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SPEC NOTE: **Henry® Company PumadeqTM System Cold-Applied Waterproofing – Reinforced Field Membrane.** This specification is ideally suited for protected membrane roof (PMR) assemblies including inverted roof membrane assemblies (IRMA), plaza decks, and terraces requiring a flexible polyurethane modified methyl methacrylate (PUMA) technology. Although prepared in CSI three (3) part format, this specification should be adapted to suit the requirements of the individual project and be included as a separate section under Division 07 - Thermal and Moisture Protection.

SPEC NOTE: This document is a reference for the recommended installation procedures of the products/system described. Although this specification section follows the recommendations of the Construction Specifications Institute (CSI), Manual of Practice including MasterFormat, SectionFormat, and PageFormat; it is the discretion of the project specification author to use the information within to set a minimum standard of performance for specified products/system on a project specific basis. Update “[project specific]” notes and coordinate as required.

SPEC NOTE: This document includes Henry® Company notes to assist the architect/specification writer. A Henry® Company “SPEC NOTE” will always immediately precede the text to which it is referring. The section serves as a guideline; modify to meet specific project requirements.

SPEC NOTE: Delete “SPEC NOTE” sections in the final copy of the specification.

SPEC NOTE: This spec is intended for new construction projects located in the continental US. For remedial and construction additions or projects located in Alaska, Hawaii, Puerto Rico, and non-US locations contact Henry® Company technical services at (800) 486-1278.

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**SECTION 07 14 16**

**COLD FLUID-APPLIED WATERPROOFING**

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SPEC NOTE: This guide specification has been written in accordance with the Construction Specifications Institute (CSI) Manual of Practice and use of General Contractor/installing Subcontractor identified accordingly. Modify Sections as required for projects where no General Contractor is allocated.

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1. **GENERAL**
	1. GENERAL REQUIREMENTS
		1. The General Conditions, Supplementary Conditions, Instructions to Bidders, and Division 01- General Requirements shall be read in conjunction with and govern this Section.
		2. Read this Specification as a whole by all parties concerned. Each Section may contain more or less than the complete Work of any trade. The Contractor is solely responsible to make clear to the installing Subcontractor the extent of their Work.
	2. SUMMARY
		1. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work as shown on the Drawings Architectural Division as specified herein including, but not limited to, the following:
			1. Primer
			2. Reinforced PUMA flashing
			3. Reinforced PUMA field membrane
			4. Protection course (optional color stability top coat or wear coat)
			5. Insulation
			6. Drainage Composite
			7. Filter Fabric
			8. Paver Ballast

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SPEC NOTE: Coordination of terminations, transitions, and penetrations are pertinent to ensure chemical compatibility and adhesion of adjacent products. Edit the following related Sections as required to ensure a continuous air and watertight building envelope. Contact manufacturer(s) where products transition from one system to another to confirm minimum installation requirements for warranty issuance.

SPEC NOTE: Edit Section below to suit project requirements: Add Sections as applicable.

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* 1. RELATED REQUIREMENTS

* + 1. DIVISION 03 – Concrete; Section 03 51 00 – Cast Roof Decks
		2. DIVISION 05 – Metals; Section 05 30 00 – [Metal decking] [Steel decking]
		3. DIVISION 06 – Wood, Plastics, and Composites; Section 06 16 00 – Sheathing
		4. DIVISION 07 – Thermal and Moisture Protection; Section 07 22 16 – Roof Board Insulation
		5. DIVISION 07 – Thermal and Moisture Protection; Section 07 27 00 – Air Barriers
		6. DIVISION 07 – Thermal and Moisture Protection; Section 07 33 63 – Vegetative Roofing
		7. DIVISION 05 – Thermal and Moisture Protection; Section 07 60 00 – Flashing and Sheet Metal
		8. DIVISION 07 – Thermal and Moisture Protection; Section 07 70 00 – Roof and Wall Specialties and Accessories
		9. DIVISION 07 – Thermal and Moisture Protection; Section 07 90 00 – Joint Protection

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SPEC NOTE: Projects not referencing LEED delete Sections “X.XX” and “X.XX” as stated below.

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* + 1. DIVISION [project specific] - LEED Requirements Section [project specific] – [project specific].
	1. ALTERNATES
		1. Submit requests for alternates in accordance with Section [project specific].
		2. PUMA system must meet the following standards to be considered acceptable substitutions:
			1. PUMA system components must be warranted by a single source manufacturer.
			2. Reinforced PUMA field membrane:
				1. Polyurethane modified methyl methacrylate (PUMA) technology with greater than 250% elongation
				2. ASTM C836/C836M-15
				3. Minimum application temperature: 40 °F
		3. Alternate submission format to include:
			1. Evidence that alternate materials meet or exceed performance characteristics of product requirements and documentation from an approved independent testing laboratory certifying that the performance of the system including auxiliary components exceed the requirements of the local building code.
			2. References clearly indicating that the PUMA System Manufacturer has successfully completed projects of similar scope and nature on an annual basis for a minimum of ten (10) years.
			3. Product Data:
				1. PUMA System Manufacturer’s guide specification
				2. PUMA System Manufacturer’s complete set of technical data sheets
				3. PUMA System Manufacturer’s complete set of guide details
			4. Certificates:
				1. Product certification that the system components are supplied and warranted by single source PUMA System Manufacturer
				2. Statement that installing Subcontractor is Gold Seal authorized by PUMA System Manufacturer to complete Work as specified
				3. Copy of PUMA System Manufacturer’s current ISO Certifications
			5. Warranty:
				1. Warranty and verification documents as required by the PUMA System Manufacturer.

Sample warranty

* + 1. Submit requests for alternates to this specification a minimum of ten (10) working days prior to bid date. Include a list of ten (10) projects executed over the past five (5) years.
		2. Issued addendums confirm acceptable alternates. Do not submit substitute materials after tender closing.
	1. REFERENCES
		1. American Society for Testing and Materials (ASTM):
			1. ASTM C836/C836M-15 – Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
			2. ASTM C1583 – Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
			3. ASTM C7234 – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers,
			4. ASTM D4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
			5. ASTM D4258 – Standard Practice for Surface Cleaning Concrete for Coating
			6. ASTM D4259 – Standard Practice for Abrading Concrete
			7. ASTM D4261 – Standard Practice for Surface Cleaning Concrete Masonry Units for Coating
			8. ASTM D5295 – Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems
			9. ASTM F3010 – Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings
		2. US Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED):
			1. LEED Reference Guide, Version 4.0, and USGBC Project Calculation Spreadsheet. Web Site <http://www.usgbc.org>.
	2. ADMINISTRATIVE REQUIREMENTS
		1. Pre-installation meetings:
			1. When required, and with prior notice, a PUMA System Manufacturer representative will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the system.

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SPEC NOTE: Gold Seal Warranted installations require site observations at a minimum rate as described below for warranty issuance. Contact Henry® Company technical services at (800) 486-1278 where projects require greater oversight or need project specific installation observation recommendations.

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* + 1. Installation observations:
			1. Onsite installation observations include the following phases:
				1. Substrate verification prior to PUMA system installation start
				2. PUMA system installation start
				3. PUMA system leak detection test
	1. SUBMITTALS
		1. Provide the following requested information in accordance with Section [project specific] Submittal Procedures.
		2. Action submittals:
			1. Product Data:
				1. PUMA System Manufacturer’s guide specification
				2. PUMA System Manufacturer’s complete set of technical data sheets
				3. PUMA System Manufacturer’s complete set of guide details
			2. Certificates:
				1. Product certification that the system components are supplied and warranted by single source PUMA System Manufacturer
				2. Statement that installing Subcontractor is Gold Seal authorized by PUMA System Manufacturer to complete Work as specified
				3. Copy of PUMA System Manufacturer’s current ISO Certifications
			3. Warranty:
				1. Warranty and verification documents as required by the PUMA System Manufacturer.

Sample warranty

Copy of warranty check list

* + - 1. Tests and evaluation reports:
				1. Copy of PUMA system leak detection test indicating passing results.

Electronic Leak Detection (ELD) or flood test

* 1. QUALITY ASSURANCE
		1. Single source responsibility:
			1. Obtain PUMA system and auxiliary materials including primer, flashings, reinforced waterproofing, protection course, aggregate, and cleaner from a single PUMA System Manufacturer regularly engaged in the manufacturing and supply of the specified products.
			2. Verify product compliance with federal, state, and local regulations.
		2. Manufacturer qualifications:
			1. PUMA System Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:
				1. PUMA System Manufacturer must not issue warranties for terms longer than they have been manufacturing/supplying specified products for similar scope of Work.
		3. Installer qualifications:
			1. Installing Subcontractor must be authorized to install PUMA System Manufacturer’s PUMA system.
			2. Perform Work in accordance with the PUMA System Manufacturer’s published literature and as specified in this section.
			3. Maintain one (1) copy of the PUMA System Manufacturer’s instructions on site.
				1. PUMA System Manufacturer’s technical bulletins
				2. PUMA System Manufacturer’s details
				3. PUMA System Manufacturer’s technical data sheets (TDS).
			4. At all times during the execution of the Work allow access to site by the PUMA System Manufacturer representative.
			5. If meeting with the PUMA System Manufacturer during project construction, contact the PUMA System Manufacturer a minimum of two weeks prior to schedule meeting.

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SPEC NOTE: Create mock-up to establish quality of work where practical. Projects not referencing Mock-Ups delete Section “1.9” as stated below.

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* 1. MOCK-UPS
		1. Mock-ups: Construct mock-ups to verify selections made under submittals and to set quality standards for materials and execution in accordance with Section [project specific] for mock-ups and as follows:
			1. Where directed by [engineer] [architect] [consultant], install typical PUMA system, ten (10) feet by ten (10) feet, incorporating PUMA system, substrate materials, and adjacent materials including surface preparation, crack and joint treatment, PUMA system application, flashings, transitions, and terminations.
		2. Notify [engineer] [architect] [consultant] a minimum fourteen (14) days prior to mock-up construction.
		3. Review and acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless [engineer] [architect] [consultant] specifically notes such deviations in writing.
		4. Once reviewed by [engineer] [architect] [consultant], acceptable mock-up can form a permanent part of the Work and will form the basis for acceptance for the remainder of the project.
		5. Remove and replace materials found unacceptable at no additional cost to Owner.
	2. DELIVERY, STORAGE, AND HANDLING
		1. Delivery of materials:
			1. Materials shall be delivered to the jobsite in undamaged and clearly marked containers indicating the name of the PUMA System Manufacturer and product.
		2. Storage of materials:
			1. Store materials as recommended by the PUMA System Manufacturer and conforming to applicable safety regulatory agencies. Refer to all applicable data including, but not limited to, Material Safety Data Sheets (MSDS), Technical Data Sheets (TDS), product labels, and specific instructions for personal protection.
			2. Keep solvents away from open flame or excessive heat.
			3. PUMA system should be stored in closed containers.
			4. Refer to PUMA System Manufacturer’s published literature.
		3. Handling:
			1. Provide adequate ventilation for protection from hazardous fumes.
			2. Protect areas not included in scope of work from overspray.
			3. Refer to PUMA System Manufacturer’s published literature.
	3. SITE CONDITIONS
		1. Environmental requirements:
			1. Do not perform Work during rain or inclement weather.
			2. Do not perform Work on frost covered substrates or surfaces that are not in accordance with PUMA System Manufacturer’s Tech-Talk Bulletins.
		2. Protection:
			1. It is the responsibility of the installing Subcontractor to protect all surfaces not included in scope of Work from overspray including, but not limited to, windows, doors, adjacent areas, and vehicles.
			2. Secure protective coverings against wind.
			3. Seal air intake ventilation equipment with activated carbon filters to prevent fumes from entering building.
			4. Provide odor control including, air fans, exhausts, and portable enclosure for mixing station as required.
		3. Complete preparation Work prior to installing the PUMA system.
		4. Ground all electrical equipment during operations.
	4. WARRANTY

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SPEC NOTE: Henry® Company offers three (3) warranty configurations. Select one (1) of the following warranty terms and desired warranty duration. Delete sections not applicable to project specific conditions

SPEC NOTE: Thirty (30) year Gold Seal Warranties are considered on a case by case basis. Contact Henry® for project specific authorization.

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* + 1. Warranty submittals to PUMA System Manufacturer:
			1. Contact Henry® Company sales representative for a complete list of required documents and procedures prior to material purchase. Warranties submitted without required documents and procedures completed may result in delay or rejection of warranty request.
		2. PUMA System single source [Material, System, Gold Seal] Warranty:
			1. Installing Subcontractor warranty:
				1. Installing Subcontractor must warranty the installation; provide material and labor costs for repair in the event of a leak as a result of faulty workmanship for a period of two (2) years from the date of installation completion.
			2. PUMA System Manufacturer’s single source warranty:
				1. Material warranty:

Installing Subcontractor must be an authorized subcontractor.

Manufacturer must warrant the material against product defect for a period of [five (5) ] [ten (10) ] [fifteen (15)] [twenty (20) years from date of purchase.

* + - * 1. System warranty:

Installing Subcontractor must be an authorized subcontractor.

Manufacturer must warranty the system and installation. Provide material and labor costs for repair for a period of [five (5) ] [ten (10) ] [fifteen (15)] [twenty (20) years from the date of installation completion as a result of any of the following:

Manufacturing product defect

Insulation shall retain a minimum of eighty percent (80%) of its thermal value for the duration of the insulation warranty.

Pavers shall not split, crack or disintegrate prematurely due to freeze-thaw cycling for the duration of the paver warranty.

* + - * 1. Gold Seal warranty:

Installing Subcontractor must be a Gold Seal Authorized Subcontractor.

Manufacturer must warranty the system and installation. Provide material and labor costs for repair for a period of [five (5) ] [ten (10) ] [fifteen (15)] [twenty (20) years from the date of installation completion as a result of any of the following:

Manufacturing product defect

Faulty workmanship

Insulation shall retain a minimum of eighty percent (80%) of its thermal value for the duration of the insulation warranty.

Pavers shall not split, crack or disintegrate prematurely due to freeze-thaw cycling for the duration of the paver warranty.

1. **PRODUCTS**
	1. MANUFACTURERS
		1. PUMA system shall comply with the following requirements:
			1. PUMA system and auxiliary materials must be warranted by a single source manufacturer.
			2. Reinforced PUMA field membrane:
				1. Polyurethane modified methyl methacrylate (PUMA) technology
				2. Elongation (ASTM D638): 283%
				3. ASTM C836/C836M-15
				4. Minimum application temperature: 40 °F
				5. Solids content by volume (ASTM D1644): 100%
				6. Volatile organic content (VOC) (ASTM C1250): 0 g/l
				7. Adhesion (ASTM C1583): >425 psi, substrate failure
				8. Tensile strength (ASTM D638): 1680 psi
				9. Elongation (ASTM D638): 283%
				10. Crack bridging (ASTM C1305): Pass
				11. Abrasion resistance (ASTM C501): 64 mg
				12. Harness (ASTM C2240): 35, Shore D
		2. Acceptable manufacturers:
			1. Henry Company

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El Segundo, CA 90245

(800) 486-1278

[www.Henry.com](http://www.Henry.com)

* 1. MATERIALS
		1. PumadeqTM system (Basis of Design):
			1. Catalyst:
				1. Dibenzoyl peroxide catalyst powder (BPO) used to initiate curing of polyurethane methyl methacrylate (PUMA) liquid resins; having the following typical properties:

Basis of design: PumadeqTM Catalyst

* + - 1. Primer; choose from the following:
				1. Standard primer:

PMMA primer having the following typical properties:

Basis of design: PumadeqTM Primer 20

Color(s): Colorless, cloudy

* + - * 1. Epoxy sealer/primer:

Two-component, epoxy sealer/primer specifically formulated to seal water and prevent vapor drive over saturated substrates or green concrete; having the following typical properties:

Basis of design:

Henry® GC Epoxy Primer Part A

Henry® GC Epoxy Primer Part B

Color(s): Gray, Red

* + - 1. Reinforced PUMA field membrane:
				1. Elastomeric polyurethane modified methacrylate (PUMA) membrane; having the following typical properties:

Basis of Design: PumadeqTM Flex 30SL

Color(s): White, Gray

* + - * 1. 100% polyester, non‐woven, needle punch constructed fleece combining high tensile and tear strength with puncture resistance; having the following typical properties:

Basis of Design: PumadeqTM N-Fleece

Color(s): White

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SPEC NOTE: Pumadeq™ Flex 30SL will yellow under indefinite UV exposure. Install Henry® Deqcoat™ 50 top coat at areas desiring long-term color stability. Install Pumadeq™ Grip 40 wear coat at areas anticipating pedestrian traffic or where overburden is directly bonded to the PUMA system. Edit Section below to suit project requirements: Delete Sections as applicable.

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* + - 1. Protection course; choose from the following:
				1. Color stability top coat:

Elastic poly methyl methacrylate (PMMA) topcoat specifically designed for areas requiring long term color stability:

Basis of design: Henry® Deqcoat™ 50

Color(s): White, gray, clear or custom

* + - * 1. Wear coat:

Liquid applied PUMA coating:

Elastomeric polyurethane modified methacrylate (PUMA) membrane specifically designed as an aggregate holding wear coat for areas anticipating pedestrian traffic or where overburden is directly bonded to the PUMA system; having the following typical properties:

Basis of Design: PumadeqTM Grip 40

Color(s): Gray

Filler:

Finely graded filler powder, having the following typical properties:

Basis of design: Henry® Filler

Color: White powder

Aggregate:

Dry, contamination free, silica sand; having the following typical properties:

Basis of Design: Silica sand

Sieve size: #20-50, #12 Silica or NJ0-NJ00

* + 1. Auxiliary materials:
			1. Reinforced PUMA flashing:
				1. Thixotropic polyurethane modified methacrylate (PUMA) membrane specifically designed for use as a reinforced flashing; having the following typical properties:

Basis of design: PumadeqTM Flex 31MV

Color(s): White

* + - * 1. 100% polyester, non‐woven, needle punch constructed fleece combining high tensile and tear strength with puncture resistance; having the following typical properties:

Basis of Design: PumadeqTM N-Fleece

Color(s): White

* + - 1. PUMA paste:
				1. Thixotropic polyurethane modified methacrylate (PUMA) membrane specifically designed for repairing substrate deficiencies such as concrete voids/bug holes; having the following typical properties:

Basis of design: PumadeqTM Flex 32TX

Color(s): White

* + - 1. PUMA cleaner:
				1. Liquid-based Methyl Methacrylate (MMA) specifically designed to re-activate the surfaces of PumadeqTM resins at tie-ins and overcoats that exceed 48 hours between coats, including repairs; having the following typical properties:

Basis of design: PumadeqTM Cleaning Fluid

Color(s): Colorless

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SPEC NOTE: Henry® Company offers optional pavers, rigid insulation, and/or prefabricated drainage composites as a single source warranty per project specific requirements. Select from the following, delete sections not applicable to project specific conditions, and coordinate with Section 3.03 Installation.

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* + 1. Additional Materials:
			1. Insulation:
				1. Extruded polystyrene rigid board insulation supplied by Henry® Company; having the following typical properties:

Acceptable Manufacturers:

DOW

Owens Corning

Minimum thermal resistance (R-Value): Project specific Minimum R-Value

Cellular Polystyrene Thermal Insulation (ASTM C-578): [Type VI], [Type VII]

Compressive Strength: [40], [60], [100] psi.

Water Absorption (ASTM C272): 0.1%

* + - 1. Drainage Composite; choose from the following:
				1. Vertical applications:

Basis of Design: Henry® DB200

Compressive strength: 11,000 lbs./ft2

Flow rate: 12.5 gpm/ft2

Basis of Design: Henry® DB500

Compressive strength: 15,000lbs./ft2

Flow rate: 17 gpm/ft2

* + - * 1. Horizontal applications:

Basis of Design: Henry® DB200

Compressive strength: 11,000 lbs./ft2

Flow rate: 12.5 gpm/ft2

Basis of Design: Henry® DB350

Compressive strength: 30,000 lbs./ft2

Flow rate: 13 gpm/ft2

Basis of Design: Henry® DB650

Compressive strength: 18,000 lbs./ft2

Flow rate: 21 gpm/ft2

* + - 1. Filter Fabric:
				1. Non-woven biodegradable geotextile fabric made up of polypropylene fibers and resistance to most soil chemicals, acids, and alkali with a pH range of 3 to 12:

Basis of Design: Henry® Filter Fabric NO4

* + - 1. Paver ballast:
				1. Paver and pedestal assembly supplied by Henry® Company; choose from the following:

Acceptable Manufacturers:

Bison

Hanover

T-Clear

Wausau

Westile

1. **EXECUTION**
	1. EXAMINATION
		1. It is the installing Subcontractor’s responsibility to verify substrates are ready to accept the Work of this Section in accordance with the PUMA System Manufacturer’s Substrate Preparation Guidelines Tech-Talk Bulletin, product specific TDS, and and as stated in this specification prior to installation of the PUMA system. Commencement of Work or any parts thereof shall mean installer’s acceptance of the substrate.
			1. Notify Contractor in writing of any conditions that are not acceptable.
		2. Ensure all components are in place, including, but not limited to, copings, railings, flashings, electrical conduit, pipes, pedestals, or curbs.
		3. Concrete surface profiles:
			1. Surface profiles must meet ICRI CSP 3-5. Refer to PUMA System Manufacturer’s Concrete Surface Profiles Tech-Talk Bulletin.
		4. As a requirement for meeting warranty conditions, the installing Subcontractor must verify substrate suitability prior to installation of the PUMA system.
			1. Moisture detection survey:
				1. Conduct a moisture detection survey in accordance with the PUMA System Manufacturer’s Moisture Test Methods Tech-Talk Bulletin.
			2. Adhesion/pull test:
				1. An optional PUMA primer adhesion test, in accordance with ASTM C1583, may be completed prior to installation of PUMA system in accordance with the PUMA System Manufacturer’s Coating Adhesion Test Guidelines Tech-Talk Bulletin.
		5. Do not apply PUMA system until substrate and environmental conditions are in accordance with PUMA System Manufacturer’s Tech-Talk Bulletin’s, TDS, and as specified in this Section.
	2. PREPARATION
		1. Refer to PUMA System Manufacturer’s Application Tools and Equipment Tech-Talk Bulletin.
		2. All surfaces must be sound, dry, clean, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.
		3. Protect adjacent surfaces not included in scope of Work to prevent spillage and overspray.
		4. Block drains to prevent clogging, except during rain events.
		5. Substrate preparation:
			1. Refer to PUMA System Manufacturer’s Substrate Preparation Guidelines Tech-Talk Bulletin for further information including, but not limited to, the following:
				1. Concrete cure time
				2. Concrete compressive strength
				3. Substrate finish for concrete, metal, PVC, exterior grade sheathing, and masonry.
			2. Prepare substrates a minimum of two (2) inches beyond anticipated PUMA system installation.
	3. INSTALLATION
		1. Ensure substrate is ready to receive PUMA system in accordance with PUMA System Manufacturer’s Tech-Talk Bulletin’s and TDS.
		2. Temperature limitations:
			1. Refer to PUMA System Manufacturer’s Catalyst Mixing Ratios Tech-Talk Bulletin and product specific TDS for product specific temperature guidelines.
		3. Primer:
			1. Apply primer to all surfaces anticipating PUMA system installation in accordance with PUMA System Manufacturer’s TDS.
			2. Refer to PUMA System Manufacturer’s Substrate Primer Guidelines Tech-Talk Bulletin.
		4. Detailing/flashing:
			1. Install detailing and flashings per PUMA System Manufacturer’s product specific TDS, details, and guide specification.
			2. Refer to PUMA System Manufacturer details including, but not limited to, the following:
				1. Drains
				2. Inside corners
				3. Outside corners
				4. Pipe penetrations
				5. Substrate terminations
				6. Wall/curb to deck interface
			3. Reinforced PUMA flashing:
				1. Install PUMA flashing in accordance with PUMA System Manufacturer’s TDS and details.
				2. Install one (1) layer of PUMA flashing membrane in accordance with PUMA System Manufacturer’s TDS; extending one (1) inch beyond anticipated area of fleece reinforcement. Refer to product specific TDS for recommended application rates.

Do not install PUMA flashing membrane beyond cured primer.

* + - * 1. Embed fleece reinforcement into PUMA flashing membrane.

Roll or brush fleece for proper adhesion and removal of voids, folds, and wrinkles.

Lap adjoining fleece edges a minimum of three (3) inches. Dry overlap is not acceptable.

Allow PUMA flashing membrane to cure in accordance with PUMA System Manufacturer product specific TDS.

* + - * 1. Apply second layer of PUMA flashing membrane in accordance with PUMA System Manufacturer’s product specific TDS; extending one (1) inch beyond fleece reinforcement. Refer to product specific TDS for recommended application rates.

Do not install PUMA flashing membrane beyond cured primer.

Ensure fleece is fully coated and has a smooth and continuous watertight finish.

Allow reinforced PUMA flashing membrane to cure in accordance with PUMA System Manufacturer product specific TDS prior to subsequent installations.

* + 1. Application of reinforced PUMA field membrane:
			1. Allow primer and flashing to cure in accordance with PUMA System Manufacturer product specific TDS.
			2. Install one (1) layer of PUMA field membrane in accordance with PUMA System Manufacturer’s TDS; extending one (1) inch beyond anticipated area of fleece reinforcement. Refer to product specific TDS for recommended application rates.
				1. Do not install PUMA field membrane beyond cured primer.
			3. Embed fleece reinforcement into PUMA field membrane.
				1. Roll or brush fleece for proper adhesion and removal of voids, folds, and wrinkles.
				2. Lap adjoining fleece edges a minimum of three (3) inches. Dry overlap is not acceptable.
				3. Allow PUMA field membrane to cure in accordance with PUMA System Manufacturer product specific TDS.
			4. Apply second layer of PUMA field membrane in accordance with PUMA System Manufacturer’s product specific TDS; extending one (1) inch beyond fleece reinforcement. Refer to product specific TDS for recommended application rates.
				1. Do not install PUMA field membrane beyond cured primer.
				2. Ensure fleece is fully coated and has a smooth and continuous watertight finish.
				3. Allow reinforced PUMA field membrane to cure in accordance with PUMA System Manufacturer product specific TDS prior to subsequent installations.

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SPEC NOTE: Pumadeq™ Flex 30SL will yellow under indefinite UV exposure. Install Henry® Deqcoat™ 50 top coat at areas desiring long-term color stability. Install Pumadeq™ Grip 40 wear coat at areas anticipating pedestrian traffic or where overburden is directly bonded to the PUMA system. Edit Section below to suit project requirements: Delete Sections as applicable.

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* + 1. Application of protection course, choose from the following:
			1. Color stability top coat:
				1. Install one (1) layer of top coat in accordance with PUMA System Manufacturer’s TDS.
			2. Wear coat:
				1. Install one (1) layer of wear coat in accordance with PUMA System Manufacturer’s TDS.
				2. Fully broadcast, to rejection, dry silica sand onto wet wear coat.
				3. Allow wear coat to cure in accordance with PUMA System Manufacturer’s product specific TDS prior to subsequent installations.
				4. Remove excess aggregate; choose from the following:

Heavy duty brooms

Mechanical blowing equipment

Industrial vacuum

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SPEC NOTE: To qualify for warranty issuance, the PUMA system must be tested for leaks by either Electronic Leak Detection (ELD) or flood testing. Henry® Company recommends Electronic Leak Detection (ELD) in lieu of flood testing

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* + 1. PUMA system leak detection test:
			1. A PUMA system leak detection test must be performed upon completion of the PUMA system and prior to acceptance of Work, verifying the PUMA system was installed in accordance with PUMA System Manufacturer’s published literature and in compliance of warranty issuance.
				1. Allow PUMA system to fully cure prior to leak detection test. Cure times may vary; refer to PUMA System Manufacturer technical data sheet (TDS).
			2. Acceptable methods; choose from the following:
				1. Electronic Leak Detection(ELD):

Contact pre-approved test provider several weeks in advance to coordinate schedule.

Conduct ELD in accordance with ELD standard practices.

* + - * 1. Flood Test:

Provide temporary stops and plugs for the roof drains within the test area.

Conduct flood test in accordance with ASTM D5957.

Minimum of 2 inches of water, for no less than 24 hours.

In the event of membrane breach, repair, and retest the system for no less than 24 hours.

Remove temporary stops and plugs.

* + - * 1. In the event of membrane breach, repair and retest the system in accordance with PUMA System Manufacturer’s published literature.
				2. Report test results to the [Architect] [Consultant] [General Contractor].
				3. Submit test results with the warranty application to the PUMA System Manufacturer.

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SPEC NOTE: Henry® Company offers optional pavers, rigid insulation, and/or prefabricated drainage composites as a single source warranty per project specific requirements. Delete sections not applicable to project specific conditions, and coordinate with Section 2.02 Materials.

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* + 1. Installation of insulation:
			1. Loose lay insulation onto cured PUMA system in full continuous sheets completely covering the field membrane to maximize thermal resistance.
			2. Refer to Insulation Manufacturer’s published literature for a complete guide of required installation practices and exposure limitations.
		2. Installation of drainage composite:
			1. Install drainage composite in a shingle pattern starting at the low point(s)/drain location(s) in full continuous sheets to promote drainage.
			2. Abut adjacent drainage composite panels, overlapping the fabric approximately one (1) inch and closely adjoining nest cups.
			3. Cut drainage composite to fit around penetrations and drain(s).
		3. Installation of filter fabric:
			1. Install filter fabric in a shingle pattern starting at the low point(s)/drain location(s).
			2. Loose lay filter fabric in full continuous sheets to promote debris obstruction.
			3. Overlap filter fabric adjoining edges approximately six (6) inches.
		4. Installation of paver ballast:
			1. Install paver ballast ensuring pavers are accurately aligned and leveled with upper surface of adjacent units.
			2. Cut paver ballast to fit irregularly shaped areas and around protrusions.
			3. Install paver ballast in accordance with Paver Ballast Manufacturer's published literature.
			4. Refer to project specific drawings for specified location and layout.
	1. FIELD QUALITY CONTROL
		1. Limit traffic on PUMA system until PUMA system is fully cured. Cure times may vary; refer to PUMA System Manufacturer TDS.
		2. Damage to surface by other trades shall not be the responsibility of the installing Subcontractor.
			1. Provide temporary protection as required:
				1. Do not damage PUMA system during other Work including, but not limited to, cutting, welding, and nailing.
				2. Install three-quarter (3/4) inch plywood for temporary protection of PUMA system where metal skid steer or tracked vehicles are anticipated.
		3. Do not penetrate PUMA system. Ensure all components are in place, including, but not limited to, copings, railings, flashings, electrical conduit, pipes, pedestals, or curbs prior to PUMA system installation.
			1. Contact Henry® where subsequent penetrations are anticipated.
		4. Do not allow the PUMA system to directly contact any of the following:
			1. Petroleum
			2. Grease
			3. Acid solvents
			4. Direct steam
		5. Final Observation and Verification:
			1. Final inspection of the PUMA system shall be carried out by the Owner’s representative, the installing Subcontractor, or Product Type Manufacturer] as required by warranty.
			2. Contact PUMA System Manufacturer for warranty issuance requirements.
	2. CLEANING
		1. As the Work proceeds, and upon completion, promptly clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing Work.
		2. Clean soiled surfaces, spatters, and damage caused by Work of this Section.
		3. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

END OF SECTION