GUIDE SPECIFICATIONS

SECTION 07 14 13
HOT POLYMERIC FLUID APPLIED WATERPROOFING
RAM-TOUGH 250 DM WITH PROTECTION COURSE
(Under Concrete Wear Slab)

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 10.63	Carpentry
Section 07 62 00	Sheet Metal
Section 07 70 00	Roofing Accessories
Section 07 92 13	Caulking & Sealants

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 for the following areas:

Edit to project requirements.

1.03 QUALIFICATIONS

The waterproofing system shall only be installed by an applicator approved and licensed by the manufacturer. To ensure single-source responsibility the same firm shall supply polymerized bitumen and reinforcing sheet. An independent laboratory may test materials supplied for installation to guarantee compliance with published physical properties and specification requirements.

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_____Year 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 waterproofing membrane reinforcement, flashing material and protection course.

E. Submit three samples of elastomeric bitumen.

F. The manufacturer shall have a minimum of ten years documented experience with the system specified herein evidencing the materials will last at least as long as the warranty period. Documentation shall include job lists with project size, Architect of record, installing applicator, telephone numbers and contact names.

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

C. Store moisture sensitive materials in dry, protected areas in an upright position with breathable tarps.

1.07 PROJECT CONDITIONS

A. Follow local, state and 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 and material storage.

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 overburden 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 all other penetrations shall be installed, in place and operative.

1.08 LOCAL CODE COMPLIANCE

It shall be the applicator's responsibility to obtain any permits required for work under this section prior to the start of the work.

1.09 WARRANTY

The supplier of the waterproofing system shall furnish its standard_____year warranty for labor and materials, including the membrane, membrane flashings and protection course.

Edit to project conditions adding drainage mat, insulation, pedestals, concrete pavers, etc., as applicable.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

The Barrett Company is set forth as the referenced standard of quality. Other manufacturers of equal of better quality may request approval in conformance with specifications requirements. Architect approved equals will be subject to all specification requirements.

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 37.50-M89 REQUIREMENTS	TYPICAL TEST RESULTS
Flash Point, °F	Min. 500	580
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 @ 200°C Penetration, 0.1 mm	Max. 110 @ 25°C Max. 200 @ 50°C	80 155
Low Temp Flex @ -25°C	No delaminating No loss adhesion No cracking	No delaminating No loss adhesion No cracking
Viscosity, @ 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,	ASTM D-624 (Die C)	120 lbs/in
Brittleness temperature, max.	ASTM D-746	-30 Fº
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 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 sheet: **Poly·Felt 125 VP** spunbond polyester fabric with a heat resistant resin binder shall comply with the following minimum specifications:

TEST	METHOD	TYPICAL TEST RESULTS
Basis Weight	ASTM D-3776	60 grams/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	9.5 mils
Fatigue Life	ASTM D-8B	≥10,000 cycles

4. Protection Unexposed Course Cap Sheet: **RAM 200**, Heavy Duty, shall comply with the ASTM D-6164, Type I, Grade S specifications.

Edit to project requirements if Ram 203-Medium Duty is required.

5. Cap Ply (Exposed Flashings): **RAM 306**, shall comply with the ASTM D-6164, Type I, Grade G minimum specifications.

2.03 Related Materials:

A. Primer: Solvent based primer for preparing surface prior to hot rubberized asphalt.
   1. Ram Primer & Surface Conditioner

B. Cold-applied flashing system: Comprised of a two-component polymethyl methacrylate primer, reinforcing fleece and membrane system.
   1. Barrett Roofing, RamFlash PMMA System

C. Joint Sealant: single component silyl-terminated polyether elastomeric sealant that meets ASTM C920.
   1. KeeneSeal 100

PART 3 - EXECUTION

3.01 PREPARATION

> **Optional:**
> Sandblasting and/or shot-blasting procedures may be required on certain renovation work or unapproved curing agents to provide the best possible surface. If required, provide unit price per square foot in bid documents.

A. 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/or pass the ASTM D-4263 Plastic Film 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 the waterproofing membrane. The General Contractor shall certify no unapproved curing compounds have been used on concrete decks. All old existing membrane and flashings shall be completely removed to bare concrete on existing decks.

Follow ASTM D-5295 "Guide for Preparation of Concrete Surfaces". Use cleaning materials and methods necessary to render an acceptable, dust-free surface, including the use of oil free filtered compressed air or high-speed power blowers. Protect adjacent areas from damage with tarpaulin or other durable materials.

Before commencing work, examine all areas and report to Architect in writing any conditions that will adversely affect successful installation. Do not begin work until the objectionable conditions have been corrected. Voids, cracks, holes and other damaged surfaces shall be repaired with materials compatible with **ram-Tough 250**.

B. 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 that 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 blocking to deck. Chamfered edges are required.

C. 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, gasoline or solvents or exposure to excessive heat.

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

3.02 FLASHING

A. BASE FLASHING BASE PLY

Complete flashing including base ply work before doing flat field application in 3.05. 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 and 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 the neoprene sheet to the top of the flashing, over the base of **Ram-Tough 250** coat and polyester reinforcement. Minimum height of base flashing is 8 inches above highest expected waterline, maximum height is 24 inches.

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. Seal the top of the neoprene flashing with additional Ram Tough 250 each night before leaving the job.

B. BASE FLASHING CAP PLY

Do not install the base flashing cap ply until the flat field of the deck 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. Side laps shall be 3 inches minimum. Mechanically fasten top to the substrate with 1/8 inch thick flat bar stock termination bar and mechanically fasten 8 inches on centers. Seal over bar with **Ram-Tough 250** the same day flashing is installed to ensure watertightness. Counter-flashing is required.

3.03 CRACK TREATMENT

At 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. Reinforcement and flashing should be installed before the continuous, unbroken thick film of bitumen and reinforcement fabric is applied over the entire deck surface and flashing areas in accordance with Section 3.05.

3.04 EXPANSION JOINTS

Over 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 neoprene flange on each side with **Ram-Tough 250**.

3.05 INSTALLATION

A. Surface Conditioner: Each day, prior to application of **Ram-Tough 250**, apply surface conditioner, as a fine spray or by roller, at a rate of approximately 1 gallon per 300-600 square feet. Allow to dry 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 and weather 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 approximately 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 slab applications up all vertical wall surfaces a minimum of 8 inches.

C. Hot fluid applied **Ram-Tough 250** shall be applied in a width exceeding the reinforcement fabric roll width and spread with a non-serrated smooth squeegee. 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 that the water flows over them and not against them. All laps shall be sealed with hot **ram-Tough 250** under lap. In no place shall fabric reinforcement touch fabric reinforcement. End laps shall be 6 inches. Carry fabric reinforcement up all vertical wall surfaces a minimum of 8 inches. The foreman shall conduct adhesion and thickness checks every hour with a pull tab and thickness gauge.

D. After reinforcement fabric has been placed and broomed in, install second layer of **Ram-Tough 250**, a minimum of 125 mils thick, at all points of the deck and walls. Carry slab applications up vertical wall surfaces a minimum of 8 inches completely covering fabric. Do not leave any reinforcement fabric uncovered at the end of day's work or in inclement weather. Complete installation of all plies each day including cap sheet.

E. Embed protection course **Ram 200** into hot **Ram -Tough 250** simultaneously with the 125 mil application (item D above). End laps shall be minimum 6 inches. End laps and selvage laps shall be fully embedded in hot **Ram-Tough 250**. "Spot"

touch-up work can be done with hot air guns. Bleed out of hot **Ram-tough 250** at all side laps shall be evident.

F. After Ram 200 protection course is installed, install Ram 306 granular flashing sheet at all exposed base flashing conditions, followed by installation of the termination bar, sealant and counterflashing.

3.06 FLOOD TEST

Each flat deck contiguous area shall be flood tested with 2 inches of standing water for a 48-hour period in accordance with ASTM D-5957. Provisions for overflow in event of rain shall be provided. Any area not passing water test shall be repaired and retested until watertight. Flood test shall be witnessed and approved by the Architect and the manufacturer providing the system warranty.

Alternately, an Electric Field Vector Mapping (EFVM) Survey by an approved surveyor may be used to verify watertightness.

3.07 PROTECTION COURSE

If protection course has not been installed to facilitate an EFVM Survey, using **ram-Tough 250** as adhesive and starting at the low points, apply **ram 200** SBS protection course lapping the side laps a minimum of 2 inches in each direction of drainage gradient.

3.08 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 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 D-2829 and D-3617.

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 deck area. The laboratory shall submit reports 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** and **Ram- Tough 250** following the manufacturer's procedures.

C. Correct deficiencies in the deck membrane, if any, as prescribed by material manufacturer and approved by the Architect.

3.09 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.

3.10 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.

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