**SECTION 07 14 16**

**Spray-Applied Fluid Composite Waterproofing Membrane System**

**(GTS-500 Blind Side, GTS-600 Under Slab)**

*Note: Highlighted text is for Specifier’s use. Verify that related or referred specification sections are used in this project and that the corresponding specification sections are correct.*

**PART 1 – GENERAL**

* 1. **SECTION INCLUDES**
1. Examination Before Application
2. Surface Preparation
3. Basic Pre-Application Procedures
4. GTM Protection Layer Application
5. Application Positive Side
6. Application Blind Side
7. Water Test
8. Job Completion
	1. **RELATED SECTIONS**
9. *The listing in this section is only partial and should be edited to include those sections specific to the project that describe subjects or products that affect this section directly.*
	1. **REFERENCES**
10. ASTM C 836 - Standard Specification for High Solids Content, Cold Liquid- Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
11. ASTM C 1135 - Standard Test Method for Determining Tensile Adhesion

Properties of Structural Sealants.

1. ASTM D 56 - Standard Test Method for Flash Point by Tag Closed Cup Tester
2. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
3. ASTM D 751 - Standard Test Methods for Coated Fabrics.
4. ASTM D 2196 - Standard Test Methods for Rheological Properties of Non- Newtonian Materials by Rotational (Brookfield type) Viscometer.
5. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geo-membranes and Related Products.
6. ASTM E 96 (Method B) - Standard Test Methods for Water Vapor Transmission of Materials.
7. ASTM E 154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover.
8. ASTM E 1745 - Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
9. ACI 302.1R - Guide for Concrete Floor and Slab Construction.
10. ICC-ES AC29 - Acceptance Criteria for Cold, Liquid-Applied, Below-Grade, Exterior Damp proofing and Waterproofing Materials.
11. National Institute of Standards and Technology (NIST) Voluntary Product Standard PS 1-07, Structural Plywood.
	1. **SUBMITTALS**
12. General: Refer to Section 01 33 00, Submittal Procedures, for submittal requirements and procedures.
13. Submit Product Data for the type of waterproofing specified, including manufacturer’s printed instructions for evaluating and preparing the substrate, technical data, and tested physical and performance properties.
14. Submit manufacturer’s waterproofing application guidelines for installation of material(s).
15. Project Data: Submit Shop Drawings showing locations and extent of waterproofing, including details for substrate joints and cracks, penetrations, construction joints, closure wall joints, backfilling of voids behind protection board, protection from water and ultraviolet (UV) radiation and other termination conditions.
16. Samples: Submit representative samples of the following for approval:

1. GTS Poly-Rubber Gel material (GTS).

2. GTM-20 Protection Sheet: High-density reinforced polyethylene fleece-backed (HDPE) sheet.

3. Detailing seam tape, laminated, self-adhering, butyl rubber mastic tape bonded to polyethylene film.

* GTA Seam Tape for positive side GTS-350 applications.
* GTA-BS Seam Tape for blindside GTS-500 applications.
1. Installer Certificates: Submit certificates signed by manufacturer of waterproofing system certifying that Installers comply with requirements under Article 1.05 herein.
2. Leakage repair details.
3. Submit documentation that demonstrates that the specified GTS Poly-Rubber Gel has been successfully installed as provided by the same manufacturer for a minimum of five years on projects of similar complexity.
	1. **CERTIFICATION**
4. With the submittals specified above, furnish certification and backup documentation signed by an officer of the waterproofing manufacturer stating that the manufacturer has examined the submitted installation drawings and installation instructions and has found them acceptable for all conditions and details reasonably expected in this Contract.
5. After installation has started, further certify that the manufacturer's representative has found the substrate conditions and the Contractor's installation procedures to be in accordance with manufacturer's recommendations and requirements.
	1. **QUALITY ASSURANCE**
6. Installer Qualifications: Installer shall be licensed, certified in writing, and approved by the material manufacturer.
7. Waterproofing material manufacturer shall have available an in-house technical staff to assist the Contractor, when necessary, in application of the products and final inspection of the assembly.
8. Waterproofing Material Qualification: The specified GTS Poly-Rubber Gel has been successfully installed for a minimum of five years on projects of similar complexity.
9. Pre-Installation Meeting(s): Contractor shall convene at least one pre-installation meeting at the job site with the manufacturer of the waterproofing system and the Engineer to discuss project conditions as they relate to the installation, protection, sequence, and schedule of construction with regard to the waterproofing system.
10. Waterproofing Material Manufacturer Qualifications: Must show evidence that the specified composite waterproofing system has been produced for a minimum of five years.
	1. **QUALITY CONTROL**
11. All of the materials on-site shall be an approved product.
12. All components of the waterproofing system shall be provided by the same manufacturer.
13. Each product and component shall be labeled with name, size, manufacturing date, and manufacturer’s name and location.
14. Product shall be protected from ultraviolet (UV) radiation and moisture when packed and during on-site storage.
15. Products shall be inspected and approved upon arrival at site. Submit signed copies of the recorded documents for verification.
16. Discontinue the application when raining and resume work only after the area has been dried and ready for re-application as determined by the Engineer.
17. Installer must be licensed, certified in writing, and approved by membrane manufacturer for the installation of the waterproofing system.
18. Install complete waterproofing system in accordance with manufacturer's installation instructions and details, additional requirements of the drawings, and these specifications.
	1. **DELIVERY, STORAGE, AND HANDLING**
19. Deliver materials to the job site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
20. Store materials in a secure, clean, cool and dry area in accordance with manufacturer's instructions.
21. Protect materials during handling and application to prevent damage or contamination.
	1. **ENVIRONMENTAL REQUIREMENTS**
22. Product shall be protected from abuse and prolonged or permanent exposure to the elements, not limited to ultraviolet (UV) radiation, heat, rain, and water from runoff.
23. Ambient temperature shall be within the manufacturer’s recommendation.
	1. **WARRANTIES**
24. Various warranties are available differing in terms and conditions, Contact RE-Systems Group Americas, Inc. for exact terms and conditions to meet specific project requirements.
25. Warranties available from the manufacturer: *(Edit to project requirements)\**
	1. Material Warranty; excludes labor.

Duration: 5-, 10-year

* 1. Water tightness Warranty; includes labor and material.

Duration: 5-, 10-, 15-, 20-year

*NOTE: \* Contact RE-Systems Group Americas, Inc. for exact warranty terms and conditions.*

**PART 2 – PRODUCTS**

1. **MATERIALS**
2. Waterproofing system protection layer sheets shall be comprised of GTM-20 Protection Sheet (high-density polyethylene (HDPE) as recommended by the manufacturer.
3. GTS Poly-Rubber Gel (GTS) fluid-applied waterproofing membrane shall be a single component, polymer-modified, waterproofing system composed of a non- Newtonian thixotropic gel and ancillary components as manufactured by RE-Systems Group Americas, Inc. ([www.re-systemsgroup.com](http://www.re-systemsgroup.com)).
	1. GTS is to be comprised of at least 20 percent recycled content.
4. GTS Waterproofing System shall have the following performance properties:
5. Self-healing at water pressures up to 60 psi.
6. Self-adhering and completely bonded to the entire surface of the concrete with no voids or lack of discontinuity.
7. Resistant to chemical attack.
8. Not affected by wet/dry cycling.
9. Contain less than one percent volatile organic compounds (VOC).
10. Non-toxic.
11. Non-flammable.
12. Seamless.
13. One-part gel type material.
14. Applied without primer.
15. GTS remains flexible and never completely cures.
16. The GTS Waterproofing System components shall have the following physical properties:

|  | GTS Poly-Rubber Gel |  |
| --- | --- | --- |
| Property | Requirements | Test Method |
| Solids Content | 99% | ASTM D 1353 |
| Resistance to Decay | 0% moisture permeation and weight change | ASTM E 154-88 |
| Puncture Resistance1 | greater than 90 lbs | ASTM E 1709 |
| Hardness1 | < 100 | ASTM C 836-89 |
| Flash Point | greater than 200 degrees F | ASTM D 56 |
| Tensile Strength1 | greater than 50 lbs | ASTM D 412 |
| Elongation % | greater than 300% | ASTM C 1135 |
| Hydrostatic Pressure Resistance1 | greater than 150 psi | ASTM D 751 |
| Adhesion to Concrete | rating of 1 (Excellent) | ASTM D 412 |
| Crack Bridging Flexibility | no cracks | ASTM C 836 |
| Moisture Permeability1 | less than 0.005 perm | ASTM E 96 |
| Viscosity | 50,000cP\*\*; 5,000,000cP\*\*\* | ASTM 2196 |

*1 Results based on composite system of GTS and GTM-20 Protection Sheet.*

*\*\* Pump application mix condition*

*\*\*\*Static Surface condition at ambient temperatures*

|  | GTM-20 Protection Sheet |  |
| --- | --- | --- |
| Property | Requirements | Test Method |
| Classification | meets Class A | ASTM E 1745 |
| Water Vapor Permeability | less than 0.0143 perm | ASTM E 96 |
| Tensile Strength | greater than 50 lbf/in | ASTM E 154 |
| Puncture Resistance | greater than 140 lbf | ASTM D 1709 |
| Chemical Resistance | unaffected | ASTM E 154 |
| Life Expectancy | indefinite | ASTM E 154 |
| Thickness | at least 20-mil HDPE | ACI 302.1R |

1. 48-mil GTM-20 Protection Sheet with fleece-backing shall have the following properties:

**2.02 ACCESSORIES**

* 1. Concrete Repair Materials: Concrete repair mortars or suitable alternative approved by manufacturer.
	2. One inch stainless steel or aluminum termination bar with pre-drilled holes at nine inches on center.
	3. One inch diameter metal capped fasteners.
	4. Geo-composite drain mat (GTD-400).

**2.03 GEOCOMPOSITE DRAIN MAT**

* 1. The geo-composite drain mat shall be of dimple core sheet drain with bonded filter fabric as GTD-400 provided by RE-Systems Group Americas, Inc. or equivalent, having the following engineering properties:

|  | GTD-400 Composite Drain Mat |  |
| --- | --- | --- |
| Property | Requirements | Test Method |
|  | Core |  |
| Compressive Strength | 15,000 psf (minimum) | ASTM D 1621 |
| Thickness | 0.40 inches | ASTM D 1777 |
| Flow (Hydraulic Gradient = 1) | 21 gal/min/ft (minimum) | ASTM D 4716 |
|  | Fabric |  |
| Flow | 140 gal/min/ft2 | ASTM D 4491 |
| Puncture | 65 lbs | ASTM D 4833 |
| AOS  | 70 U.S. Sieve (.212 mm) | EOS |
| Grab Tensile | 100 lbs | ASTM D 4632 |

* 1. Provide geo-composite drain mat in rolls wrapped with a protective covering and store in a manner that protects the fabric from mud, dirt, dust, debris, and shotcrete rebound. Do not remove protective wrapping until immediately before the drainage mat is installed. Avoid extended exposure to ultraviolet (UV) light as per manufacturer’s recommendations. Label each roll of drain mat in the shipment to identify the production run.

*NOTE: Delete references to geo-composite drain mat if not desired in specification*.

**PART 3 – EXECUTION**

1. **EXAMINATION BEFORE APPLICATION**
	1. Examine all surfaces to receive the geo-composite drain mat and the waterproofing material, to verify with the manufacturer that the surface preparation is acceptable and proper for the application of the material.
	2. Do not proceed with the installation of the geo-composite drain mat and the waterproofing material until all unacceptable surfaces or defects have been corrected according to the manufacturer’s application guidelines for material installation.
2. **SURFACE PREPARATION**
	1. Protect adjacent surfaces not designated for geo-composite drain mat and waterproofing application.
	2. Prepare surfaces designated for waterproofing application in accordance with manufacturer’s instructions.
	3. Surfaces shall be clean, relatively smooth, and free of standing water.
	4. Patch all holes and voids. Smooth out all substrate surface misalignments.
	5. Remove all concrete form ties and patch form tie holes.
3. **BASIC PRE-APPLICATION PROCEEDURES**
	1. Detailing and Flashing:
		1. Prepare as required by the Contract Documents detailing and flashing as required in accordance with the manufacturer's standard installation guideline details.
		2. Complete all detailing and flashing as required before installing the GTS Waterproofing System over the substrate.

B. Construction Joint Application:

1. Prior to starting work on construction joints, prepare surface according to Article 3.02 herein.

 a. Apply minimum 100-mil layer of GTS at a minimum of 14 inches on each side of construction joint.

 Install 24 inch wide strip of GTM Protection Sheet centered on the construction joint.

 b. Install protective waterproofing layers in accordance with Article 3.06 herein.

 c. Refer to typical expansion joint or control joint details per manufacturer’s recommendation.

* 1. Waterproofing System Application:
		1. Apply the GTS at a rate to provide a continuous, monolithic coat of 100-mil minimum, onto the GTM Protection Sheet or concrete surfaces, as recommended by the manufacturer.

2. GTS may be applied to green concrete, as recommended by the manufacturer.

* + 1. Install GTM Protection Sheets as shown on the Contract Drawings and as recommended by the manufacturer.
1. **GTM PROTECTION LAYER APPLICATION**
	1. Protection Layer:
		1. Embed the fleece side of the GTM Protection Sheets into the GTS as shown on the Contract Drawings, and as recommended by the manufacturer.
		2. Overlap adjoining Protection Sheet edges a minimum of six inches to ensure complete coverage.
		3. Tape all GTM Protection Sheet seams with detailing tape as recommended by the manufacturer.
		4. The completed material/protection assembly shall be covered with subsequent topping materials within one day of application.
	2. Protection Board:
		1. Apply protection board as shown on the Contract Drawings and as recommended by the manufacturer.
		2. Do not overlap the protection board materials.
		3. Provide backfill operations against positive side vertical applications as soon as possible. If backfill operations will not be installed within 7 days of installation of waterproofing system, contractor shall be responsible for the protection of the GTS waterproofing system until the backfill is complete.

**3.05 APPLICATION OF GTS-500 BLIND SIDE (vertical applications)**

* 1. Soil Retention System: Contractor shall provide a smooth surface soil retention systems that is acceptable to the waterproofing manufacturer. Site verification of wall condition to be inspected and approved by manufacturer on-site representative.

*NOTE: Specifier to indicate soil retention system and design standards to provide a smoothened surface for waterproofing system to be installed.*

* 1. Substrate must be smooth and clean for installation of GTM-20 Protection Sheet. Apply GTM-20 sheet against the substrate face or concrete with approved fasteners as recommended by the manufacturer. Fleece backing shall face the installer during installation to receive the GTS. Do not use any fasteners with the GTM-20 during horizontal applications.
	2. GTM-20 seams shall be taped using GTS-BS Seam Tape as recommended by the manufacturer prior to the application of the GTS material.
	3. Apply the GTS material providing a continuous, monolithic coat of 100-mil minimum as recommended by the manufacturer.
	4. Apply GTM-20 Protection Sheet with the fleece side exposed.
	5. GTM-20 seams shall be taped using GTS-BS Seam Tape as recommended by the manufacturer prior to the application of the GTS material.
	6. GTM-20 shall be installed the same day as the GTS material is applied.
	7. Protect the waterproofing system from exposure to ultraviolet (UV) radiation, water, wind, and cold or heat as recommended by the manufacturer.
	8. Terminate all finished edges of the GTS Waterproofing System with Termination Bar per manufacturer’s standard details.
	9. Do not leave GTS exposed to the elements. Only install area of GTS that can be covered in the same day. All GTS must be covered at the end of each work day to avoid contamination from other construction site debris
	10. Keep the workplace clean during the application process and after the workday is complete.

**3.06 APPLICATION OF GTS-600 Under Slab (horizontal applications)**

* 1. Soil Retention System: Contractor shall provide a smooth surface soil retention system that is acceptable to the waterproofing manufacturer. Site verification of floor condition to be inspected and approved by manufacturer on-site representative.

*NOTE: Specifier to indicate soil retention system and design standards to provide a smoothened surface for waterproofing system to be installed.*

* 1. Substrate must be smooth and clean for installation of GTM-20 Protection Sheet. Apply GTM-20 sheet against the substrate face or concrete with approved fasteners as recommended by the manufacturer. Fleece backing shall face the installer during installation to receive the GTS. Do not use any fasteners with the GTM-20 during horizontal applications.
	2. GTM-20 seams shall be taped using GTS-BS Seam Tape as recommended by the manufacturer prior to the application of the GTS material.
	3. Apply the GTS material providing a continuous, monolithic coat of 100-mil minimum as recommended by the manufacturer.
	4. Apply GTM-20 Protection Sheet with the fleece side exposed.
	5. GTM-20 seams shall be taped using GTS-BS Seam Tape as recommended by the manufacturer prior to the application of the GTS material.
	6. GTM-20 shall be installed the same day as the GTS material is applied.
	7. Protect the waterproofing system from exposure to ultraviolet (UV) radiation, water, wind, and cold or heat as recommended by the manufacturer.
	8. Terminate all finished edges of the GTS Waterproofing System with Termination Bar per manufacturer’s standard details.
	9. Do not leave GTS exposed to the elements. Only install area of GTS that can be covered in the same day. All GTS must be covered at the end of each work day to avoid contamination from other construction site debris
	10. Keep the workplace clean during the application process and after the workday is complete.

**3.08** **WATER TEST**

*Not required by RE-Systems Group Americas. This section to be incorporated as needed by the specifying architect or engineer.*

* 1. Areas of the closure wall or portions thereof shall be water tested by means of electronic testing or ponding water to a minimum depth of two inches for a period of 24 hours to check the integrity of the waterproofing system installation. Prior to backfilling any section of the closure wall, not less than ten percent of the roof area shall be water tested. The Engineer will determine the specific areas to be tested.
	2. If leaks should occur, the water shall be drained completely and the waterproofing system installation repaired and retested at no cost to the owner.
		1. As soon as water test has passed place subsequent topping materials over the GTS Waterproofing System as soon as possible.

**3.09 JOB COMPLETION**

* 1. Contractor and a representative of the waterproofing system manufacturer shall inspect the waterproofing assembly and notify the Engineer of defects. All defects shall be corrected at the expense of the Contractor.
	2. After final inspection of the work and acceptance by the manufacturer’s representative, the manufacturer’s representative shall provide a signed document identifying, by location areas, acceptance to the Engineer.
	3. Clean up all debris and equipment and remove from site.
	4. Protect installed waterproofing from damage

**END OF SECTION**