM D448 (2012; R 2017) Standard Classification for Sizes of Aggregate for Road and Bridge Construction

ASTM D4751 (2016) Standard Test Method for Determining Apparent Opening Size of a Geotextile

ASTM D5034 (2009; R 2017) Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

ASTM D751 (2006; R 2011) Coated Fabrics FM GLOBAL (FM)

FM APP GUIDE (updated on-line) Approval Guide <http://www.approvalguide.com/>

FM P9513 (2002) Specialist Data Book Set for Roofing Contractors; contains 1-22 (2001),

1-28 (2002), 1-29 (2002), 1-28R/1-29R

(1998), 1-30 (2000), 1-31 (2000), 1-32

(2000), 1-33 (2000), 1-34 (2001), 1-49

(2000), 1-52 (2000), 1-54 (2001) SINGLE PLY ROOFING INDUSTRY (SPRI)

SPRI RP-4 (2013) Wind Design Standard for Ballasted Single-Ply Roofing Systems

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star (1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

PL 109-58 Energy Policy Act of 2005 (EPAct05)

|  |  |  |
| --- | --- | --- |
|  | UNDERWRITERS | LABORATORIES (UL) |
| UL | 580 |  | (2006; Reprint Oct 2013) Tests for Uplift Resistance of Roof Assemblies |
| UL | 790 |  | (2004; Reprint Jul 2014) Standard Test Methods for Fire Tests of Roof Coverings |

* 1. SYSTEM DESCRIPTION
		1. Wind Uplift Resistance

Wind uplift resistance of the complete roof assembly shall be rated Class I-60 minimum with I-90 as desirable in accordance with UL 580. **Use of loose-laid ballasted system is not recommended**. Submit drawings required for the membrane, modified to include the complete PMR assembly.

* + 1. Pre-Roofing Conference

After approval of submittals and before performing roofing and insulation installation work, hold a pre-roofing conference to review the following:

* + - 1. Drawings, specifications and submittals related to the roof work
			2. Roof system components installation
			3. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representatives to roof manufacturer
			4. Plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing
			5. Quality control plan for the roof system installation
			6. Safety requirements

Coordinate pre-roofing conference scheduling with the Contracting Officer. The conference shall be attended by the Contractor, the Contracting Officer's designated personnel, and personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with roof work , Fire Marshall, and representative of the roofing materials manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

* 1. SUBMITTALS

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

NOTE: If 01 33 29 is incorporated in the specifications, select that option below. If not, select the option for 01 57 19. Include items noted at SD-01 and SD-11 as applicable, based on project scope.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the [Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING]‌[Environmental Records Binder, in conformance to Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS]. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Roofing Materials (Recycled Content); S

Insulation (Recycled Content); S

SD-02 Shop Drawings Roof Assembly

SD-07 Certificates

Material and Equipment Energy Efficiency Qualifications

SD-11 Closeout Submittals

Roofing Materials (Recycled Content); S

Insulation (Recycled Content); S

* 1. QUALITY ASSURANCE
		1. Material and Equipment

Submit material supplier's or equipment manufacturer's statement that the supplied insulation, filter fabric and membrane materials meet specified requirements. Each certificate shall be signed by an official authorized to certify on behalf of material supplier or product manufacturer and shall identify quantity and date or dates of shipment or delivery to which the certificates apply. Submit certificates of compliance for material and equipment, as specified.

* + 1. Qualifications

Submit documentation verifying a minimum of 2 years’ experience with PMR systems and certification by the PMR manufacturer as an approved Installer for the specified PMR system.

* + 1. Fire Resistance

The completed roof system shall be rated Class A as determined by UL 790 or Class I as determined by FM APP GUIDE. Compliance of each component of the roofing system shall be evidenced by the label or written certification from the manufacturer.

* 1. DELIVERY, STORAGE, AND HANDLING

Store insulation away from areas where welding is being performed or where contact with open flames is possible. Shield insulation from extended exposure to sunlight. Remove materials damaged by moisture from the site. Ballast shall not be stored on the roof.

PART 2 PRODUCTS

* 1. UNDERLAYMENT

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NOTE: If 01 33 29 is incorporated in the specifications, select that option below. If not, select the option for 01 57 19.

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Underlayment may be concrete, any insulation which is suitable for the particular membrane, mineral fiberboard in accordance with ASTM C726. Provide products with recycled content and provide documentation in accordance with Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS] paragraph RECYCLED CONTENT. For more information see https://sftool.gov/greenprocurement/green-products/1/construction-materials/231/roofing-materials/0?addon=False and https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program. **Use of loose-laid membrane is not recommended for use**.

* 1. ROOF MEMBRANE

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NOTE: If 01 33 29 is incorporated in the specifications, select that option below. If not, select the option for 01 57 19.

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Roof membrane shall be in accordance with Section 07 53 23 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING or 07 52 00 MODIFIED BITUMINOUS MEMBRANE ROOFING. Provide products with recycled content and provide documentation in accordance with Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS] paragraph RECYCLED CONTENT. For more information see https://sftool.gov/greenprocurement/green-products/1/construction-materials/231/roofing-materials/0?addon=False and https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program.

* 1. INSULATION ABOVE THE MEMBRANE

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NOTE: If 01 33 29 is incorporated in the specifications, select that option below. If not, select the option for 01 57 19.

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Provide products with recycled content and provide documentation in accordance with Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS] paragraph RECYCLED CONTENT. For more information see https://sftool.gov/greenprocurement/green-products/1/construction-materials/231/roofing-materials/0?addon=False and <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>. **Use of insulation above the membrane is Not Recommended.**

* 1. FILTER FABRIC

Filter fabric shall be either woven or non-woven pervious sheet of long chain polymeric filaments or yarns such as polypropylene, polyethylene, polyester, or polyamide formed into a pattern with distinct and measurable openings. The filter fabric shall provide an ASTM D4751 Apparent Opening Size (AOS) no finer than the 0.125 mm No. 120 sieve and no coarser than the 0.212 mm No. 70 sieve. Edges of fabric shall be salvaged or otherwise finished to prevent raveling. Fabric shall have minimum weight of 102 gms/sq. m 3 oz/sq. yard and shall conform to the following table:

|  |  |  |
| --- | --- | --- |
| Property | Test Procedure | Result |
| Tensile strength | ASTM D5034 Grab test method using 25 mm 1 inch square jaws and a travel rate of 55 mm per sec 12 inches per minute | 29 kg/25 mm65 lbs/inch minimum in any principal direction |
| Puncture strength | ASTM D751 - Tension testing machine with ring clamp; steel ball replaced with a 8 mm 5/16 inch diameter solid steel cylinder with a hemispherical tip centered within the ring clamp | 18 kg40 lbs minimum load |

* 1. BALLAST **Use of Ballast** **not recommended**.
		1. Pavers

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* + 1. Aggregate Ballast – **Use of aggregate not recommended**

PART 3 EXECUTION

* 1. INSTALLATION

Install roof membrane and flashing in accordance with Sections 07 53 23 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING or 07 52 00 MODIFIED BITUMINOUS MEMBRANE ROOFING.

* 1. FLOOD TEST

After the membrane and its flashings are installed, and before the insulation is placed above the membrane, plug the drains and flood the roof with water for 24 hours. Leaks shall be remedied before insulation is installed.

* 1. INSULATION

When required by the manufacturer of the insulation, a slip sheet shall be installed over the membrane. Unless otherwise specified by the manufacturer, end joints shall be staggered. Joints between boards shall not exceed 6 mm 1/4 inch. Insulation shall be installed to within 19 mm 3/4 inch of projections and cant strips.

* 1. INSPECTION

Establish and maintain an inspection procedure to ensure compliance of the installed roof with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Inspection shall include, but not be limited to, the following:

* + 1. Observation of environmental conditions; number and skill level of roofing workers; start and end time of various tasks; condition of substrate.
		2. Verification of compliance of materials before, during, and after installation, proper storage and handling of insulation.
		3. Inspection of mechanical fasteners; type, number, length, and spacing.
		4. Coordination with other materials, cants, nailers, flashings, and penetrations.
		5. Inspection of proper placement of insulation, joint orientation and laps between layers, joint widths and bearing of edges of underlayment on deck.

Submit procedures for approval, prior to start of roofing work including a checklist of points to be observed. The actual inspections shall be documented and a copy of the documentation furnished to the Contracting Officer at the end of each day.

-- End of Section --