GUIDE SPECIFICATIONS

SECTION 07 14 13
HOT POLYMERIC FLUID-APPLIED WATERPROOFING
RAM-TOUGH 250 VM
(VERTICAL)

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 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

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:

Below Grade Walls, Footings and elsewhere as designated.

1.03 QUALIFICATIONS

The waterproofing system shall only be installed by an applicator approved and licensed by the manufacturer. To insure 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. 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 Ten (10) 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, approximately 8 inches x 10 inches, of the drainage media.

F. Submit three samples of elastomeric bitumen.

G. Submit evidence of manufacturer's 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 fifteen (15) 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 substrate. Do not heat bitumen above 400°F.

C. Ensure work platform 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 courses, before other construction trades are allowed in the area. Prior to starting the work, all projections, sleeves and 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 Ten (10) year warranty for labor and materials, including the membrane, membrane flashings, protection course, insulation and drainage medium.

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: **RamTough** 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, °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 @ 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: **RamFlash** 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

2.03 Related Materials:

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

B. Reinforcing Fabric: 16 mil lightweight thermally bonded spun laid non-woven fabric reinforcement.
   1. PolyFelt 125

C. Flashing Membrane: elastomeric sheet comprised of uncured neoprene sheet 60 mils(1.52mm)
   1. RamFlash 327

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

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

F. Protection Course Series: Manufacture protection course materials recommended by application.

   1. Fiberglass sheet: A smooth surfaced 3.0 mm (118mil) heavy-duty fiberglass reinforced rubberize sheet
      a) Ram 200

   2. Fiberglass sheet: A smooth surfaced 2.2 mm (86mil) medium-duty fiberglass reinforced rubberize sheet
      b) Ram 203

2.04 Drainage Panels

A. Drainage materials with a drainage core and filter fabric recommended by waterproofing manufacture.

1. Polymeric 1/4" cuspate core with a nonwoven filter fabric. Flow rate 9 gpm per foot (112 lpm per m).

    - RamDrain DD 025

2. Polymeric 7/16" cuspate core with a non-woven spunbonded filter fabric with a high flow rate. Flow rate 18 gpm per foot (224 lpm per m).

    - RamDrain DD 050

3. Polymeric entangled net prefabricated composite drain 0.13-inches thick, "zig-zag" geometric patterned core, drainage mat with a layer of non-woven geotextile.

    - RamDrain EN 36 013

4. Polymeric entangled net prefabricated composite drain 0.25-inches thick, "zig-zag" geometric patterned core, drainage mat with a layer of non-woven geotextile

    - RamDrain EN 36 025

5. Polymeric entangled net prefabricated composite drain 0.45-inches thick, "zig-zag" geometric patterned core, drainage mat with a layer of non-woven geotextile

    - RamDrain EN 36 045

PART 3 - EXECUTION

3.01 PREPARATION

A. Remove all dirt, trash, debris, grease, oil, water, moisture and other contaminates from the footings and walls which may affect the bond of the membrane to application surface.

> **Optional:**
> Sand-blasting and/or shot-blasting procedures may be required on some work to remove certain curing agents or contaminants in order 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 and comply with ASTM D-5295 requirements. All concrete shall have cured for a minimum of 28 days or, alternatively, pass the ASTM D-4263 and the NRCA deck dryness tests. All surfaces shall be dry, clean, firm and free from laitance, frost, dust, dirt,

oil, unapproved curing compounds or other foreign matter detrimental to the performance of the waterproofing membrane. The General Contractor shall certify no wax base curing compounds have been used.

Before commencing work, examine all areas and report in writing to Architect any conditions that will adversely affect successful installation. Do not begin work until the conditions have been addressed and corrected. Voids, cracks, holes and other damaged surfaces shall be repaired with materials compatible with Ram-Tough 250 equal to ChemRex, Inc. "EMACO T430".

C. Expansion Joints: Expansion joints shall be sharply formed and free of broken edges, 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. Chamfer edges of the joint.

D. Concrete Contractor shall verify concrete surfaces are properly cured, dry, and reasonably smooth and in conformance with ASTM D-5295 standard guide for concrete surface preparation. Prepare other surfaces according to respective Manufacturer's published 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 and solvents or excessive heat.

F. Delivery and Storage: Deliver and store materials undamaged in original containers with manufacturer's labels and seals intact. Moisture sensitive materials shall be stored on raised platforms and covered with breathable tarps.

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-jacketed melter under continuous agitation until the material can be drawn free-flowing and lump-free at a temperature of approximately 350°F - 400°F. Flash foundation footing before application of vertical wall waterproofing. The Ram-Tough 250 shall be applied at a rate to provide a continuous coating with a minimum thickness of 90 mils and averaging 125 mils over all wall surfaces.

C. Precut Ram 400 PS membrane to desired lengths. Apply membrane vertically in lengths up to 8 feet. Apply the sheet membrane to the hot or still warm Ram-Tough 250 substrate, removing release paper. Press and roll firmly in place with hand roller as material is placed in position. On higher walls apply membrane in multiple lifts of two or more sections with the upper sheets overlapping the lower sheets by a minimum of 3 inches. Roll all membrane with a steel hand roller. Install termination bar at top of lower sheets prior to installation of higher sheets.

At the top terminations, press the membrane firmly to the wall with steel roller and secure with a termination bar. Seal all laps and termination bars with a toweling of hot Ram-Tough 250 before the end of each work day. Deck membrane shall overlap vertical wall membrane by 12 inches.

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. Mechanically 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. Flashing should be installed before the continuous, unbroken thick film of bitumen and reinforcement felt is applied over the entire application surface and flashing areas in accordance with specification in Section 3.02.

3.05 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 substrate on each side of the joint. The sheet shall be covered and the loop coated 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 wall on each side of the joint. Overcoat flange on each side.

3.06 PROTECTION COURSE

Install specified protection course over the Ram 400PS, rolling in place with steel hand roller. Provide 3 inch side laps and 6 inch end laps. Seal all laps with Ram Mastic or Ram Tough 250.

3.07 DRAIN MAT

Install specified drain mat over the waterproofing protection course starting drain panels so that the fabric lap is facing the perimeter conditions. Seal the lap to the perimeter. Place adjacent panels so that the cores are butted together. Place successive fabric laps over adjacent panels and secure at 3 inch intervals with adhesive or duct tape. Join roll ends by peeling back the fabric and cutting off 4 inches of the drain core. Place drain panel ends so that the cores are butted together and then glue or tape the 4 inch fabric overlap 3 inches on centers.

On vertical applications measure full height, add 4 feet, and cut from roll. At the top of the wall, glue 2 feet of fabric on the flat deck. Gently drape the balance of the mat down the wall allowing an extra 2 feet to fall over the drain at the bottom. Backfill, by hand, as soon as possible.

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's or Manufacturer's request:

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

2. Follow field audit criteria outlined by ASTM D-3617 practice.

3. Send sample 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 waterproofed area. Laboratory results 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 RAM 400PS and Ram-Tough 250 following the Manufacturer's and NRCA procedures.

C. Correct any deficiencies in the membrane, if any, (as determined by sample core analysis) 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 waterproofed 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.