SECTION 071354 - THERMOPLASTIC SHEET WATERPROOFING

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

PVC sheet waterproofing for horizontal installations.

CTEM sheet waterproofing.

Drainage panels.

Plaza-deck pavers.

* + - 1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

If needed, insert list of conference participants not mentioned." Revise subparagraph below to suit Project.

Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product.

Include construction details, material descriptions, and tested physical and performance properties of waterproofing.

Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

Include manufacturer’s installation instructions.

* + - * 1. Sustainable Design Submittals:

Retain "Shop Drawings" paragraph below if justified by extent or complexity of waterproofing.

* + - * 1. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

Retain first subparagraph below for loosely laid installations and compartmented, loosely laid installations. Retain option for compartmented, loosely laid installations if control test drains are required.

Include layout drawings showing locations of submembrane containment strips [**and control test drains**].

Retain subparagraph below if using pedestal-supported concrete pavers on plaza decks over waterproofing.

Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

Retain "Samples" paragraph below for single-stage Samples.

* + - * 1. Samples: For each exposed product and for each color and texture specified, including the following products:

Retain required Samples in subparagraphs below; revise to suit Project.

8-by-8-inch square of waterproofing and flashing sheet.

4-by-4-inch square of drainage panel.

Plaza-deck paver, [**4-by-4-inch square**] [**full sized**], in each color and texture required.

Paver pedestal assembly.

* + - * 1. Quality Control Submittals:

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing and inspecting.

Field quality-control reports.

Sample Warranties: For special warranties.

* + - 1. QUALITY ASSURANCE

Coordinate "Installer Qualifications" paragraph below with qualifications that manufacturer requires of Installer for warranty purposes; verify with manufacturers that installers meeting this requirement are available for Project location.

* + - * 1. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
				2. Benchmark: Build Benchmark to verify selections made under Sample submittals and to set quality standards for installation.

Retain option in first subparagraph below if using pavers.

Build for each typical waterproofing installation including [**pavers and**] accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.

Size: [**100 sq. ft. in area**] [**As indicated on Drawings**].

Description: Each type of [**deck**] [**and**] [**plaza**] <**Insert description**> installation.

Approval of Benchmark does not constitute approval of deviations from the Contract Documents contained in Benchmark unless Director’s Representative specifically approves such deviations in writing.

Retain subparagraph below if the intention is to make an exception to the default requirement for demolishing and removing Benchmark.

Subject to compliance with requirements, approved Benchmark may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - 1. FIELD CONDITIONS
				1. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

Do not apply waterproofing in snow, rain, fog, or mist.

* + - * 1. Do not permit asphaltic materials or polystyrene insulation to contact PVC materials.
				2. Maintain adequate ventilation during preparation and application of waterproofing materials.
			1. WARRANTY

When warranties are required, verify with Owner's counsel that warranties stated in this article are not less than remedies available to Owner under prevailing local laws. Retain first option in "Manufacturer's Warranty" paragraph below for a materials-only warranty; retain second option for a labor-and-material warranty. These warranties customarily do not include costs of excavating and exposing the waterproofing membrane or backfilling and restoring overlying construction.

* + - * 1. Manufacturer's Warranty: [**Manufacturer agrees to furnish replacement waterproofing material for**] [**Manufacturer and Installer agree to repair or replace**] waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

Verify available warranties and warranty periods.

Warranty Period: [**Five**] [**10**] [**20**] <**Insert number**> years from date of Substantial Completion.

Retain "Installer's Special Warranty" paragraph below if a separate installer's warranty is required and if this is an accepted practice locally; revise to suit Project. Coordinate requirements of both warranties to clarify responsibilities. If a specific installer's warranty form is required, see low-slope roofing Sections for examples that may be revised for waterproofing and inserted at end of this Section.

* + - * 1. Installer's Special Warranty: Specified form, [**on warranty form at end of this Section,**]signed by Installer, covering Work of this Section, for warranty period of [**two**] <**Insert number**> years.

Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

* + - * 1. Warranty Extension: The one year period required by Paragraph 9.8 of the General Conditions is extended to 2 years for the Work of this Section. Refer to Supplementary Conditions.
1. PRODUCTS
	* + 1. MANUFACTURERS

Retain applicable products from options in "Source Limitations for Waterproofing System" paragraph below; revise to suit Project.

* + - * 1. Source Limitations for Waterproofing System: Obtain waterproofing materials [**, protection course,**] [**and**] [**drainage panels**] from single source from single manufacturer.

Retain "Source Limitations for Plaza-Deck Paving" paragraph below if required for plaza-deck pavers.

* + - * 1. Source Limitations for Plaza-Deck Paving: Obtain plaza-deck pavers[**and paver pedestals**] from single source from single manufacturer.
			1. PVC SHEET WATERPROOFING

Revise thickness in "PVC Sheet" paragraph below to suit Project. Manufacturer recommends a minimum membrane thickness of 80 mils) for most applications; consult manufacturer for recommendations.

Review products listed below and revise as necessary per project. Ensure products are current and are comparable to one another.

* + - * 1. PVC Sheet: [**60-mil-**] [**80-mil-**] thick, PVC membrane with integral pigments, stabilizers, UV absorbers, biocide, and nonwoven fiberglass reinforcement; with the following properties measured according to standard test methods referenced:

Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

CETCO; COREFLEX® 60 waterproofing membrane.

[Sika Sarnafil](http://www.specagent.com/Lookup?uid=123457174749); Sarnafil G476 Membrane.

Approved equivalent.

Tensile Strength: 1500 psi minimum; ASTM D638.

Elongation at Break: 240 percent minimum, machine direction; ASTM D638.

Seam Strength: 90 percent minimum of tensile strength; ASTM D638.

Retention of Properties after Heat Aging: 95 percent minimum retention of tensile strength and elongation; ASTM D638 after 168 hours at 194 deg F; ASTM D3045.

Tear Resistance: 21 lbf minimum; ASTM D1004.

Low-Temperature Bend: Pass at minus 40 deg F; ASTM D2136.

Linear Dimension Change: 0.002 percent maximum after 6 hours at 176 deg F; ASTM D1204.

Water Absorption: 2.5 percent maximum weight gain after 168 hours' immersion at 158 deg F; ASTM D570.

Dynamic Puncture Resistance: 117.7 ft. pdl minimum; ASTM D5635.

* + - * 1. Self-Adhered PVC Sheet: 120-mil- thick, composite sheet composed of 60-mil-thick, PVC membrane with integral pigments, stabilizers, biocide, and nonwoven fiberglass reinforcement; a 60-mil-thick, nonpermeable, closed-cell-foam backing layer; and a pressure-sensitive adhesive coating; with the following properties measured according to standard test methods referenced:

Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Sika Sarnafil](http://www.specagent.com/Lookup?uid=123457174750); Sarnafil G476 SA.

Approved equivalent.

Tensile Strength: 1500 psi minimum; ASTM D638.

Elongation at Break: 240 percent minimum, machine direction; ASTM D638.

Seam Strength: 90 percent minimum of tensile strength; ASTM D638.

Retention of Properties after Heat Aging: 95 percent minimum retention of tensile strength and elongation; ASTM D638 after 168 hours at 194 deg F; ASTM D3045.

Tear Resistance: 21 lbf minimum; ASTM D1004.

Linear Dimension Change: 0.002 percent maximum after 6 hours at 176 deg F; ASTM D1204.

Dynamic Puncture Resistance: 949.2 ft. pdl minimum; ASTM D5635.

* + - 1. CTEM SHEET WATERPROOFING
				1. CTEM Sheet: [**60-mil-**] [**75-mil-**], coal tar elastomeric (CTEM) membrane with coal tar pitch, PVC, and kee resin; with the following properties measured in accordance with standard test methods referenced:

[Products:](http://www.specagent.com/Lookup?ulid=14051) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Hyload, Inc](http://www.specagent.com/Lookup?uid=123457174755).; Hyproof GL.

Approved equivalent.

Tensile Strength: 1050 psi minimum, ASTM D638.

Elongation at Break: 150 percent minimum, machine direction; ASTM D638.

Seam Strength: 95 percent minimum of tensile strength; ASTM D638.

Retention of Properties after Heat Aging: ASTM D3045.

Tear Resistance: 250 lb/in. minimum, ASTM D1004.

Low Temperature Bend, Minus 40 Deg F: Pass, ASTM D2136.

Water Vapor Permeance: 0.375 perm maximum, ASTM E96.

Hydrostatic Pressure Resistance: 290 psi minimum, ASTM D751.

* + - * 1. Self-Adhered CTEM Sheet: Composite sheet composed of [**60-mil-**] [**75-mil-**] thick, coal tar elastomeric (CTEM) membrane with coal tar pitch, PVC, and kee resin; and a pressure-sensitive adhesive coating; with the following properties measured in accordance with standard test methods referenced:

[Products:](http://www.specagent.com/Lookup?ulid=14052) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Hyload, Inc](http://www.specagent.com/Lookup?uid=123457174754).; [Hyproof SA 75][Hyproof SA 90].

Approved equivalent.

Tensile Strength: 1050 psi minimum, ASTM D638.

Elongation at Break: 150 percent minimum, machine direction; ASTM D638.

Seam Strength: 95 percent minimum of tensile strength; ASTM D638.

Retention of Properties after Heat Aging: ASTM D3045.

Tear Resistance: 250 lb/in. minimum, ASTM D1004.

Low Temperature Bend, Minus 40 Deg F: Pass, ASTM D2136.

Water Vapor Permeance: 0.375 perm maximum, ASTM E96.

Hydrostatic Pressure Resistance: 290 psi minimum, ASTM D751.

* + - * 1. Fleece-Backed CTEM Sheet: Composite sheet composed of 60-mil-thick, coal tar elastomeric (CTEM) membrane with coal tar pitch, PVC, and kee resin with a 30-40-mil-thick polyester fleece backing; with the following properties measured in accordance with standard test methods referenced:

[Products:](http://www.specagent.com/Lookup?ulid=14053) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Hyload, Inc](http://www.specagent.com/Lookup?uid=123457174840).; Hyproof with Fleece.

Approved equivalent.

Tensile Strength: 1300 psi minimum, ASTM D638.

Elongation at Break: 150 percent minimum, machine direction; ASTM D638.

Seam Strength: 95 percent minimum of tensile strength; ASTM D638.

Retention of Properties after Heat Aging: ASTM D3045.

Tear Resistance: 380 lb/in. minimum, ASTM D1004.

Low Temperature Bend, Minus 40 Deg F: Pass, ASTM D2136.

Water Vapor Permeance: 0.375 perm maximum, ASTM E96.

Hydrostatic Pressure Resistance: 290 psi minimum, ASTM D751.

* + - 1. AUXILIARY MATERIALS
				1. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

Insert specific VOC-limit values in subparagraph below if known; coordinate with products and revise to suit Project.

Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

* + - * 1. Concealed Sheet Flashing: Same material, construction, and thickness as sheet waterproofing.

Retain "Exposed PVC Sheet Flashing" paragraph below for PVC flashing.

* + - * 1. Exposed PVC Sheet Flashing: PVC-sheet flashing [**60 mils**] [**80 mils**] [**96 mils**] thick; PVC with integral pigments, stabilizers, UV absorbers, and biocide; reinforced with nonwoven fiberglass.

Retain "Exposed CTEM Sheet Flashing" paragraph below for CTEM.

* + - * 1. Exposed CTEM Sheet Flashing: CTEM-sheet flashing 60-mil-thick; modified coal tar elastomeric sheet.

Sheet Width: [**4 inches**] [**6 inches**] [**9 inches**] [**12 inches**] [**or**] [**as required**].

"Preformed Flashing Shapes" paragraph below describes Hyload's CTEM preformed three-dimensional flashing products. Verify availability with waterproofing manufacturer.

* + - * 1. Preformed Flashing Shapes: As needed to suit Project requirements including, but not limited to, detail corners, level changes, stop ends, and other similar special applications

Retain "Surface Conditioner" paragraph below for fully adhered installations.

* + - * 1. Surface Conditioner: Manufacturer's standard waterborne surface treatment to bind residual surface dust and efflorescence to substrate.

Retain "Bonding Adhesives," "Containment Strip," and "Geotextile Leveling Layer" paragraphs below for loosely laid installations and compartmented, loosely laid installations. Retain option in "Bonding Adhesives" paragraph for loosely laid installations and compartmented, loosely laid installations.

* + - * 1. Bonding Adhesives: For bonding waterproofing sheets[**, containment strips,**] and sheet flashings to substrates.
				2. Containment Strip: Manufacturer's standard asphalt-resistant, 60-mil-thick, [**PVC**] [**CTEM**] strip; reinforced with nonwoven fiberglass; 12 inches wide.
				3. Geotextile Leveling Layer: Manufacturer's standard 0.22-inch-thick, nonwoven polypropylene fabric.
				4. Separation Layer: Manufacturer's standard 0.16-inch- thick, nonwoven polypropylene fabric.

Retain one or all options in "Protection Course" paragraph below if required. First describes Sika's high-density polyethylene (HDPE) sheet for heavy-duty protection; second describes Sika's PVC sheet for regular-duty protection. Verify acceptability of protection course type with waterproofing manufacturer. Distinguish locations if both types are required.

* + - * 1. Protection Course: [**39-mil-thick, HDPE sheet**] [**or**] [**51-mil-thick, hot-air-weldable, PVC sheet**] protection layer.
				2. Waterproofing and Sheet-Flashing Accessories: Sealants, pourable sealers, termination reglets, clamps, compression bars, tapes, preformed cone and stack flashings, and other accessories recommended by waterproofing manufacturer for intended use.

Retain "Control Test Drain" paragraph below for compartmented, loosely laid installations if control test drains are required.

* + - * 1. Control Test Drain: Manufacturer's standard assembly to verify the absence or presence of leaks from underside of waterproofed slab.
				2. Metal Termination Bars: Manufacturer's standard stainless-steel or aluminum bars, prepunched, with noncorrosive fasteners.
			1. DRAINAGE PANELS

Review products listed below and revise as necessary per project. Ensure products are current and are comparable to one another when there are multiple products indicated as options.

Retain this article if specifying drainage panels in this Section; revise to suit Project. If not indicated on Drawings, insert thickness requirement only after coordinating required thickness with required flow rate.

* + - * 1. Composite Drainage Panels: Drainage panel acceptable to waterproofing manufacturer and consisting of a nonbiodegradable core of fused, entangled filaments or a three-dimensional drainage net; with a geotextile facing on both sides.

[Products:](http://www.specagent.com/Lookup?ulid=12335) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Sika Sarnafil](http://www.specagent.com/Lookup?uid=123457174752); [Drainage Composite 3811R][Geonet B].

Approved equivalent.

* + - 1. PLAZA-DECK PAVERS

Retain this article for plaza-deck pavers installed on pedestals over waterproofing. Specify pavers installed in an aggregate, mortar, or bituminous setting bed in Section 321400 "Unit Paving."

Retain "Plaza-Deck Pavers" or "Stone Plaza-Deck Pavers" paragraph below if specifying plaza-deck pavers in another Section; revise to suit Project. Insert other paver types if required.

* + - * 1. Plaza-Deck Pavers: [**Brick**] [**Concrete**] [**Asphalt-block**] pavers specified in Section 321400 "Unit Paving."
				2. Stone Plaza-Deck Pavers: [**Granite**] [**Limestone**] [**Marble**] [**Quartz-based stone**] [**Slate**] [**Travertine**] <**Insert type**> pavers specified in Section 321400 "Unit Paving."

Retain "Concrete Plaza-Deck Pavers" paragraph below if specifying plaza-deck pavers in this Section; revise to suit Project. Verify availability of pavers with manufacturer for characteristics required; insert other characteristics if required. paragraph describes concrete pavers commonly used in pedestal set applications over insulation and waterproofing; Hanover Architectural Products and perhaps other manufacturers offer concrete plaza-deck pavers of lightweight concrete and with integrally cast concrete pedestals. Limit pedestal systems to pedestrian plazas; they are generally unsuitable for vehicles.

Review products listed below and revise as necessary per project. Ensure products are current and are comparable to one another when there are multiple products indicated as options.

* + - * 1. Concrete Plaza-Deck Pavers: Solid, hydraulically pressed, standard-weight concrete units, [**square edged**] [**with top edges beveled 3/16 inch**], manufactured for use as plaza-deck pavers; [**7500-psi**] [**6500-psi**] <**Insert value**> minimum compressive strength, ASTM C140; absorption not greater than 5 percent, ASTM C140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C67.

[Products:](http://www.specagent.com/Lookup?ulid=1627) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Carlisle Coatings & Waterproofing Inc](http://www.specagent.com/Lookup?uid=123457174739).

[Hanover Architectural Products](http://www.specagent.com/Lookup?uid=123457174733).

[Roofblok Limited](http://www.specagent.com/Lookup?uid=123457174734).

Approved equivalent.

Retain one thickness and one face size from options in "Thickness" and "Face Size" subparagraphs below. Include special paver sizes and insert descriptions of custom pavers such as stair tread and riser units, coping or curbed termination pavers, and oversize pavers.

Thickness: [**2 inches**] [**2-1/2 inches**] <Insert dimension.

Face Size: [**12 inches** square] [**12 by 24 inches**] [**18 inches** square] [**24 inches** square] [As indicated] <Insert dimension(s) and shape>.

Color and Texture: [As indicated by manufacturer's designations] [Match Director’s Representative's sample] [As selected by Director’s Representative from manufacturer's full range] <Insert requirement>.

Generally, retain "Paver Pedestals" paragraph below if setting-bed systems are not required; revise to suit Project and products by named manufacturers. If retaining first option but not third option, do not name other manufacturers.

Review products listed below and revise as necessary per project. Ensure products are current and are comparable to one another when there are multiple products indicated as options.

* + - * 1. Paver Pedestals: Paver-support assembly, [**standard with paver manufacturer**] [**or**] [**named below**], including [**fixed-height**] [**adjustable or stackable**] pedestals, shims, and spacer tabs for joint spacing of [**1/8 inch**] [**3/16 inch**] [**1/8 to 3/16 inch**].

[Manufacturers:](http://www.specagent.com/Lookup?ulid=7266) Subject to compliance with requirements, provide products by one of the following:

[Envirospec, Inc](http://www.specagent.com/Lookup?uid=123457174741).

[Hanover Architectural Products](http://www.specagent.com/Lookup?uid=123457174742).

[Roofblok Limited](http://www.specagent.com/Lookup?uid=123457174744).

Approved equivalent.

Retain "Fill" Subparagraph below if telescoping pedestals that require fill.

Fill: As recommended in writing by pedestal manufacturer.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the waterproofing.

Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.

Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

* + - * 1. Proceed with installation only after unsatisfactory conditions have been corrected.
			1. PREPARATION
				1. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
				2. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
				3. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
				4. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
				5. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D4258.
				6. Prepare, treat, and seal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.
			2. INSTALLATION OF FULLY ADHERED SHEET WATERPROOFING

Retain this article for fully adhered sheet installation; revise to suit Project.

* + - * 1. Install self-adhered sheets over entire area to receive waterproofing according to manufacturer's written instructions.

Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.

Install laps shingled with slope of deck where possible.

Install flashings concurrently with deck sheet.

Perform hot-air welding to ensure a watertight seam installation. Inspect outside edge of seams with pointed metal probe and ensure completed laps lay flat and are free of voids, fishmouths, or wrinkles.

Install temporary cut-offs if work is interrupted. Remove the cut-offs completely before proceeding with the installation.

Retain subparagraph below if tie-ins to adjoining waterproofing are required.

Install sheets and auxiliary materials to tie into adjoining waterproofing.

* + - * 1. Apply surface conditioner, at required rate, to substrates to receive waterproofing. Apply only at temperatures greater than 25 deg F and rising.
				2. Apply and firmly adhere sheets to substrate; butt adjoining sheets tightly. Apply only when the membrane, air, and substrate temperatures are greater than 40 deg F and rising. Apply a minimum 8-inch-wide cover strip centered over joints and lap edges; hot-air weld cover strip to deck sheet.
				3. Hot-air weld three-way overlaps or T-joints with a 4-inch-round or square patch.
				4. Unless terminations and deck-sheet waterproofing perimeter are sealed with flashings, secure them with mechanically anchored metal termination bar. Seal edge of termination with sealant.

Retain first paragraph below if deck drains are required; coordinate with drain details and revise to suit Project.

* + - * 1. Install flashing at deck drains. Spread sealant bed over deck drain flange, lap flashing membrane into drain flange and over deck sheet according to membrane manufacturer's written instructions, and hot-air-weld flashing to deck sheet; securely seal flashing sheet in place with clamping ring.
				2. Perform field quality-control testing before subsequent work.
				3. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.
			1. INSTALLATION OF LOOSELY LAID SHEET WATERPROOFING

Retain this article for loosely laid installations; revise to suit Project. Revise this article and "Protection Course Installation" Article if insulation is installed beneath loosely laid sheet.

* + - * 1. Install loosely laid sheets over entire area to receive waterproofing according to manufacturer's written instructions.

Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.

Install laps shingled with slope of deck where possible.

Install flashings concurrently with deck sheet.

Perform hot-air welding to ensure a watertight seam installation. Inspect outside edge of seams with pointed metal probe and ensure completed laps lay flat and are free of voids, fishmouths, or wrinkles.

Install temporary cut-offs if work is interrupted. Remove the cut-offs completely before proceeding with the installation.

Retain subparagraph below if tie-ins to adjoining waterproofing are required.

Install sheets and auxiliary materials to tie into adjoining waterproofing.

* + - * 1. Install geotextile leveling layer over entire area to receive deck sheet. Lap edges at least 4 inches and spot adhere fabric to deck as required to keep in position as waterproofing sheet is placed in position. Trim fabric using scissors or utility blades; do not use welding equipment to cut fabric.
				2. Apply deck sheet over area, lapping edges at least 3 inches for machine welding or at least 4 inches for hand welding. Hot-air weld sheets.
				3. Hot-air weld three-way overlaps or T-joints with a 4-inch-round or square patch.
				4. Secure perimeter of deck sheet with manufacturer's standard metal termination bars and accessories as recommended by manufacturer for each condition.

Retain first paragraph below if deck drains are required; coordinate with drain details and revise to suit Project.

* + - * 1. At deck drains, spread sealant bed over drain flange and lap membrane into drain flange according to membrane manufacturer's written instructions; securely seal sheets in place with clamping ring.
				2. Perform field quality-control testing before subsequent work.
				3. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.
			1. INSTALLATION OF COMPARTMENTED, LOOSELY LAID SHEET WATERPROOFING

Retain this article for compartmented, loosely laid sheet installations; revise to suit Project.

* + - * 1. Install compartmented, loosely laid sheets over entire area to receive waterproofing according to manufacturer's written instructions.

Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.

Install laps shingled with slope of deck where possible.

Install flashings concurrently with deck sheet.

Perform hot-air welding to ensure a watertight seam installation. Inspect outside edge of seams with pointed metal probe and ensure completed laps lay flat and are free of voids, fishmouths, or wrinkles.

Install temporary cut-offs if work is interrupted. Remove the cut-offs completely before proceeding with the installation.

Retain subparagraph below if tie-ins to adjoining waterproofing are required.

Install sheets and auxiliary materials to tie into adjoining waterproofing.

* + - * 1. Construct a test containment grid before beginning installation. Perform manufacturer's recommended peel test on the test containment grid and on each day's completed waterproofing work before resuming the following day's installation.
				2. Install submembrane containment grid to form compartments secured by containment strips. Also, install containment strips at the base of walls, curbs, penetrations, terminations, and transitions and at the perimeter of the installation. Secure containment grid to substrate with bonding adhesive.
				3. Install geotextile leveling layer over entire area between containment strips. Lap edges at least 4 inches and spot adhere fabric to deck as required to keep in position as waterproofing sheet is placed in position. Trim fabric even with edges of containment strips using scissors or utility blades; do not use welding equipment to cut fabric.

Retain "Control-Test-Drain Installation" paragraph below if required.

* + - * 1. Control-Test-Drain Installation: Drill 1-inch-diameter hole through the substrate at or near the low point of each compartment and install control test drain, according to manufacturer's written instructions, so as to enable verification of the absence or presence of leaks from underside of waterproofed slab.
				2. Apply deck sheet over area, lapping edges at least 3 inches for machine welding or at least 4 inches for hand welding. Hot-air weld the sheet to containment strips.
				3. Hot-air weld three-way overlaps or T-joints with a 4-inch-round or square patch.

Retain first paragraph below if deck drains are required; coordinate with drain details and revise to suit Project.

* + - * 1. Install flashing at deck drains. Spread sealant bed over deck drain flange, lap flashing membrane into drain flange and over containment strips according to membrane manufacturer's written instructions, and hot-air weld flashing to containment strips; securely seal flashing sheet in place with clamping ring.
				2. Perform field quality-control testing before subsequent work.
				3. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.
			1. INSTALLATION OF SHEET FLASHING
				1. Form wall flashings exposed in final construction using exposed sheet flashing; otherwise, use concealed sheet flashing.
				2. Lap sheet flashings over deck sheet or containment strips. Flash penetrations and field-formed inside and outside corners with sheet flashing.
				3. Extend flashings a minimum of 8 inches above the overburden unless otherwise indicated on Drawings and acceptable to waterproofing manufacturer.
				4. Hot-air weld joints with deck sheet or containment strips and end laps of overlapping sheet flashings and accessories to ensure a watertight seam installation.
				5. Hot-air weld three-way overlaps or T-joints with a 4-inch-round or square patch.
				6. Secure flashings along top edge with mechanically anchored metal termination bar or with mechanically anchored metal reglet for subsequent metal counterflashing. Seal top of termination with sealant.

Verify, with manufacturer, that paragraph below applies to thermoplastic sheet waterproofing for Project; revise or delete if required. Coordinate expansion-joint treatment with expansion-joint assemblies that interface with waterproofing. Specialty manufacturers such as Situra also produce membrane-type waterproofing expansion joints.

* + - * 1. Terminate deck sheet at expansion joints and discontinuous deck-to-wall or deck-to-deck joints. Bridge and cover joints with sheet flashing and joint accessories according to manufacturer's written instructions for each type of joint.
			1. INSTALLATION OF PROTECTION COURSE

Usually retain separation layer and protection course in first paragraph below. Sika does not require separation layer if drainage panels are applied directly over HDPE protection course.

* + - * 1. Install separation layer over sheet waterproofing before placing protection course.
				2. Install protection course over [**sheet waterproofing**] [**separation layer**] according to manufacturer's written instructions and before beginning subsequent construction operations. Minimize exposure of membrane.
			1. INSTALLATION OF DRAINAGE PANELS
				1. Install drainage panels immediately after waterproofing-membrane manufacturer's inspection and acceptance of the waterproofing installation.
				2. Place and secure drainage panels directly over the waterproofing membrane, according to waterproofing manufacturer's written instructions.
				3. Trim drainage panels to fit closely around penetrations and at the base of drains to ensure that water flows freely from composite into drain openings.
				4. Cover cut edges of drainage panels to protect waterproofing membrane from damage.
				5. Protect installed drainage panels during subsequent construction.
			2. INSTALLATION OF PLAZA-DECK PAVERS

Retain this article for pavers installed on pedestals.

* + - * 1. Install pavers according to manufacturer's written instructions.

Retain first two paragraphs below if installing pavers on paving pedestals.

* + - * 1. Install paver pedestals and accessories to required elevations. Adjust for final level and slope of paved surfaces.
				2. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.

Revise subparagraph below to suit Project. Consider paved area layout, paver module, and construction tolerances when imposing limits. Verify minimum dimensions with paver manufacturer. Minimum pedestal dimensions may also govern. Custom-dimensioned pavers or pavers scored to repeat module may be available.

Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.

Insert special installation requirements here. Examples might include tread/riser units on tabs or treatment of pavers at plaza/building expansion joints.

* + - * 1. Install pavers to vary no more than 1/16 inch in elevation between adjacent pavers and no more than 1/16 inch from surface plane elevation of individual paver.
				2. Limit variation in paving installation to within [**1/4 inch in 10 feet**] <**Insert dimensions**> of surface plane in any direction; noncumulative.
			1. FIELD QUALITY CONTROL

Retain "Testing Agency" and "Manufacturer's Field Service" paragraphs below to identify who shall perform tests and inspections. If retaining second option in "Testing Agency" paragraph or if retaining "Manufacturer's Field Service" paragraph, retain "Field quality-control reports" paragraph in "Informational Submittals" Article.

* + - * 1. Testing Agency: [**Director’s Representative will engage**] [**Engage**] a qualified testing agency to perform tests.

Retain "Manufacturer's Field Service" paragraph below to require a company field advisor per OGS Section 014216 to perform inspections. Manufacturer may require this as a warranty condition.

* + - * 1. Manufacturer's Field Service: Engage a [**full-time**]site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Director’s Representative.

Retain "Flood Testing" or "Electronic Leak-Detection Testing" paragraph below, or both, if required.

Retain "Flood Testing" paragraph below if required for horizontal surfaces sloping up to 2 percent or 1/4 in./ft.. Revise paragraph by identifying particular Project areas to flood test if required. Limit water depth to not exceed deck load capacity.

* + - * 1. Flood Testing: Flood test each deck area for leaks, according to procedures in ASTM D5957, after completing waterproofing but before placing overlying construction. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and a maximum depth of 4 inches. Maintain 2 inches of clearance from top of sheet flashings.

ASTM D5957 sets 24 hours as minimum and 72 hours as maximum duration for flood testing.

Flood each area for [**24**] [**48**] [**72**] hours.

Testing agency shall observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

Retain "Electronic Leak-Detection Testing" paragraph below if required. The language in paragraph accommodates both low- and high-voltage testing. If a permanent electronic leak-detection system is required, consult companies offering these systems; coordinate waterproofing system components with requirements for a permanent electronic leak-detection system.

* + - * 1. Electronic Leak-Detection Testing:

Testing agency shall test **[each deck area] [each deck area indicated for testing on Drawings] <Insert area to be tested>** for leaks using an electronic leak-detection method that locates discontinuities in the waterproofing membrane.

Testing agency shall perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.

Testing agency shall create a conductive electronic field over the area of waterproofing to be tested and electronically determine locations of discontinuities or leaks, if any, in the waterproofing.

Testing agency shall provide survey report indicating locations of discontinuities, if any.

* + - * 1. Waterproofing will be considered defective if it does not pass tests and inspections.
				2. Prepare test and inspection report.
			1. PROTECTION, REPAIR, AND CLEANING
				1. Do not permit foot or vehicular traffic on unprotected membrane.
				2. Protect waterproofing from damage and wear during remainder of construction period.
				3. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
				4. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

Insert Installer's Special Warranty Form here if required.

END OF SECTION 071354