GUIDE SPECIFICATIONS

SECTION 07 55 56.13
HOT POLYMERIC FLUID APPLIED WATERPROOFING
PROTECTED MEMBRANE SYSTEM
RAM-TOUGH 250 DM WITH STONE BALLAST AND PAVERS

PART 1 - GENERAL

1.00 GENERAL

The general conditions, special conditions, applicable portions of Division 1 and requirements for general construction and sub-trades form part of this specification.

1.01 RELATED SECTIONS

Section 02 41 19.13	Demolition
Section 03 31 00	Concrete
Section 04 00 00	Masonry
Section 06 06 10.23	Carpentry
Section 07 62 00	Sheet Metal
Section 07 70 00	Roofing Accessories
Section 07 92 13	Caulking & Sealants
Section 09 28 16	Roof Insulation

Edit to project conditions.

1.02 SCOPE

The work includes supplying all materials, labor and equipment to complete the installation of the Hot Polymeric Fluid Applied Double Membrane Waterproofing System with cap sheet for the following areas:

Roof deck areas, associated walls and projections, and elsewhere as shown.

1.03 QUALIFICATIONS

The roofing System shall be installed only by an Applicator approved and licensed by the Manufacturer with a minimum of five (5) years documented experience with the system specified herein. Polymerized bitumen and reinforcing sheet shall be supplied by the same firm to ensure single-source responsibility. Materials supplied for installation will be tested by an independent laboratory to guarantee compliance with published physical properties.

The Manufacturer shall have a minimum of twenty (20) years documented experience with

the system specified herein.

1.04 SUBMITTALS

A. Submit Manufacturer's written approval or license of Applicator for installation of the herein specified Waterproofing System.

B. Submit Manufacturer's sample Labor and Material System Warranty and Manufacturer's Intent to Warranty Certification for this project.

C. Submit most recent copy of Manufacturer's literature applicable to products and specifications to be used, as specified herein, including applicable flashing details.

D. Submit three sheet samples, approximately 8 inches x 10 inches, of both waterproofing membrane reinforcement and flashing material.

E. Submit three sample pints of elastomeric bitumen.

F. Submit three samples, approximately 8 inches x 10 inches, of both roof deck insulation and filter fabric.

G. Submit evidence of Manufacturers history of production for the system specified herein. A minimum of twenty (20) years' experience is required. Documentation shall include job lists with project size, Architect of record, installing Applicator, telephone numbers and contact names.

H. Submit, in duplicate, certification from the primary Manufacturer, properly attested by a corporate officer, stating that all materials being supplied comply with the specifications and requirements of the contract documents, including conformance with all federal, state and local building codes including United States Code Section 41:10, Subsections a-d, popularly known as the "Buy American Act".

1.05 QUALITY ASSURANCE

All the materials specified herein are cited as a minimum standard of quality, and shall not preclude consideration of equal or superior materials. All suggested "equivalent materials" or other substitutions are to be submitted to the Architect for consideration a minimum of ten (10) days prior to the bid date. Submittal shall include all evidence of compliance or superiority of material from the proposed substitute Manufacturer. If accepted by the Architect, an addendum will be issued to all bidders for their consideration of the proposed substitute Manufacturer. Determination of equivalency of all substitutions shall rest exclusively with the Architect and such decision shall be final.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver and store materials under provisions of General Conditions Section.

B. Deliver material to jobsite on pallets. Package labels shall indicate material name, production date and product code.

C. Store materials in dry, protected areas in an upright position. Control temperature of storage areas in accordance with Manufacturer's instructions. Protect materials from moisture with breathable tarps on sides and top surfaces.

1.07 PROJECT CONDITIONS

A. Follow local, state & federal regulations, safety standards and codes. When a conflict exists use the stricter requirement.

B. Do not apply waterproofing materials unless proper bitumen application temperatures (approximately 350°F-400°F) can be maintained, or when moisture in any form (i.e. rain, dew, ice, frost, snow, etc.) is present on the deck. Do not heat bitumen above 400°F.

C. Ensure deck is structurally sound to support the live and dead load requirements of the Waterproofing System and sufficiently rigid to support construction traffic.

D. Sequencing and Scheduling: The work shall be scheduled in the construction sequence so that designated complete contiguous areas can be installed and completed, including overlay wear courses, before other construction trades are allowed in the area. Prior to starting the Work, all drains shall be operative and all deck projections, sleeves and other penetrations shall be installed, in place and operative.

1.08 CODE COMPLIANCE

It shall be the Applicator's responsibility to ensure that all the Work done under this project shall be in compliance with applicable code requirements including obtaining any required permits prior to the start of the Work.

1.09 WARRANTY

Supplier of the Waterproofing System shall furnish its standard Full System twenty-year Warranty for labor and materials on the roof, including the membrane and membrane flashings.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS
Products manufactured or accepted by The Barrett Company (1-800-647-0100) or Architect approved equal.

2.02 MATERIALS

A. Waterproofing Membrane:

1. Hot Polymeric Waterproofing: **ram-Tough 250** SBS Kraton® modified bitumen shall have inert mineral stabilizer. Material shall comply with the following specifications:

TEST	CGSB 37-GP-50M REQUIREMENTS	TYPICAL TEST RESULTS
Flash Point, °C	Min. 260	327
Penetration, 0.1 mm	Max. 110 @ 25°C Max. 200 @ 50°C	83 165
Flow, mm	Max. 3	0.5
Toughness, J	Min. 5.5	11.7
Ratio of Toughness, J/N to Peak Load	Min. 0.040	0.059
Adhesion	Min. 1	1
Water Vapor Permeance ng/Pa.s.m²	Max. 1.7	0.39
Water Absorption, g	Loss 0.18 Gain 0.35	0.22+
Crack Bridging @ -25°C	No delaminating No loss adhesion No cracking	No delaminating No loss adhesion No cracking
Heat Stability @ 200ºC	Max. 110 @ 25°C	80
Penetration, 0.1 mm	Max. 200 @ 50°C	155
Low Temp Flex @ -25°C	No delaminating	No delaminating

	No loss adhesion No cracking	No loss adhesion No cracking
Viscosity, s @ 200ºC	Min. 2 Max. 15	5

2. Uncured Neoprene Flashing Sheet: **ram Flash 327 HDR** Sheet, shall comply with the following minimum specifications:

TEST	METHOD	TYPICAL TEST RESULTS
Thickness Tolerance, %	ASTM D-412	±10
Specific Gravity	ASTM D-297	1.48 ± .05
Tensile Strength min,	ASTM D-412	1500 psi
Elongation, Ultimate min, %	ASTM D-412	250
Hardness, Durometer, A	ASTM D-2240	60 ±10
Tear Resistance min, 1 bf/in (kN/m)	ASTM D-624 (Die C)	120 (21.0)
Brittleness Temperature, max, F(deg C)	ASTM D-746	-30 (-34)
Flame Resistance must not propagate flame	ASTM C-542	Pass
Resistance to Heat Aging Properties after 70 h at 212°F Hardness increase max.	ASTM D-573	+ 10
Resistance to Oil Aging Change in Volume, max after 70 h Immersion in ASTM oil #3 at 212°F	ASTM D-471	+ 80%

Ozone Resistance Condition after Exposure to 100 pphm ozone in Air for 100 h at 104 F (sample under 20% strain)	ASTM D-1149	No cracks Pass
Resistance to Water Change in Mass, max, after 7 Days Immersion at 158°F	ASTM D-471	+ 10%
Water Vapor Permeance	ASTM E-96	.07 (perms)

3. Reinforcing Fabric: **Poly·Felt 125 VP** spunbond polyester fabric, non-needle punched, heat set with resin binder shall comply with the following minimum specifications:

TEST	METHOD	TYPICAL TEST RESULTS
Basis Weight	ASTM D-3776	60 GR/M^2
Grab Tensile/lb	ASTM D-4830	34/lb. MD 32/lb. CD
Elongation/%	ASTM D-4830	37 MD, 42 CD
Trapezoid Tear/lb.	ASTM D-4830	14 MD 12 CD
Ames Thickness	ASTM D-1777-64	9.5 mils
Fatigue Life	ASTM D-8B	≥10,000 cycles

B. Related Materials:

1. Primer: **ram-Primer/Surface Conditioner** shall comply with ASTM D-41 requirements.

2. Pipe, Stack and all Corner Base Flashing: R**am-Pipe Boot** and pre-molded corner pieces, supplied by primary materials Manufacturer and installed in accordance with published flashing details. Neoprene sheet is not acceptable in corners or at pipe and stack flashing.

3. Insulation: Plaza insulation board shall be a dense, rigid, extruded polystyrene insulation, _____ inches thick, unless otherwise noted, designed for plaza applications utilizing Foamular by Owens-Corning, 60 psi. Plaza insulation

shall meet the following values:

TEST	METHOD	TYPICAL TEST RESULTS
Thermal Conductivity @ 75°F	ASTM C-518	0.20K
Compressive Strength, min.	ASTM D-1621	60 psi
Flexural Strength, min.	ASTM C-203	75 lb/in.
Water Absorption	ASTM C-272	0.1%
Water Vapor Permeance	ASTM E-96	0.3-.8 perm
Dimensional Stability	ASTM D-2126	2% max

4. Paver Units: Exposed aggregate precast concrete units, or approved equal, lightly sandblasted in production, in standard colors as selected by the Architect. Paver unit size shall be nominally 2 inches thick, 24 inches x 24 inches square. Paver unit manufacturer shall be Westile Pavers.

TEST	METHOD	TYPICAL TEST RESULTS
Compressive Strength	ASTM C-140	8000 psi, min.
Water Absorption	ASTM C-140	5% max
Freeze/Thaw Resistance	ASTM C-67:8	1% loss, max
Flexural Strength	ASTM C-293	600 PSI

5. Paver Pedestal units shall be manufactured by Westile Pavers or approved equal.

6. Protection course shall be **RAM 203** modified bitumen sheet reinforced with fiberglass fabric.

7. Filter Fabric: nonwoven polypropylene **Poly-Felt 3.5** or approved equal.

8. Nails and Mechanical Fasteners: As specified by the fastener Manufacturer for specific application and approved by membrane Manufacturer.

9. Stone Ballast: Clean graded rock ballast meeting ASTM specification #57, minimum of 15 pounds per square foot for 2 inch thick insulation. Add an additional 5 pounds per square foot for each additional inch of insulation and

at 20 foot building perimeters. Provide heavier weights if recommended by insulation Manufacturer. Provide extra ballast at the rate of 20 pounds per foot for 20 foot width at all roof perimeters.

10. Pitch Pockets and Umbrella Covers: Shall be fabricated from 16 ounce cold rolled copper with stainless steel drawband and sealant cove.

11. Roof Drains: All drains must be set slightly depressed or flush with concrete slab. Existing drains that are raised above deck level shall be replaced with new drain sumps and connections by J.R. Smith, Josam or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

A. Remove trash, debris, grease, oil, water, moisture and other contaminates from the concrete deck, which may affect bond of bitumen to deck surface. Deck surface shall comply with ASTM D-5295 standard guide.

Optional:

Sandblasting and/or shot-blasting procedures may be required on certain re-roofing applications to provide the best possible surface. If required, provide unit price per square foot in bid documents.

B. Condition of Surface: Any new concrete surfaces shall be wood float finish ACI 301-11.7.3 or better. All concrete shall have cured for a minimum of 28 days and pass the ASTM D-4263 plastic sheet deck dryness test. All surfaces shall be dry, clean, firm and free from laitance, frost, dust, dirt, oil, unapproved curing compounds or other foreign matter detrimental to performance of waterproofing membrane. The General Contractor shall certify no wax base curing compounds were used. Concrete surfaces shall be prepared in accordance with ASTM D-5295 guide.

Before commencing Work, examine all areas and report in writing to the Architect any conditions that will adversely affect successful installation. Do not begin Work until these conditions have been corrected. Voids, cracks, holes and other damaged surfaces shall be repaired with materials compatible with **Ram-Tough 250** such as Concrete repairs shall be made with ChemRex, Inc. “EMACO T415 rapid strength repair mortar or Master Builders “Set.45”.

C. Expansion Joints: Expansion joints shall be sharply formed and free of broken edges or loose aggregate and completely free of preformed joint fillers, sealants or back-up materials to a depth which is at least twice the width of the joint. Curb expansion joints at each side of the joint, either by integrally forming with the slab or securely fastening sulfate treated wood strips to deck. Chamfered edges are required.

D. Verify concrete surfaces are properly cured, dry and reasonably smooth. Prepare other surfaces according to respective Manufacturer's instructions. Use cleaning materials and methods necessary to render an acceptable dust free surface, including oil free filtered compressed air or high-speed power blowers. Protect adjacent areas from damage with tarpaulins or other durable materials.

E. No protection from the weather is necessary for **Ram-Tough 250**, but temporary protection to installed membrane is required to prevent damage by mechanical gouging, scraping, spilling of oil & solvents or excessive heat.

F. Delivery and Storage: Deliver and store materials undamaged in original containers with Manufacturer's labels and seals intact.

3.02 INSTALLATION

A. Surface Conditioner: Each day, prior to application of **Ram-Tough 250**, apply surface conditioner, as a fine spray at a rate of approximately 1 gallon per 300-600 square feet. Allow drying completely tack free. Do not allow primed surface to be contaminated with construction debris or dust barrier. Re-prime and allow drying as may be required by job conditions.

B. Application: Units of **Ram-Tough 250** shall be melted in an approved double-jacket oil bath melter under continuous agitation until the material can be drawn free-flowing and lump-free at a temperature of approx. 350°F - 400°F. The **Ram-Tough 250** shall be applied at a rate to provide a continuous coating not less than 90 mils thick. Carry up all vertical wall surfaces a minimum of 8 inches unless otherwise shown or required by field conditions.

C. Hot fluid applied **Ram-Tough 250** shall be applied in a width exceeding the reinforcement fabric roll width. While **Ram-Tough 250** is hot and tacky, install specified **Poly·Felt 125 VP** reinforcement, broom in place from the side of the fabric. Side laps shall be a minimum of 2 inches with lap placement so water flows over them and not against them. All laps shall be sealed with hot **Ram-Tough 250** under lap. In no place shall reinforcement touch reinforcement. End laps shall be 7 inches. Carry reinforcement up all vertical wall surfaces a minimum of 6 inches. Do not leave any reinforcement fabric uncoated at end of day's work or in inclement weather.

D. After reinforcement fabric has been placed and broomed in, starting at drains and low points, install second layer of **Ram-Tough 250**, a minimum of 125 mils thick, and install **Ram 203** protection course into hot **Ram-Tough 250**. Bitumen shall bleed out at all side-laps. Roll or broom sheet into place. Carry up vertical wall surfaces a minimum of 4 inches unless otherwise shown or required by field conditions.

3.03 FLASHING

A. BASE FLASHING BASE PLY

Complete base flashing base ply work before doing flat field application in 3.02. Carry hot applied **Ram-tough 250** and reinforcement up all junctions of horizontal deck and vertical surfaces, all changes of plane, all cold joints and cracks as indicated on the drawings. At all parapets, walls, curbs, penetrations, drains, edges, and other changes of plane, install **Ram Flash 327 HDR** 60 mil neoprene flashing with hot fluid **Ram-Tough 250** as shown on the drawings, extending to top of the flashing over the base of **Ram-Tough 250** coat and polyester reinforcement.

Apply the neoprene flashing tight to all substrates starting the installation on the flat and working the sheet into place in upward direction. Finished sheet shall be completely adhered with no unsupported "bridging" at the change of plane. Over-coat sheet with another 125-mil coat of the **Ram-Tough 250**. Application width of neoprene flashing sheet shall be a minimum 3 inches in any single direction or more as required by field conditions.

B. BASE FLASHING CAP PLY

Do not install the base flashing cap ply until the flat field of the roof is completed. Precut **Ram 306** sheet across the roll to install in 36 inch wide sheets. Embed **Ram 306** SBS granular cap sheet membrane into hot **Ram-Tough 250** extending flashings out onto the field of the roof 3 inches minimum and up vertical surfaces 8 inches minimum and 24 inches maximum. Overlap shall be 3 inches minimum. Seal the top of the flashing with **Ram Mastic** or **Ram Tough 250** every day before leaving the job. Fasten top to the substrate with 1/8 inch thick flat bar stock termination bar and mechanically fasten 8 inches on centers. Counter-flashing is required.

3.04 CRACK TREATMENT

At all cracks and construction joints, apply **Ram-Tough 250**, 125 mils thick, then center a 6 inch wide strip of **Ram-Flash 327 HDR** neoprene flashing over the joint or crack and embed into the warm **Ram-Tough 250**. Avoid air pockets. Allow assembly to cool. Except for RAM 306 flashing sheet, all other flashing should be installed before the continuous, unbroken thick film of bitumen or reinforcement felt is applied over the entire roof surface and flashing areas in accordance with Section 3.02.

3.05 EXPANSION JOINTS

For expansion joints up to 2 inches in width, with a designed total movement of 50% or less, **Ram-Flash 327 HDR** neoprene flashing shall be placed over the joint as shown on the drawings and embedded into a 125 mil thick coating of **Ram-Tough 250**. The sheet shall be looped into the joint 1-1/2 times the joint width at maximum opening and extend 8 inches onto the deck on each side of the joint. The sheet shall be covered and the loop filled solid and flush with **Ram-Tough 250**. Install 1-1/2 inch foam rod and second sheet of neoprene flashing looped over the foam rod. Extend sheet 12 inches onto the deck on each side of the joint. Overcoat flange on each side.

3.06 FLOOD TEST

Each contiguous area shall be water tested with 2 inches of standing water for a 48-hour period. Provisions for overflow in event of rain shall be provided. Any area not passing water test shall be repaired and retested until watertight. Water test shall be witnessed and approved by the Architect and the Manufacturer providing the system warranty. An electric field vector mapping (EFVM) may be used in lieu of the flood test.

3.07 INSULATION

Ensure that membrane, flashing and other associated work is completed and tested. Upon acceptance of the waterproofing application, install extruded polystyrene insulation directly on the protection course with open channel sides down in accordance with manufacturer's requirements and recommendations. Stagger end joints. Tightly abut all boards. The maximum acceptable opening between boards is ¼ inch. Provide temporary ballast and filter fabric as required to prevent wind damage. In multiple layer applications, all joints shall be staggered.

3.08 PAVERS AND PEDESTALS

Specified paver units shall be set on specified pedestals in areas indicated to line and grade as shown, with uniform joint width. Adjust pedestal elements so that precast paver has bearing on all four corners. Where cutting is required, it shall be done with a high-speed masonry saw producing clean sharp edges. Precast paver units shall fit to within ¼ inch of all projections and walls or as shown on drawings. Protect units in place from soiling or damage during the construction process. Replace any units damaged prior to Owner acceptance. Provide shims as required to align paver surface with existing elements and other pavers.

3.09 STONE BALLAST

Install ballast in conformance with Dow Chemical Tech Note 508 "Ballast Design Guide for IRMA Roofs", as updated, or OCF Foamular's current design guide requirements.

3.10 FIELD QUALITY CONTROL

A. Adhesion Tests and Thickness Tests shall be monitored by Applicator every hour throughout the application process. If there appears to be any problem with maintaining proper adhesion or thickness, contact the Manufacturer and Architect immediately.

B. Test Cuts shall be made at locations of Architect or Manufacturer's request:

1. Remove one 12 inch x 12 inch un-surfaced cut per 100 squares of deck area.

2. Follow field audit criteria outlined by ASTM Standards.

3. Send roof cuts to: Structural Research Inc., Madison, Wisconsin, or Manufacturer approved accredited laboratory for laboratory examinations. Applicator shall allow $500.00 for testing fees per 100 squares of roof area. The laboratory directly to the Architect shall submit laboratory reports.

4. Repair sampled areas by filling in the cut-out area then use a "feathered in" patch consisting of **Poly•Felt 125 VP**, **Ram-Tough 250**, and **Ram-Flash 306** cap following the Manufacturer's procedures.

C. Correct any deficiencies in the deck membrane, if any, (determined by deck cut analysis) as prescribed by material Manufacturer and approved by the Architect.

3.11 CLEANING

A. Remove equipment, trash, debris and any excess material from the jobsite.

B. Repair damage and remove any stains caused by Work of this Section.

3.12 PROTECTION

General Contractor shall protect finished deck areas from damage during subsequent construction.

MAINTENANCE:

Semi-annual inspections and a systematic maintenance program are recommended to the Owner and Architect. Consult your Barrett Representative or Barrett Approved Applicator for further information.

BARRETT COMPANY · P.O. Box 421 · Millington, New Jersey 07946

Ph: 800-647-0100 · Fax: 908-647-0278 · E-mail: info@barrettroofs.com

www.barrettroofs.com