

GUIDE SPECIFICATIONS

**SECTION 07120
HOT POLYMERIC FLUID APPLIED WATERPROOFING
PROTECTED MEMBRANE PLAZA SYSTEM
RAM-TOUGH 250 DM WITH PAVERS**

PART 1 - GENERAL

1.00 GENERAL

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

1.01 RELATED SECTIONS

Section 02050	Demolition
Section 04100	Masonry
Section 06100	Carpentry
Section 07220	Roof Insulation
Section 07600	Sheet Metal
Section 07710	Roofing Accessories
Section 07900	Caulking & Sealants

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:

Plaza deck areas, associated walls & 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 insure 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 ten (10) 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 ten (10) 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 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:

<u>TEST</u>	<u>CGSB 37-GP-50M REQUIREMENTS</u>	<u>TYPICAL TEST RESULTS</u>
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.m_	Max. 1.7	0.39
Water Absorption, g	Loss 0.18 Gain 0.35	0.22+
Crack Bridging @ -25°C		No delamination No loss adhesion No cracking
Heat Stability @ 200°C Penetration, 0.1 mm	Max. 110 @ 25°C Max. 200 @ 50°C	80 155
Low Temp Flex @ -25°C		No delamination No loss adhesion No cracking
Viscosity,s @ 200°C	Min. 2 Max. 15	5

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

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Thickness Tolerance, %	ASTM D-412	±10
Specific Gravity	ASTM D-297	1.48 ±.05
Tensile Strength min, psi (Mpa)	ASTM D-412	1500 (10.3)
Elongation, Ultimate min, %	ASTM D-412	250
Hardness, Curometer, A Tear Resistance min,	ASTM D-2240	60 ±10
1 bf/in (kN/m)	ASTM D-624	120 (21.0) (Die C)

Brittleness Temperature, max, F(deg C)	ASTM D-746	-30 (-34)
Flame Resistance	ASTM C-542	Must not propagate flame
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
Resistance to Water Change in Mass, max, after 7 Days Immersion at 158°F	ASTM D-471	+ 10%
Water Vapor Permeance (perms)	ASTM E-96	.07

3. Ply Sheet: Poly-Felt 125 VP spunbonded polyester fabric, non-needlepunched, heat set with resin binder shall comply with the following minimum specifications:

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
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-1777-649	.5 mils

Fatigue Life	ASTM D-8B	10,000 cycles
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4. Protection Course: **ram** 203 SBS modified Protection Course shall comply with the following minimum specifications:

Weight	ASTM-D-461	Min. 50 lbs / 100 sq. ft.
Asphalt Softening Point	ASTM-D-36	220°-250°F
Asphalt Penetration	ASTM-D-5	15 – 20 dmm
Surface Stabilizer	ASTM-D-4601	65%

B. Related Materials:

1. Primer: **ram** Primer/Surface Conditioner shall comply with ASTM D-41 requirements.
2. Pipe, Stack and all Corner Base Flashing: **ram** Pipe Boot and premolded 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, 2 inches thick, unless otherwise noted, designed for plaza applications and equal to Dow “Plaza-Dry” with drainage grooves at top and bottom of insulation board, integral filter fabric on topside and approved by the membrane manufacturer for system warranty. Plaza insulation shall meet the following values:

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Thermal Conductivity @ 75°F	ASTM C-518	0.20K
Compressive Strength, min.	ASTM D-1621	60 lbs.
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, lightly sandblasted in production, in standard colors as selected by the Architect. Paver unit size shall be 2 inches thick, 24 inches x 24 inches square. Paver unit manufacturer shall be approved by the membrane manufacturer for total system warranty.

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
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 and Leveling Plates: Barrett “Roofscape” Pedestal Units fabricated from high density polyethylene with integral 1/8 inch joint spacer ribs. Pedestal units shall have thorough drainage. Pedestal units shall meet the following values:

<u>TEST</u>	<u>METHOD</u>	<u>TYPICAL TEST RESULTS</u>
Low Temperature Brittleness	ASTM D-476	90°F
Shore Hardness	ASTM D-1706 D	65
Softening point	ASTM D-1525 2	64°F
Weatherability		Unaffected

6. Insulation separation sheet shall be 6 mil thick polyethylene
7. Filter Fabric: nonwoven polypropylene Phillips Fiber’s “Rufon” or approved equal.
9. Nails and Mechanical Fasteners: As specified by the fastener Manufacturer for specific application and approved by membrane Manufacturer.

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:
Sand-blasting and/or shot-blasting procedures may be required on certain reroofing 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 ACI301-11.7.3 or better. All concrete shall have cured for a minimum of 28 days or, alternatively, pass the NRCA 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.

Before commencing work, examine all areas and report in writing to the Architect and manufacturer, 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 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 tarpaulin 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 to dry completely tack free. Do not allow primed surface to be contaminated with construction debris or dust barrier. Re-prime and allow to dry 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, brooming 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.
- 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, install RAM Cap 306 into hot RAM 250. Bitumen shall bleed out at all sidelaps. Roll or broom capsheet into place. Install loose granules into sidelap bleedout. Carry up vertical wall surfaces a minimum of 4 inches unless otherwise shown or required by field conditions. Do not leave any reinforcement fabric uncoated at end of day's work or in inclement weather.

3.03 FLASHING

Carry hot applied roof **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 or as encountered. At all parapets, walls, curbs, penetrations, drains, roof edges, etc., install **ram Flash 327 HDR 60 mil neoprene flashing** with hot fluid **ram-Tough 250** over the reinforcement sheet as shown on the drawings, extending to top of the flashing. All RAM 306 flashing shall be mechanically fastened with 1/8 inch flat bar stock termination bar and fasteners approved for the substrate receiver. Overcoat the neoprene flashing with another 125 mil coat of the **ram-Tough 250**. All conditions that will be exposed after paver installation shall be covered with **ram 306 flashing** or metal flashing, in accordance with the manufacturer's drawings.

Application width of neoprene flashing sheet shall be a minimum 6 inches total, minimum 3 inches in any single direction. Provide wider widths as required by project conditions.

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 WATER TEST

Each contiguous area shall be water tested with 2 inches of standing water for a 24-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.

3.07 PROTECTION COURSE

After water test is completed, using **ram Tough 250** as adhesive and starting at the low points, apply **ram 203 protection course** lapping the side laps in each direction of drainage gradient a minimum of 2 inches.

3.08 INSULATION

Insure that membrane, flashing and other associated work is completed and water tested. Upon acceptance of the waterproofing application, install extruded polystyrene insulation directly on the protection course with open channel sides down and fabric side up. Stagger end joints. Tightly abut all boards. The maximum acceptable opening between boards is _ inch. Provide temporary ballast and filter fabric as required to prevent

wind damage.

3.09 PAVERS AND PEDESTALS

Specified paver units shall be set on specified pedestals 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 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.

3.10 FIELD QUALITY CONTROL

- A. Adhesion Tests and Thickness Tests shall be monitored by Applicator every hour throughout the application process.
- B. Test Cuts shall be made at locations of Architect's or Manufacturer's request:
 - 1. Remove one 12 inch x 12 inch unsurfaced 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. Laboratory reports shall be submitted by the laboratory directly to the Architect.
 - 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** 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.

<p>MAINTENANCE:</p>

<p>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.</p>
