

SECTION 07 52 16.13
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PART 1 GENERAL

1.1 DESCRIPTION

- A. Fully adhered, fabric reinforced thermoplastic tri-polymer alloy roofing membrane.
- B. Roofing materials including but are not necessarily limited to Polyisocyanurate insulation, Securock board, metal coping cap, flashing, and other items.

1.2 DEFINITIONS

- A. Products: items purchased for incorporating into the project, whether for this project or taken from previous stock, includes the term materials, equipment, system, and other similar intent.
- B. Named Products: Items identified by manufacturer's product name, including make and/or model number or other designation shown or listed in manufacturer's published product literature that is current at time of this contract.
- C. New Products: Items not previously incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
- D. Comparable Product: Product that is demonstrated and approved through submittals process, or where indicated as a product substitution, to have indicated qualities related to type, function dimension, in service performance, physical properties, appearance, and other characteristics that equal or exceed those of the specified product.
- E. Substitutions: Changes in products, materials, equipment, and method of construction from those required by specifications and drawings and proposed by the Contractor.
- F. Basis of Design Product Specification: When a specific manufacturer's product is named and accompanied by "basis of design", including make and/or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating and determining comparable products of other named manufacturers.

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1.3 QUALITY ASSURANCE

- A. Approved applicator by the membrane roofing system manufacturer, and certified by the manufacturer as having the necessary expertise to install the specific system.
- B. All products shall be compatible with each other as prior approved by the manufacturer of the roofing membrane
- C. Pre-construction Roofing Meeting:
 - 1. Upon completion of roof deck installation and prior to any roofing application, hold a pre-construction roofing meeting arranged by the Contractor and attended by the Roofing Inspector, Material Manufacturers Technical Representative, Roofing Applicator, Contractor, and COR.
 - 2. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.
 - 3. Inspect roof deck at this time to:
 - a. Verify that work of other trades which penetrates roof deck is completed.
 - b. Determine adequacy of deck anchorage, presence of foreign material, moisture and unlevel surfaces, or other conditions that would prevent application of roofing system from commencing or cause a roof failure.
 - c. Examine samples and installation instructions of manufacturer.
 - d. Perform pull out test of fasteners if necessary (See paragraph 3.2).

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. After award of contract, submit complete list of products, including explanation of data for variation from contract requirements.
- B. OR EQUAL: Use CSI Request Form 13.1A. VA must be able to determine equal or exceed of specification of product to make a decision based on the proposed product. Show compliance with requirements for substitution and the following numbers 1-12 as applicable:

- L. **Preconstruction Test Reports:** Provide reports written by a qualified testing agency on their form, indicating and interpreting results of tests performed before installation of product.
- M. **Compatibility Test Reports:** Provide reports written by a qualified testing agency on their form, indicating and interpreting results of compatibility test performed before installed of product. Include recommendations for primers and substrate preparation needed for adhesion.
- N. **Field Test Reports:** Provide written reports by a qualified testing agency on their standard form, indicating and interpreting results of fields tests performed either during installation or after product is installed.
- O. **Maintenance Data:** Provide written and graphic instructions and procedures for operation and normal maintenance of products and equipment.
- P. **Design Data:** Provide written and graphic information including but not limited to performance and design criteria, list of applicable codes and regulations and calculations. Include list of assumptions and other performance and design criteria.
- Q. **Manufacturer Instructions:** Provide written or published information that documents manufacturer's recommendation, guidelines, and procedures for installing or operating a product or equipment. Include name of product and contact information. Include as applicable:
 - 1. Preparation of substrates
 - 2. Required substrate tolerances
 - 3. Sequence of installation or erection
 - 4. Required installation tolerance
 - 5. Required adjustments
 - 6. Recommendation for cleaning and protection
- R. **Manufacturer's Field Reports:** Provide written information documenting factory authorized service representative's tests and inspections. Include the following as applicable:
 - 1. Contact information of factory authorized service representative making the report.

2. Statement of condition of substrate and acceptability for installation of product.
 3. Statement that products comply with requirements
 4. Summary of installation procedures being followed
 5. Results of operational and other tests and a statement whether observed performance complies with requirements and if they affect warranty.
- S. Material Safety Data Sheets (MSD): Submit with all products or they will not be reviewed.
- T. Applicators approval certification by manufacturer, signed by authorized individual officer of the entity.
- U. Shop Drawings: Sheet membrane layout. Fastener pattern, layout, and spacing requirements. Termination details.
- V. Manufacturers installation instructions revised for project.
- W. Samples:
1. Sheet membrane: One 150 mm (6 inch) square piece.
 2. Sheet flashing: One 150 mm (6 inch) square piece.
 3. Fasteners: Two, each type.
 4. Welded seam: Two 300 mm (12 inch) square samples of welded seams to represent quality of field welded seams.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle materials as specified by manufacturer written instructions for temperature, humidity, ventilation, and weather protection. Protect liquids from freezing or becoming damaged during storage.
- B. Store volatile materials separate from other materials with separation to prevent fire from damaging this project, or other materials.
- C. Schedule deliveries while contractor is on site to receive it; deliveries to VA warehouse may be subject to denial of receiving goods, coordinate with COR. Minimize long term storage to prevent overcrowding of construction spaces.
- D. Inspect products on delivery to insure no damage occurred during shipment, and are properly protected prior to installation.

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 - 1. Upon completion of roof deck installation and prior to any roofing application, hold a pre-construction roofing meeting arranged by the Contractor and attended by the Roofing Inspector, Material Manufacturers Technical Representative, Roofing Applicator, Contractor, and COR.
 - 2. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.
 - 3. Inspect roof deck at this time to:
 - a. Verify that work of other trades which penetrates roof deck is completed.
 - b. Determine adequacy of deck anchorage, presence of foreign material, moisture and unlevel surfaces, or other conditions that would prevent application of roofing system from commencing or cause a roof failure.
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- B. OR EQUAL: Use CSI Request Form 13.1A. VA must be able to determine equal or exceed of specification of product to make a decision based on the proposed product. Show compliance with requirements for substitution and the following numbers 1-12 as applicable:

1. Statement indicating why specified material or product cannot be provided.
2. Coordination information, including a list of changes or modifications needed to other parts of this project that will be necessary to accommodate proposed substitution.
3. Detailed comparison of significant qualities of proposed substitution with those of this project specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
4. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
5. Samples, where applicable or requested.
6. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
7. Material test reports from a qualified independent testing agency indicating and interpreting test results for compliance with requirements indicated.
8. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
9. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for this project, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
10. Cost information, including a proposal of change, if any, in the Contract Sum.
11. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

12. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

- C. Qualification Data: Provide written information that demonstrates capabilities and experience of firm or person. Include list of completed projects with name and address and contacts.
- D. Welding Certificate: Provide written certification that welding procedures and personnel comply with the requirements of the contract documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installers Certificates: Provide written statements on manufacturer's letterhead certifying that Installer complies with requirements in the contract documents and, where required, is authorized by manufacturer for this project.
- F. Manufacturer Certificates: Provide written statement on manufacturer letterhead certifying that manufacturer complies with requirements in contract documents. Include evidence of manufacturing experience.
- G. Product Certificates: Provide written statements on manufacturer letterhead certifying that product complies with requirements of contract documents.
- H. Material Certificate: Provide written statements on manufacturer's letterhead certifying that material complies with requirements of contract documents.
- I. Material Test Report: Provide reports written by qualified testing agency on their form, indicating and interpreting test result of material for compliance with requirements of contract documents.
- J. Product Test Reports: Provide written reports indicating current product produced by manufacturer complying with requirements of contract documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by the same.
- K. Research/Evaluation Report: Provide written evidence from a model code organization that product complies with building code in effect for this project

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- P. **Design Data:** Provide written and graphic information including but not limited to performance and design criteria, list of applicable codes and regulations and calculations. Include list of assumptions and other performance and design criteria.
- Q. **Manufacturer Instructions:** Provide written or published information that documents manufacturer's recommendation, guidelines, and procedures for installing or operating a product or equipment. Include name of product and contact information. Include as applicable:
 - 1. Preparation of substrates
 - 2. Required substrate tolerances
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 - 4. Required installation tolerance
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 - 6. Recommendation for cleaning and protection
- R. **Manufacturer's Field Reports:** Provide written information documenting factory authorized service representative's tests and inspections. Include the following as applicable:
 - 1. Contact information of factory authorized service representative making the report.

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- S. Material Safety Data Sheets (MSD): Submit with all products or they will not be reviewed.
- T. Applicators approval certification by manufacturer, signed by authorized individual officer of the entity.
- U. Shop Drawings: Sheet membrane layout. Fastener pattern, layout, and spacing requirements. Termination details.
- V. Manufacturers installation instructions revised for project.
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 4. Welded seam: Two 300 mm (12 inch) square samples of welded seams to represent quality of field welded seams.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle materials as specified by manufacturer written instructions for temperature, humidity, ventilation, and weather protection. Protect liquids from freezing or becoming damaged during storage.
- B. Store volatile materials separate from other materials with separation to prevent fire from damaging this project, or other materials.
- C. Schedule deliveries while contractor is on site to receive it; deliveries to VA warehouse may be subject to denial of receiving goods, coordinate with COR. Minimize long term storage to prevent overcrowding of construction spaces.
- D. Inspect products on delivery to insure no damage occurred during shipment, and are properly protected prior to installation.

1.6 WARRANTY

- A. Roofing work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21; see special warranty below.
- B. Manufacturer's Special Warranty: (20) years from the date of substantial completion (VA date of punch list for entire project as minimum). Manufacturer's standard form in which manufacturer agrees to replace or repair components of membrane roofing system that fails in material or workmanship within specified period.
- C. Special warranty includes coverage of roofing membrane, base flashing, insulation board, cover board, membrane fasteners and plates, membrane and flashing adhesive, insulation adhesives, wood nailers, curbs and cants, all perimeter metal edges, copings, and counter flashing (even those re-used), all roof drain detail and projections, roof drain bowls, rings, and connection, flashing made to existing adjacent roofs, leaks caused by substrate movement, movement associated with metal edge joints of flanges causing leaks, damages caused by wind speed up to 74 mph, and all components including those manufactured by others.
- D. Maintenance Agreement: Inspections, maintenance and housekeeping during years (2), (5), (10), and (15). Manufacturer shall provide a written inspection report on roof conditions along with performing routine maintenance or housekeeping.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A167-99(R2009) Stainless and Heat-Resisting Chromium-Nickel Steel
Plate, Sheet and Strip
 - B209-07 Aluminum and Aluminum-Alloy Sheet and Plate
 - D751-06 Coated Fabrics
 - D2103-10..... Polyethylene Film and Sheeting
 - D2240-05(R2010)..... Rubber Property - Durometer Hardness

- D3884-09..... Abrasive Resistance of Textile Fabrics (Rotary Platform,
Double-Head Method)
- D6162-00a Modified Bitumen Sheet Used in Built-up Roofing
Membrane
- D6163-00..... Heavy Duty Base Sheet used in Built-up Roofing
- D6866-18..... Bio Based Adhesive used in Built-up Roofing
- D3960-00..... Bio Based Aromatic Liquid Membrane
- D4586-07..... Asphalt Roof Cement, Asbestos Free
- E96-10 Water Vapor Transmission of Materials
- E108-10..... Fire Tests of Roof Coverings
- G21-09..... Resistance of Synthetic Polymeric Materials to Fungi
- C. National Roofing Contractors Association (NRCA):
Fifth Edition - 05..... The NRCA Roofing and Waterproofing Manual.
- D. Federal Specifications (Fed. Spec.)
- FF-S-107C(2)..... Screws, Tapping and Drive
- FF-S-111D(1) Screw, Wood
- UU-B-790A..... Building Paper, Vegetable Fiber (Kraft, Waterproofed,
Water Repellent and Fire Resistant)
- E. Factory Mutual Engineering and Research Corporation (FM):
Annual Issue..... Approval Guide Building Materials
- F. Underwriters Laboratories, Inc (UL):
Annual Issue..... Building Materials Directory
Annual Issue..... Fire Resistance Directory
- G. Warnock Hersey (WH):
Annual Issue..... Certification Listings

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide products that are undamaged and new at time of installation. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
- B. Provide standard products of types that have been produced and successfully used in similar installations on other projects, and are of the same manufacturer where required for warranty of roofing system.
- C. Liquid type auxiliary material shall meet VOC limits of authority having jurisdiction.

2.1 MODIFIED BITUMEN ROOF MEMBRANE

- A. Modified Bitumen Membrane is a granule surfaced, fire resistant modified bitumen membrane. It consists of specially selected bitumens, modified with compatible SBS/SEBS/SIS elastomers and reinforced composite polyester/glass core, by "Tremco" or approved equal meeting the characteristics of specifications.
- B. (.160) mils thick nominal, exceeding the performance requirements of ASTM D 6162.
Roll size 39 3/8" x 34.5', 100 SF, 105 lbs.
- C. Additional Properties:

PROPERTY	TEST METHOD	REQUIREMENT
Tensile Strength @0 Deg F	ASTM D5147-05	541 lbf/in MD 544 ibf/in XMD
Tensile Strength @77 Deg F	ASTM D5147-05	482 lbf/in MD 500 ibf/in XMD
Tear Strength @ 0 Deg F	ASTM D5147-05	785 ibf MD 760 ibf XMD
Elongation @0 Deg F	ASTM D5147-05	5% MD 4% XMD
Thickness	ASTM D5147-05	.160 in (4 mm)
Low temperature flexibility	ASTM D 2136-94	-35 deg F

2.2 MODIFIED BITUMEN FLASHING SHEET

- A. Manufacturer's specified base sheet flashing of same material, type, reinforcement, thickness and color of sheet membrane.
- B. Modified Bitumen flashing, adaptable to irregular shapes and surfaces.

2.3 MISCELLANEOUS ROOFING MEMBRANE MATERIALS

- A. Sheet roofing manufacturers specified products.
- B. Splice Adhesive: For roofing and flashing sheet.
- C. Lap Sealant: Manufacturer's standard lap sealant for roofing sheet exposed lap edge.
- D. Bonding Adhesives: Manufacturer's standard BIO and LOW VOC based adhesive for roofing membrane, flashing membrane, insulation, metals, concrete, and masonry for bonding roofing and flashing sheet to substrate.
- E. Fastener Sealer: Manufacturer's adhesive sealant.
- F. Temporary Closure Sealers (Night Sealant): Manufacturer's sealer.
- G. Primers, Cleaners, and Butyl Rubber Seals: As specified by roof membrane manufacturer.
- H. Metal Termination Bars: Manufacturer's standard predrilled stainless steel or aluminum bars, approximately 1.25" thick, with anchors
- I. Metal Battens: Manufacturer's standard aluminum zinc alloy coated or zinc coated steel sheets, approximately 1" wide by .05" thick, pre-punched.
- J. Miscellaneous Accessories: Pourable sealers, preformed cone and vent flashings, termination reglets, cover strips and other accessories approved by manufacturer.

2.4 ROOF INSULATION

- A. General: Preformed roof insulation boards complying with requirements and referenced standards, selected from manufacturer's standard sizes and of thickness indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, glass-fiber mat facer on both major surfaces.
- C. Tapered Insulation: Provide factory-tapered polyisocyanurate insulation boards fabricated to slope 1/4" per 12 inches unless otherwise indicated.

1.3 QUALITY ASSURANCE

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- B. All products shall be compatible with each other as prior approved by the manufacturer of the roofing membrane
- C. Pre-construction Roofing Meeting:
 - 1. Upon completion of roof deck installation and prior to any roofing application, hold a pre-construction roofing meeting arranged by the Contractor and attended by the Roofing Inspector, Material Manufacturers Technical Representative, Roofing Applicator, Contractor, and COR.
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 - d. Perform pull out test of fasteners if necessary (See paragraph 3.2).

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- B. OR EQUAL: Use CSI Request Form 13.1A. VA must be able to determine equal or exceed of specification of product to make a decision based on the proposed product. Show compliance with requirements for substitution and the following numbers 1-12 as applicable:

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6. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
7. Material test reports from a qualified independent testing agency indicating and interpreting test results for compliance with requirements indicated.
8. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
9. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for this project, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
10. Cost information, including a proposal of change, if any, in the Contract Sum.
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- C. Qualification Data: Provide written information that demonstrates capabilities and experience of firm or person. Include list of completed projects with name and address and contacts.
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 3. Fasteners: Two, each type.
 4. Welded seam: Two 300 mm (12 inch) square samples of welded seams to represent quality of field welded seams.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle materials as specified by manufacturer written instructions for temperature, humidity, ventilation, and weather protection. Protect liquids from freezing or becoming damaged during storage.
- B. Store volatile materials separate from other materials with separation to prevent fire from damaging this project, or other materials.
- C. Schedule deliveries while contractor is on site to receive it; deliveries to VA warehouse may be subject to denial of receiving goods, coordinate with COR. Minimize long term storage to prevent overcrowding of construction spaces.
- D. Inspect products on delivery to insure no damage occurred during shipment, and are properly protected prior to installation.

1.6 WARRANTY

- A. Roofing work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21; see special warranty below.
- B. Manufacturer's Special Warranty: (20) years from the date of substantial completion (VA date of punch list for entire project as minimum). Manufacturer's standard form in which manufacturer agrees to replace or repair components of membrane roofing system that fails in material or workmanship within specified period.
- C. Special warranty includes coverage of roofing membrane, base flashing, insulation board, cover board, membrane fasteners and plates, membrane and flashing adhesive, insulation adhesives, wood nailers, curbs and cants, all perimeter metal edges, copings, and counter flashing (even those re-used), all roof drain detail and projections, roof drain bowls, rings, and connection, flashing made to existing adjacent roofs, leaks caused by substrate movement, movement associated with metal edge joints of flanges causing leaks, damages caused by wind speed up to 74 mph, and all components including those manufactured by others.
- D. Maintenance Agreement: Inspections, maintenance and housekeeping during years (2), (5), (10), and (15). Manufacturer shall provide a written inspection report on roof conditions along with performing routine maintenance or housekeeping.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A167-99(R2009) Stainless and Heat-Resisting Chromium-Nickel Steel
Plate, Sheet and Strip
 - B209-07 Aluminum and Aluminum-Alloy Sheet and Plate
 - D751-06 Coated Fabrics
 - D2103-10..... Polyethylene Film and Sheeting
 - D2240-05(R2010)..... Rubber Property - Durometer Hardness

- D3884-09..... Abrasive Resistance of Textile Fabrics (Rotary Platform,
Double-Head Method)
- D6162-00a Modified Bitumen Sheet Used in Built-up Roofing
Membrane
- D6163-00..... Heavy Duty Base Sheet used in Built-up Roofing
- D6866-18..... Bio Based Adhesive used in Built-up Roofing
- D3960-00..... Bio Based Aromatic Liquid Membrane
- D4586-07..... Asphalt Roof Cement, Asbestos Free
- E96-10 Water Vapor Transmission of Materials
- E108-10..... Fire Tests of Roof Coverings
- G21-09..... Resistance of Synthetic Polymeric Materials to Fungi
- C. National Roofing Contractors Association (NRCA):
Fifth Edition - 05..... The NRCA Roofing and Waterproofing Manual.
- D. Federal Specifications (Fed. Spec.)
- FF-S-107C(2)..... Screws, Tapping and Drive
- FF-S-111D(1) Screw, Wood
- UU-B-790A..... Building Paper, Vegetable Fiber (Kraft, Waterproofed,
Water Repellent and Fire Resistant)
- E. Factory Mutual Engineering and Research Corporation (FM):
Annual Issue..... Approval Guide Building Materials
- F. Underwriters Laboratories, Inc (UL):
Annual Issue..... Building Materials Directory
Annual Issue..... Fire Resistance Directory
- G. Warnock Hersey (WH):
Annual Issue..... Certification Listings

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide products that are undamaged and new at time of installation. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
- B. Provide standard products of types that have been produced and successfully used in similar installations on other projects, and are of the same manufacturer where required for warranty of roofing system.
- C. Liquid type auxiliary material shall meet VOC limits of authority having jurisdiction.

2.1 MODIFIED BITUMEN ROOF MEMBRANE

- A. Modified Bitumen Membrane is a granule surfaced, fire resistant modified bitumen membrane. It consists of specially selected bitumens, modified with compatible SBS/SEBS/SIS elastomers and reinforced composite polyester/glass core, by "Tremco" or approved equal meeting the characteristics of specifications.
- B. (.160) mils thick nominal, exceeding the performance requirements of ASTM D 6162.
Roll size 39 3/8" x 34.5', 100 SF, 105 lbs.
- C. Additional Properties:

PROPERTY	TEST METHOD	REQUIREMENT
Tensile Strength @0 Deg F	ASTM D5147-05	541 lbf/in MD 544 ibf/in XMD
Tensile Strength @77 Deg F	ASTM D5147-05	482 lbf/in MD 500 ibf/in XMD
Tear Strength @ 0 Deg F	ASTM D5147-05	785 ibf MD 760 ibf XMD
Elongation @0 Deg F	ASTM D5147-05	5% MD 4% XMD
Thickness	ASTM D5147-05	.160 in (4 mm)
Low temperature flexibility	ASTM D 2136-94	-35 deg F

SECTION 07 52 16.13
SBS-MODIFIED BITUMINOUS MEMBRANE ROOFING, COLD APPLIED

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