

**EFFECTIVE OCTOBER 30, 2020 AND SUPERSEDES ALL PREVIOUS VERSIONS.**

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**SPEC NOTE: Henry® Vegetative Roofing for 790-11 or 790-11EV Hot Applied Rubberized Asphalt Waterproofing/Roofing System.** This specification is ideally suited for the protection and waterproofing of roofs and decks where vegetative overburden is anticipated.

SPEC NOTE: Henry 790-11 hot rubberized asphalt waterproofing/roofing system is certified by FM approval when installed per FM approved tested criteria. Buildings requiring a FM approved Henry 790-11 assembly must refer to the FM RoofNav Assembly Number: 397437-397438-0 for authorized assembly components and utilize the Henry 790-11 FM specific guide specification.

SPEC NOTE: This guide specification is a reference for recommended installation procedures of the products/assembly described; formatted in accordance with the Construction Specifications Institute (CSI) Manual of Practice. It is the discretion of the project specification author to use the information within as a whole, or in part, to set a minimum standard of performance. Update “[project specific]” notes and coordinate as required. Use of General Contractor/installing Subcontractor identified accordingly; modify 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 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.

SPEC NOTE: Contact Henry Company technical services at (800) 486-1278 for hurricane speed winds or Miami Dade installation requirements.

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**SECTION 07 55 63  
VEGETATED PROTECTED MEMBRANE ROOFING**

**PART 1 - GENERAL**

**1.01. GENERAL REQUIREMENTS**

- A. The General Conditions, Supplementary Conditions, Instructions to Bidders, and Division 01-General Requirements shall be read in conjunction with and govern this section.
- B. 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.

**1.02. SUMMARY**

- A. This Section includes requirements for supplying labor, materials, tools, and equipment to complete the Work as shown on the Drawings Architectural Division and as specified herein including, but not limited to, the following:
  - 1. Primer
  - 2. Flashing
  - 3. Reinforced Hot Rubberized Asphalt Waterproofing Membrane
  - 4. Protection Course/Separation Sheet
  - 5. Root Barrier
  - 6. Drainage Composite (Optional)
  - 7. Insulation

8. Water Retention and Drainage Composite
9. Moisture Retention Fabric (Optional)
10. Filter Fabric
11. Metal Edging
12. Drain Inspection Chambers
13. Growing Media
14. Erosion Control (Optional)
15. Vegetation
16. Paver Ballast (Optional)

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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 specify a continuous air and watertight building envelope. Contact manufacturer(s) where products transition from one assembly to another to confirm minimum installation requirements for warranty issuance.  
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1.03. RELATED REQUIREMENTS

- A. DIVISION 03 – Concrete, Section 03 50 00 – Cast Roof Decks
  1. Coordination of this section is necessary to facilitate the successful installation of the waterproofing membrane. Refer to Sections 3.01 Examination and 3.02 Preparation for additional information.
  2. Acceptable substrates:
    - a. Form Release Agents: Submit technical data sheet to Henry® Company technical services for formal review.
    - b. Curing compounds: Submit technical data sheet to Henry Company technical services for formal review.
    - c. Cast-in-Place/Precast Structural Concrete/Composite Deck:
      1. Strength/density:
        - a. Minimum 2,500 psi (17 mPa) compressive strength and minimum 115 pcf (1842 kg/m3) density
      2. Finish:
        - a. Broom, wood-float, or wood-troweled equivalent finish.
      3. Concrete Hydration (Cure):
        - a. Method of Cure: Water cure, wet coverings, paper sheets, plastic sheets or approved liquid curing compound (sodium silicate preferred).
        - b. Duration of Cure/Dry:
          1. Recommend 28 days, minimum 14 days, after concrete form removal.
    - d. Lightweight Insulating Concrete:
      1. Not an acceptable substrate.
    - e. Lightweight Structural Concrete:
      1. Metal pan decks should be venting type.
      2. Contact Henry Company technical services if metal pan deck is not venting type.
      3. Strength/density:
        - a. Minimum 2,500 psi (17mPa) compressive strength and minimum 115 pcf (1842 kg/m3) density
      4. Finish:
        - a. Broom, wood-float, or wood-troweled equivalent finish.
      5. Concrete Hydration (Cure):
        - a. Method of Cure: Water cure, wet coverings, paper sheets, plastic sheets or approved liquid curing compound (sodium silicate preferred).
        - b. Duration of Cure/Dry:
          1. Recommend 60 days, minimum 28 days, after concrete form removal.

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SPEC NOTE: Metal pan decks should be venting type due to moisture trapping potential. Coordinate metal decking section as required and contact Henry Company technical services at (800) 486-1278 for further assistance.  
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- B. DIVISION 05 – Metals, Section 05 30 00 – Metal Decking
  - 1. Acceptable Substrates:
    - a. Metal Deck
      - 1. Vented metal deck
- C. DIVISION 06 – Wood, Plastics, and Composites, Section 06 16 00 – Sheathing
  - 1. Acceptable Substrates:
    - a. Sheathing over [metal decking] [steel decking]
      - 1. Gypsum roof board:
        - a. Thickness: 5/8” (15.9 mm) minimum
      - 2. Plywood:
        - a. Thickness: 1/2” (12 mm) minimum
        - b. Tongue and groove joints: required
        - c. Free of chemicals that may affect membrane adhesion.
- D. DIVISION 07 – Flashing and Sheet Metal, Section 07 62 00 – Sheet Metal Flashing and Trim
- E. DIVISION 07 – Thermal and Moisture Protection, Section 07 22 16 – Roof Board Insulation
- F. DIVISION 07 – Thermal and Moisture Protection, Section 07 92 00 – Joint Sealants
- G. DIVISION 22 – Plumbing, Section 22 14 00 – Facility Storm Drainage
- H. DIVISION 32 – Exterior Improvements, Section 32 80 00 – Irrigation
- I. DIVISION 32 – Exterior Improvements, Section 32 90 00 – Planting

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SPEC NOTE: Projects not referencing LEED delete Sections “1.03. J” and “1.06.H” as stated below.  
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- J. DIVISION – Project Specific # - LEED Requirements [Section Project Specific #] – Project Specific Title.

1.04. ALTERNATES

- A. Submit requests for alternates in accordance with Section [project specific].
- B. Vegetative Roofing must meet the following standards:
  - 1. A single source manufacturer must warrant vegetative roofing components.
  - 2. Hot Rubberized Asphalt Waterproofing:
    - a. UL/ULC: Class A Classification for use in Ballasted Systems.
    - b. Meets ASTM D5329; chemically resistant to water, calcium, chloride, salt, mild acid, alkaline solutions, fertilizer, and animal waste.
    - c. CAN/CGSB-37.50-M89, Standard for Asphalt, Rubberized, Hot Applied, for Roofing and Water-proofing
    - d. FM Approval Certification 4470
- C. 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 Vegetative Roofing Manufacturer has successfully completed projects of similar scope and nature on an annual basis for a minimum of ten (10) years.
  3. Vegetative Roofing Manufacturer's complete set of technical data sheets for assembly.
- D. Submit requests for alternates to this specification a minimum of ten (10) working days prior to bid date. Include a list of twenty-five (25) projects executed over the past five (5) years.
- E. Issued addendums confirm acceptable alternates. Do not submit substitute materials after tender closing.

#### 1.05. DEFINITIONS

- A. Vegetated Roofing – Vegetation/landscaping installed over a waterproofed substrate separated from the ground surface by a manufactured structure.
- B. Extensive Vegetative Roofing – Low maintenance landscaping consisting of shallow growing media depths (< 6 inches (152 mm)) with plant varieties restricted to primarily mosses, herbs and succulents capable of withstanding harsh growing conditions.
- C. Intensive Vegetative Roofing – Regular maintenance landscaping, consisting of deeper growing media depths (> 6 inches (152 mm)) with a variety of feasible plant species including shrubs and small trees.
- D. Vegetative Roofing – Complete system consisting of, but not limited to, the following components supplied for the installation of vegetative roofing over Henry 790-11/790-11EV hot rubberized asphalt:
  1. Root barrier, aeration, drainage, insulation, water retention, filter fabric, growing media, and vegetation.
- E. Steep Slope Vegetated Roofing – sloped substrates exceeding 3:12 pitch.

#### 1.06. REFERENCES

- A. American Society for Testing and Materials (ASTM):
  1. ASTM D41M-11: Asphalt Primer used in Roofing, Dampproofing, and Waterproofing.
  2. ASTM D92-12: Standard Test Method for Flash and Fire Points by Cleveland Open Cup
  3. ASTM D3407: Standard Test Method for Joint Sealants, Hot Poured, for Concrete and Asphalt Pavements.
  4. ASTM D5329-09: Standard Test Method for Sealants and Fillers, Hot-Applied for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.
  5. ASTM E96: Water Vapor Transmission of Materials
  6. ASTM E2397-11 - Standard Practice for Determination of Dead Loads and Live Loads Associated with Vegetative (Green) Roof Systems.
  7. ASTM E2399-11 - Standard Test Method for Maximum Media Density for Dead Load Analysis of Vegetative (Green) Roof Systems.
  8. ASTM E2400-06 - Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems.
- B. ANSI/SPRI
  1. VF- 1 External Fire Design Standard for Vegetative Roofs.

- 2. RP-14 Wind Design Standard for Vegetative Roofing Systems.
- C. Canadian General Standards Board (CGSB):
  - 1. CAN/CGSB-37.50-M89, Standard for Asphalt, Rubberized, Hot Applied, for Roofing and Water-proofing
  - 2. CAN/CGSB-37.51M90, Application for Hot-Applied Rubberized Asphalt, for Roofing and Waterproofing
  - 3. CAN/CGSB-37-GP-56M, Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing.
  - 4. CAN/CGSB-37-GP-9MA, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
- D. Factory Mutual (FM):
  - 1. Approval Standard for Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction (Class Number 4470)
- E. Underwriters Laboratories (UL):
  - 1. UL/ULC: Class A Classification for use in Ballasted Systems
- F. 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>.

1.07. ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meetings:
  - 1. When required, and with prior notice, a Vegetative Roofing 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 assembly.

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SPEC NOTE: Observe Gold Seal Warranted installations as described below. Material and System Warranties do not require installation observations. Delete sections not applicable to project specific conditions.  
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- B. Installation Observations:
  - 1. Onsite installation observations include the following phases:
    - a. Waterproofing membrane installation start
    - b. Prior to overburden installation
    - c. Plant installation

1.08. SUBMITTALS

- A. Provide the following requested information in accordance with Section [project specific] Submittal Procedures.
- B. Action Submittals:
  - 1. Product Data:
    - a. Vegetative Roofing Manufacturer's guide specification.
    - b. Vegetative Roofing Manufacturer's complete set of technical data sheets for assembly.
    - c. Vegetative Roofing Manufacturer's complete set of standard details.
    - d. Evidence that the waterproofing assembly meets the following standards:
      - 1. CAN/CGSB-37.50-M89
      - 2. UL/ULC: Class A Classification for use in Ballasted Systems

2. Certificates:
  - a. Product certification stating that assembly components are supplied and warranted by a single source Vegetative Roofing Manufacturer.
  - b. Statement that installing Subcontractor is authorized by Vegetative Roofing Manufacturer to complete Work as specified.
  - c. Copy of Vegetative Roofing Manufacturer's current ISO Certifications
3. Warranty:
  - a. Warranty and verification documents as required by the Vegetative Roofing Manufacturer.
    1. Sample warranty
4. Shop Drawings:
  - a. Subcontractor to provide documentation indicating vegetative roofing layout to confirm design intent and indicate where Vegetative Roofing Manufacturer typical details apply.

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SPEC NOTE: Mock-ups establish quality of Work for the materials indicated in this Section. Delete the following paragraph if the scope of work in this Section is minimal and a mock-up is not required.  
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1.09. MOCK-UPS

- A. Mock-ups:
  1. Where directed by [engineer] [architect] [consultant] construct mock-ups to verify selections made under submittals and to set quality standards for materials and execution in accordance with Section [project specific].

1.10. QUALITY ASSURANCE

- A. Single Source Responsibility:
  1. Obtain vegetative roofing and auxiliary materials including waterproofing, flashings, fabric reinforcement, sealants, adhesives, and overburden as authorized from a Vegetative Roofing Manufacturer regularly engaged in the manufacturing and supply of the specified products.
  2. Verify product compliance with federal, state, and local regulations.
- B. Manufacturer Qualifications:
  1. Vegetative Roofing Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:
    - a. Vegetative Roofing Manufacturer must not issue warranties for terms longer than they have been manufacturing and supplying specified products for similar scope of Work.
- C. Installer Qualifications:
  1. Waterproofing installing Subcontractor:
    - a. Only authorized Subcontractor(s) shall install the vegetative roofing.
    - b. Perform Work in accordance with the Vegetative Roofing Manufacturer's published literature and as specified in this section.
    - c. Maintain one (1) copy of the Vegetative Roofing Manufacturer's instructions on site.
    - d. Allow the Vegetative Roofing Manufacturer representative site access during installation.
    - e. Contact the Vegetative Roofing Manufacturer a minimum of two weeks prior to scheduling a meeting.

1.11. DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials:

1. Deliver materials to the jobsite in undamaged and clearly marked containers and/or wrapping indicating the name of the Vegetative Roofing Manufacturer and product.
- B. Storage of Materials:
1. Store materials as recommended by the Vegetative Roofing Manufacturer and conform to applicable safety regulatory agencies. Refer to all applicable data including, but not limited to, SDS sheets, Product Data sheets, product labels, and specific instructions for personal protection.
  2. Keep solvents away from open flame or excessive heat.
  3. Store rolled materials on end.
  4. Product requirements may vary. Refer to Vegetative Roofing Manufacturer's published literature.
- C. Handling:
1. Product requirements may vary. Refer to Vegetative Roofing Manufacturer's published literature.

1.12. SITE CONDITIONS

- A. 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 wet to touch.
  3. Product requirements may vary. Refer to Vegetative Roofing Manufacturer's published literature.
- B. Protection:
1. It is the responsibility of the installing Subcontractor to protect all surfaces not included in scope of Work from damage.
  2. It is the responsibility of the General Contractor to organize and protect installed waterproofing components from damage by other trades.
    - a. Temporary protection:
      1. Protect waterproofing membrane to prevent damage from work of other trades, foreign materials, and exposure to oil or solvents until permanent protection provided.
- C. Complete preparation Work prior to installing the vegetative roofing.
- D. Ground all electrical equipment during operations.

1.13. WARRANTY

- A. Single Source Warranty:
1. Installing Subcontractor Warranty:
    - a. Installing Subcontractor must warrant the system and installation. Provide material and labor costs for repair for a period of two years from the date of installation completion as a result of any of the following:
      1. Faulty workmanship

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SPEC NOTE: Henry Company offers two (2) warranty configurations. Select one (1) of the following warranty terms and desired warranty durations. Delete sections not applicable to project specific conditions.  
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2. Manufacturer's Single Source Warranty:
  - a. System warranty:
    1. Installing Subcontractor must be an authorized subcontractor.

2. Manufacturer must warrant 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:
  - a. Manufacturing product defect
3. Insulation shall retain a minimum of eighty percent (80%) of its thermal value for the duration of the insulation warranty.
4. Pavers shall not split, crack or disintegrate prematurely due to freeze-thaw cycling for the duration of the paver warranty.
- b. Gold Seal warranty:
  1. Installing Subcontractor must be a Gold Seal Authorized Subcontractor.
  2. Manufacturer must warrant 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:
    - a. Manufacturing product defect
    - b. Faulty workmanship
  3. Insulation shall retain a minimum of eighty percent (80%) of its thermal value for the duration of the insulation warranty.
  4. Pavers shall not split, crack or disintegrate prematurely due to freeze-thaw cycling for the duration of the paver warranty.
  5. Vegetative survival rate coverage:
    - a. One (1) year after installation: Minimum fifty percent (50%)
    - b. Two (2) yeas after installation: Minimum eighty percent (80%)

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SPEC NOTE: Henry Company collaborates with various green roof component suppliers to accommodate project specific designs. Project specific modifications to Henry supplied vegetative roofing materials as described below may vary as needed. Contact Henry Company for alternative solutions and warrantable product substitutions.  
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## PART 2 - PRODUCTS

### 2.01. MANUFACTURERS

- A. Acceptable Manufacturers:
  1. Henry Company  
 999 N. Pacific Coast Highway, Suite 800  
 El Segundo, CA 90245  
 (800) 486-1278  
[www.henry.com](http://www.henry.com)

### 2.02. MATERIALS

- A. Obtain vegetative roofing and auxiliary materials as authorized from a Vegetative Roofing Manufacturer regularly engaged in the manufacturing, supply and approval of the specified products to ensure compatibility, warranty, and compliance with the following requirements:
  1. Hot applied rubberized asphalt waterproofing/roofing assembly; having the following properties:
    - a. Complies with CAN/CGSB-37.50
    - b. Meets ASTM D5329; chemically resistant to water, calcium, chloride, salt, mild acid, alkaline solutions, fertilizer, and animal waste.
    - c. FM Approval Certification 4470



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SPEC NOTE: Henry Company supplies two types of hot rubberized asphalt. Warranty duration and performance characteristics remain constant for both 790-11 and 790-11EV, however Henry 790-11EV is comprised of recycled content as listed in the product description below. Delete sections not applicable to project specific conditions.  
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B. Primary Assembly Products:

1. Hot Applied Rubberized Asphalt Waterproofing/Roofing Membrane; choose from the following:
  - a. Hot applied, rubberized asphalt composed of a specially selected blend of refined asphalts, synthetic rubber and mineral stabilizers to promote adhesion, improve low temperature flexibility, and provide a monolithic fully bonded roofing and waterproofing membrane; having the following typical properties:
    1. Basis of Design: Henry 790-11 EV Environmental Grade Hot Applied Rubberized Asphalt Waterproofing/Roofing Membrane
    2. Complies with CAN/CGSB-37.50
    3. Recycled Content: 25%
    4. Chemical Resistance:
      - a. Resists water, calcium chloride, salt, mild acids, alkaline solutions, fertilizer, and animal waste
      - b. Non-resistant to oil, grease, or solvents
    5. Solids Content: 100%
    6. Flash Point (Open cup): 555 degrees F (291 degrees C)
    7. Flow (1/8" film, 75 degree angle, 5 hours @ 140 degrees F): No Flow
    8. Toughness (CAN/CGSB-37.50): 16.0J
    9. Ratio of Toughness to Peak Load (CAN/CGSB-37.50): 0.05
    10. Water Absorption (CAN/CGSB-37.50): +0.10 g
    11. Low Temperature Flexibility and Adhesion @ Minus 13°F (CAN/CGSB-37.50):
      - a. No cracking
      - b. No loss of adhesion
      - c. No delamination
    12. Heat Stability for 5 hours @ 390°F (CAN/CGSB-37.50):
      - a. No loss of adhesion
      - b. Meets Flow, Penetration
    13. Crack Bridging Capability:
      - a. No cracking
      - b. No splitting
    14. Viscosity @ 390 degrees F (CAN/CGSB-37.50): Low temperature flexibility
    15. Resistance to Hydrostatic Pressure
    16. Volatile Organic Content (VOC) (ASTM D3960/EPA Method 24): 0 grams/liter
    17. Water Vapor Permeability (ASTM E96 Procedure E): 0.016 perms
  - b. Hot applied, rubberized asphalt composed of a specially selected blend of refined asphalts, synthetic rubber and mineral stabilizers to promote adhesion, improve low temperature flexibility, and provide a monolithic fully bonded roofing and waterproofing membrane; having the following typical properties:
    1. Basis of Design: Henry 790-11 Hot Applied Rubberized Asphalt Waterproofing/Roofing Membrane
    2. Complies with CAN/CGSB-37.50
    3. Chemical Resistance:
      - a. Resists water, calcium chloride, salt, mild acids, alkaline solutions, fertilizer, and animal waste
      - b. Non-resistant to oil, grease, or solvents
    4. Solids Content: 100%
    5. Flash Point (Open cup): 555 degrees F (291 degrees C)
    6. Flow (1/8" film, 75 degree angle, 5 hours @ 140 degrees F): No Flow
    7. Toughness (CAN/CGSB-37.50): 16.0J

8. Ratio of Toughness to Peak Load (CAN/CGSB-37.50): 0.05
9. Water Absorption (CAN/CGSB-37.50): +0.10 g
10. Low Temperature Flexibility and Adhesion @ Minus 13°F (CAN/CGSB-37.50):
  - a. No cracking
  - b. No loss of adhesion
  - c. No delamination
11. Heat Stability for 5 hours @ 390°F (CAN/CGSB-37.50):
  - a. No loss of adhesion
  - b. Meets Flow, Penetration
12. Crack Bridging Capability:
  - a. No cracking
  - b. No splitting
13. Viscosity @ 390 degrees F (CAN/CGSB-37.50): Low temperature flexibility
14. Resistance to Hydrostatic Pressure
15. Volatile Organic Content (VOC) (ASTM D3960/EPA Method 24): 0 grams/liter
16. Water Vapor Permeability (ASTM E96 Procedure E): 0.016 perms

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SPEC NOTE: Henry Company supplies two types of primer for the hot rubberized asphalt waterproofing system. Henry 910 Asphalt Primer achieves significantly improved adhesion; however, Henry 930 Polymer Modified Adhesive is required in OTC States for VOC compliance. Delete sections not applicable to project specific conditions.  
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2. Primer; choose from the following:
  - a. Solvent based synthetic rubber adhesive, where VOC compliant, for priming surfaces prior to hot rubberized asphalt application to assure substrate bond:
    1. Basis of Design: Henry 930-18 Polymer Modified Adhesive
  - b. Thin penetrating solution of selected asphalt base in a petroleum solvent for priming surfaces prior to hot rubberized asphalt application to assure substrate bond:
    1. Basis of Design: Henry 910-01 Asphalt Primer
3. Polyester fabric reinforcement:
  - a. Polyester Fabric unsaturated spun bonded polyester mat reinforcement sheet:
    1. Basis of Design: Henry Polyester Fabric

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SPEC NOTE: Henry Company offers flashing membrane options for exposed and non-exposed installations. Henry Company recommends the use of Henry 990-25 Henry ModifiedPLUS® NP180, or Pumadeq™ System flashings in place of standard neoprene sheets. Delete sections not applicable to project specific conditions.  
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4. Flashing membranes; choose from the following:
  - a. Torch grade flashing; choose from the following:
    1. SBS modified bitumen non-woven polyester reinforced granulated cap sheet with a thermofusible poly lower surface for torch applied installation to substrate specifically designed for indefinite UV exposure:
      - a. Basis of Design: Henry ModifiedPLUS® NP180gT4
    2. SBS modified bitumen with a sanded upper surface to receive liquid applied membranes and a thermofusible lower surface for torch applied installation:
      - a. Basis of Design: Henry ModifiedPLUS NP180s/p
  - b. Mop grade flashing; choose from the following:
    1. SBS modified bitumen non-woven polyester reinforced granulated cap sheet with a sanded lower surface for liquid applied membrane installation to substrate specifically designed for indefinite UV exposure:
      - a. Basis of Design: Henry ModifiedPLUS NP180gM4

- 2. SBS modified bitumen non-woven polyester reinforced membrane with a sanded upper and lower surface for liquid applied membrane installation to substrate not intended for indefinite UV exposure:
  - a. Basis of Design: Henry ModifiedPLUS NP180s/s
- 3. Butyl and EPDM polymer combination flexible flashing membrane specifically designed for enhanced elongation:
  - a. Basis of Design: Henry 990-25 Elastomeric Flashing Sheet Unreinforced
- 4. Uncured neoprene flexible flashing membrane specifically designed for enhanced elongation:
  - a. Basis of Design: Henry Neoflash Uncured Neoprene
- c. Liquid applied flashing:
  - 1. Polyurethane modified methyl methacrylate (PUMA) reinforced liquid flashing:
    - a. Basis of Design: Henry Pumadeq™ System
- 5. Protection course/separation sheet:
  - a. SBS modified bitumen glass reinforced membrane with a sanded upper and lower surface for liquid-applied membrane installation not intended for indefinite UV exposure:
    - 1. Basis of Design: Henry ModifiedPLUS G100s/s
- 6. Sealant; choose from the following:
  - a. A one part moisture cure premium silyl-terminated polyether polymer with low VOC and odor providing excellent weathering resistance and flexibility:
    - 1. Basis of Design: Henry 925 BES Sealant
  - b. Polymer modified sealing compound used in concealed applications:
    - 1. Basis of Design: Henry Polybitume 570-05 Polymer Modified Sealing Compound

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SPEC NOTE: Henry Company offers two root barrier options. Delete sections not applicable to project specific conditions.  
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- 7. Root Barrier; choose from the following:
  - a. Polyethylene composite geo-membrane specially designed as a barrier against root penetration in vegetative roofs; having the following typical properties:
    - 1. Basis of Design: Henry Root Bloc™ 20
  - b. Polyethylene composite geo-membrane specially designed as a barrier against root penetration in vegetative roofs; having the following typical properties:
    - 1. Basis of Design: Henry Root Bloc 30

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SPEC NOTE: Installation of a drainage composite is an optional feature; deletion from the Henry Vegetative Roofing will not negatively affect the warranty duration or terms. Coordinate with Section 3.03 Installation and delete sections not applicable to project specific conditions.  
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- 8. Drainage Composite (optional); choose from the following:
  - a. Prefabricated polystyrene or PVC core composite combined with a polypropylene fabric ; choose from the following:
    - 1. Basis of Design: Henry DB200
      - a. AOS: 70 sieve
      - b. Compressive strength: 11,000 lbs/ft<sup>2</sup>
      - c. Flow rate: 12.5 gpm/ft<sup>2</sup>
    - 2. Basis of Design: Henry DB650
      - a. AOS: 45 sieve
      - b. Compressive strength: 18,000 lbs/ft<sup>2</sup>
      - c. Flow rate: 21 gpm/ft<sup>2</sup>

- 9. Insulation:
  - a. Extruded polystyrene rigid board insulation supplied by Henry Company; choose from the following:
    - 1. Acceptable Manufacturers:
      - a. Owens Corning
      - b. DOW
    - 2. Minimum Thermal Resistance (R-Value): Project specific Minimum R-Value
    - 3. Cellular Polystyrene Thermal Insulation (ASTM C-578): [Type VI], [Type VII]
    - 4. Compressive Strength: [40], [60], [100] psi.
    - 5. Water Absorption (ASTM C272): 0.1%

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SPEC NOTE: Henry Company offers high and low water retention and drainage composites. All listed offerings meet Henry Company warranty conditions when installed per project specific performance requirements. Coordinate with Section 3.03 Installation and delete sections not applicable to project specific conditions.  
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- 10. Water Retention and Drainage Composite; choose from the following:
  - a. High water storage capacity prefabricated polystyrene or PVC core composite combined with a polypropylene fabric; having the following typical properties:
    - 1. Basis of Design: Henry DB100
      - a. Water storage capacity: 0.11 gal/ ft<sup>2</sup>
      - b. Compressive strength: 9,000 lbs/ft<sup>2</sup>
      - c. Flow rate: 21 gpm/ft<sup>2</sup>
      - d. Thickness: 1 inch
    - b. Low water storage capacity prefabricated polystyrene or PVC core composite combined with a polypropylene fabric; having the following typical properties:
      - 1. Basis of Design: Henry DB50
        - a. Water storage capacity: 0.06 gal/ ft<sup>2</sup>
        - b. Compressive strength: 15,000 lbs/ft<sup>2</sup>
        - c. Flow rate: 6 gpm/ft<sup>2</sup>
        - d. Thickness: 0.44 inch
      - c. Other as authorized by Henry Company
- 11. Moisture Retention Fabric (Optional); choose from the following:
  - a. Secondary water retention fabric, commonly specified for dry environments, shallow soils and non-irrigated vegetative roofing:
    - 1. Basis of Design: Henry Moisture Retention Fabric
      - a. Moisture retention capacity: 0.12 gallons/ft<sup>2</sup>
      - b. Flow rate: 75 gpm/ft<sup>2</sup>
      - c. Recycled content: 100%
    - b. Other as authorized by Henry Company
- 12. Filter Fabric:
  - a. 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:
    - 1. Basis of Design: Henry Filter Fabric N04
      - a. Tensile strength: 90 lbs.
      - b. Puncture strength: 55 lbs.
      - c. AOS: 70 US sieve
    - 2. Other as authorized by Henry Company

\*\*\*\*\*  
SPEC NOTE: Growing media is evaluated on a project specific basis. Contact Henry technical services for further information on regional selections, availability, and pricing.  
 \*\*\*\*\*

13. Growing Media:
  - a. Light-weight growing media, designed, and specifically blended for regional vegetative roofing applications to be optimized for roof growing conditions:
    1. Acceptable Manufacturers:
      - a. Contact Henry for a complete list of local authorized vendors
    2. Thickness: [project specific see spec note above]

\*\*\*\*\*  
SPEC NOTE: Vegetation is evaluated on a project specific basis. Contact Henry technical services for further information on maintenance guidelines, regional selections, availability, and pricing.  
 \*\*\*\*\*

14. Vegetation:
  - a. Custom regionally grown vegetation for use on Vegetative Roofs as designed and specified to meet project specific applications; supplied by Henry Company:
    1. Acceptable Manufacturers:
      - a. Contact Henry for a complete list of local authorized vendors
    2. Vegetation type(s): [Sedum Mats/Tiles, Plugs, Sedum Cuttings]

C. Assembly Auxiliary Materials:

1. Metal edging:
  - a. Custom metal accessories available in aluminum and stainless steel at a variety of thicknesses and sized to suit project specific requirements; supplied by Henry Company:
    1. Basis of Design: Metal Edging
2. Drain Inspection Chambers:
  - a. Custom metal accessories available in aluminum and stainless steel at a variety of thicknesses and sized to suit project specific requirements; supplied by Henry Company:
    1. Basis of Design: Drain Inspection Chambers
3. Paver Systems (Optional):
  - a. Paver and pedestal assembly supplied by Henry Company; choose from the following:
    1. Acceptable Manufacturers:
      - a. Bison
      - b. Hanover
      - c. T-Clear
      - d. Wausau
      - e. Westile
4. Erosion Control (Optional):
  - a. Erosion control blanket (ECB) consisting of seed free Great Lakes Aspen curled wood excelsior with 80% six (6) inch minimum fibers; supplied by Henry Company:
    1. Basis of Design: Curlex® Wind Erosion Control

**PART 3 - EXECUTION**

3.01. EXAMINATION

- A. It is the installing Subcontractor's responsibility to verify the substrate is dry and in accordance with Section 1.03 Related Requirements prior to installation of the vegetative roofing. Commencement of the Work or any parts thereof, indicates installer acceptance of the substrate.
  1. Verify substrates are in accordance with Vegetative Roofing Manufacturer's published literature and as specified in this Section prior to installation.
  2. Substrates must be continuous and secured.
  3. Fill spalled areas with appropriate repair mortar to provide an even plane.

4. Remove curing compounds or foreign matter detrimental to the adhesion.
- B. The installing Subcontractor must verify the following:
1. Moisture detection survey:
    - a. Visual inspection
    - b. ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
  2. Adhesion/Pull Test:
    - a. Complete a waterproofing adhesion test in accordance with Vegetative Roofing Manufacturer's published literature prior to installation of vegetative roofing.
- C. Do not apply vegetative roofing components until substrate and environmental conditions are in accordance with Vegetative Roofing Manufacturer's product specific TDS, and as specified in this Section.

### 3.02. PREPARATION

- A. Surfaces must be sound, dry, clean, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.
- B. Waterproofing Membrane Preparation:
1. Heat waterproofing membrane in a mechanically agitating melter specifically designed for the preparation of hot rubberized asphalt membranes to a consistent temperature:
    - a. Heating temperature: 356 °F (180 °C) to 392 °F (200 °C)

### 3.03. INSTALLATION

- A. Verify substrate is ready to receive the vegetative roofing in accordance with the Vegetative Roofing Manufacturer's TDS and guide specification.
- B. Air and substrate temperature limitations:
1. Waterproofing:
    - a. None
  2. Vegetation:
    - a. Do not install vegetation if extended freezing temperatures are anticipated.
    - b. Do not install vegetation if extended temperatures of growing media below 50 degrees F (10 degrees C) are anticipated.
    - c. For optimal thrive rate potential it is recommended that vegetation be installed between April 1 and November 1 (at northern latitudes) at temperatures between 40 degrees F (4 degrees C) and 95 degrees F (35 degrees C).
    - d. Contact Vegetative Roofing Manufacturer where installation of vegetation is anticipated at temperatures outside of the recommended range.
- C. Primer:
1. Apply primer in accordance with Vegetative Roofing Manufacturer's TDS.
  2. Do not over spray primer; excessive and/or ponding primer is not recommended.
- D. Detailing/Flashing:
1. Install detailing and flashings per Vegetative Roofing Manufacturer's details.
  2. Install prefabricated expansion joint assemblies prior to installation of waterproofing.
  3. Set drains at proper deck height and do not impede drainage.
  4. Secure flashing at drain with an integral clamping ring.
- E. Installation of Waterproofing Assembly:

1. Install one layer of waterproofing membrane at ninety (90) mils minimum to form a continuous monolithic membrane over horizontal and vertical surfaces.
  2. Fully embed polyester fabric into waterproofing membrane.
  3. Coat side and end laps of embedded polyester fabric with waterproofing membrane. Overlap of dry polyester fabric is not acceptable.
  4. Overlap polyester fabric a minimum of one-quarter (1/4) inch.
  5. Apply second layer of waterproofing membrane at one-hundred twenty-five (125) mils minimum to form a continuous monolithic membrane over previously coated areas.
  6. Total reinforced waterproofing membrane thickness shall be two-hundred and fifteen (215) mils minimum.
- F. Installation of Protection Course:
1. Install protection course in a shingle pattern starting at the low point(s) or drain location(s).
  2. Install protection course while waterproofing membrane is partially cured to a warm and tacky consistency.
  3. Install protection course in full continuous sheets.
  4. Overlap protection course dry adjoining edges approximately two (2) inches.
- G. Waterproofing Integrity Test; choose from the following:
1. Electronic Leak Detection (Alternate to Flood Test):
    - a. Conduct electronic leak detection upon waterproofing assembly completion and prior to overburden placement.
    - b. Contact pre-approved test provider several weeks in advance to coordinate schedule.
    - c. In the event of a breach of the membrane, repair and retest the system in accordance with project specifications.
    - d. Report results of testing to the [Architect] [Consultant] and Vegetative Roofing Manufacturer. Submit results with the warranty application.
    - e. No other Work is to proceed without prior direction from the [Architect] [Consultant].
  2. Flood Test:
    - a. Conduct flood test upon waterproofing assembly completion prior to overburden placement.
    - b. Provide temporary stops and plugs for the roof drain(s) or scupper(s) within the test area.
    - c. Flood test with a minimum of two (2) inches of water for no less than twenty-four (24) hours.
    - d. In the event of a breach of the membrane, repair, and retest the system for no less than twenty-four (24) hours.
    - e. Remove temporary stops and plugs.
    - f. Report results of testing to the [Architect] [Consultant] and Vegetative Roofing Manufacturer. Submit results with the warranty application.
    - g. No other Work is to proceed without prior direction from the [Architect] [Consultant].
- H. Installation of Root Barrier:
1. Install root barrier in a shingle pattern starting at the low point(s) or drain location(s).
  2. Loose lay root barrier in full continuous sheets to restrict root penetration.
  3. Overlap root barrier adjoining edges approximately twenty-four (24) inches.
  4. Provide temporary ballasting over root barrier where required until permanent covering material is installed.
- I. Installation of Metal Edging:
1. Confirm root barrier is installed and ready for subsequent installations.
  2. Install metal edging in accordance with ASTM E2400 Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems.
  3. Refer to project specific drawings for specified location and layout.

- J. Installation of Drain Inspection Chambers:
1. Securely install drainage components in accordance with Drainage Unit Manufacturer and ready for subsequent installations.
  2. Confirm root barrier is installed and ready for subsequent installations.
  3. Install drain inspection chamber and cover in accordance with ASTM E2400 Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems.
  4. Refer to project specific drawings for specified location and layout.

\*\*\*\*\*  
SPEC NOTE: Installation of an aeration and drainage composite is an optional feature; deletion from the Henry Vegetative Roofing will not negatively affect the warranty duration or terms. Coordinate with Section 2.02 Materials and delete sections not applicable to project specific conditions.  
 \*\*\*\*\*

- K. Installation of Drainage Composite:
1. Loose lay aeration and drainage composite in full continuous sheets to promote water drainage.
  2. Abut adjacent aeration and drainage composite panels overlapping the fabric approximately one (1) inch.
  3. Cut aeration and drainage composite to fit around penetrations and drain(s).
  4. Provide temporary ballasting until installing permanent covering material.

- L. Installation of Insulation:
1. Refer to Insulation Manufacturer's published literature for a complete guide to required installation practices and exposure limitations.
  2. Loose lay insulation in full continuous sheets to provide a continuous thermal resistance layer:
    - a. Stagger and firmly abut adjacent insulation.
    - b. Stagger board joints between layers.
  3. Cut insulation to fit around penetrations and drain(s).
  4. Provide temporary ballasting until installing permanent covering material.

- M. Installation of Water Retention and Drainage Composite:
1. Loose lay water retention drainage composite in full continuous sheets to promote water drainage.
  2. Abut adjacent drainage composite panels overlapping the fabric approximately one (1) inch.
  3. Cut drainage composite to fit around penetrations and drain(s).
  4. Provide temporary ballasting until installing permanent covering material.

- N. Installation of Moisture Retention Fabric:
1. Install moisture retention fabric in a shingle pattern starting at the low point(s) or drain location(s).
  2. Loose lay moisture retention fabric in full continuous sheets to promote water retention.
  3. Overlap moisture retention fabric edges approximately four (4) inches.
  4. Provide temporary ballasting until permanent covering material is installed.

- O. Installation of Filter Fabric:
1. Install filter fabric in a shingle pattern starting at the low point(s) or drain location(s).
  2. Loose lay filter fabric in full continuous sheets to promote debris obstruction.
  3. Overlap the filter fabric adjoining edges approximately six (6) inches.
  4. Provide temporary ballasting until installing permanent covering material.

- P. Installation of Growing Media:
1. Install growing media taking care to avoid displacement or damage to previously installed vegetative roofing components.



2. Install growing media to a sufficient depth to allow compaction.
3. Growing media compaction; choose from the following:
  - a. Final grades equal to or less than eight (8) inches:
    1. Growing media with specified final grades equal to or less than eight (8) inches of growing media require one sequence of equipment compaction.
    2. Loose lay growing media to a level of three-quarters (3/4) final grade.
    3. Using a 300-400 pound landscape roller compact growing media to a smooth surface until 50-60% compaction. Do not use mechanical or plate compactors.
    4. Loose lay and hand compress remaining growing media allowing growing media to exceed the specified final grade by one (1) inch.
  - b. Final grades greater than eight (8) inches:
    1. Growing media with specified final grades greater than eight (8) inches of growing media require multiple sequences of installation and compaction.
    2. Loose lay growing media up to six (6) inches.
    3. Using a 300-400 pound landscape roller compact growing media to a smooth surface until 50-60% compaction. Do not use mechanical or plate compactors.
    4. Continue installation and compaction procedures as described above until installed growing media equals approximately two (2) inches less than the specified final grade.
    5. Loose lay remaining growing media allowing growing media to exceed the specified final grade by one (1) inch.
4. Verify final grade of growing media by watering growing media until lightly saturated. Areas where low areas in growing media are observed shall be filled with additional growing media and re-watered until a continuous final grade as specified is achieved.

Q. Installation of Erosion Control:

1. Verify final grade of growing media is ready for subsequent installations.
2. Unroll and install erosion control mat directly over growing media until material is even and smooth. Do not stretch.
3. Abut adjacent erosion control fabrics and secure with erosion control assembly anchors at rate and layout to provide a continuous and secure erosion control layer.

R. Installation of Vegetation:

1. Installation of vegetation shall be in accordance with Vegetative Roofing Manufacturer guidelines.
  - a. Refer to Section 3.03.B. Temperature limitations.
  - b. Contact Vegetative Roofing Manufacturer for installations outside of recommended environmental conditions.
2. Refer to project specific drawings for vegetation specified location(s) and layout.
3. Vegetation installation requirements are dependent upon vegetation varieties; choose from the following:
  - a. Sedum Mats/Tiles
    1. Water growing media until lightly saturated prior to sedum mats/ tiles installation.
    2. Install sedum mats/ tiles onto moistened growing media ensuring smooth continuous contact with growing media.
    3. Abut adjacent sedum mats/tiles to avoid air gaps.

4. Stagger sedum mats/tiles in accordance with Vegetative Roofing Manufacturer's published literature.
- b. Plugs
  1. Confirm growing media moisture content is high enough to eliminate dust production upon disturbance prior to plug installation.
    - a. Growing media indicating dust production upon disturbance requires watering of growing media until lightly saturated.
  2. Install plugs to a depth where the top of the plug root ball corresponds to the surface of the growing media.
  3. Install plugs at the specified spacing of project/plant specific rate inches on center in staggered rows resembling the number five (5) on a dice.
- c. Sedum Cuttings
  1. Confirm growing media moisture content is high enough to eliminate dust production upon disturbance prior to sedum cutting installation.
    - a. Growing media indicating dust production upon disturbance requires watering of growing media until lightly saturated.
  2. Hand sow sedum cuttings at a rate of project/plant specific rate pounds per 100 square feet.
4. Water vegetation at end of workday until lightly saturated.

S. Installation of Paver Ballast:

1. Install paver ballast in accordance with Paver Ballast Manufacturer's published literature.
2. Install paver ballast ensuring pavers are accurately aligned and leveled with upper surface of pavers in plane with adjacent units.
3. Cut paver ballast to fit irregularly shaped areas and around protrusions.
4. Refer to project specific drawings for specified location and layout.

3.04. FIELD QUALITY CONTROL

A. Final Observation and Verification:

1. [Architect] [Consultant] [General Contractor] and Vegetative Roofing Manufacturer to complete final inspection of vegetative roofing as required by warranty.
2. Contact Vegetative Roofing Manufacturer for warranty issuance requirements.

3.05. CLEANING

- A. 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.
- B. Clean soiled surfaces, spatters, and damage caused by Work of this Section.
- C. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

END OF SECTION