

This is a guidance document with sample specification language intended to be inserted into project specifications on this subject as appropriate to the agency's environmental goals. Certain provisions, where indicated, are required for U.S. federal agency projects. Sample specification language is numbered to clearly distinguish it from advisory or discussion material. Each sample is preceded by identification of the typical location in a specification section where it would appear using the SectionFormat™ of the Construction Specifications Institute; the six digit section number cited is per CSI Masterformat™ 2004 and the five digit section number cited parenthetically is per CSI Masterformat™ 1995.

.....

**SECTION 07 55 63 (SECTION 07530) – VEGETATED PROTECTED MEMBRANE ROOFING**

**SPECIFIER NOTE:**

*resource management:* Refer to Sections 07 33 63 (02930) and 07 50 00 (07500).

*toxicity/IEQ:* Refer to Sections 07 33 63 (02930) and 07 50 00 (07500).

*performance:* Refer to Sections 07 33 63 (02930) and 07 50 00 (07500).

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Membrane Roofing Systems for use in Green Roofing Systems.
- B. Related Sections:
  - 1. Section 07 33 63 (02930) –Vegetated Roof Covering for Green Roofing Systems.

**1.2 SUBMITTALS**

- A. Product data. Unless otherwise indicated, submit the following for each type of product provided under work of this Section:

**SPECIFIER NOTE:**

Green building rating systems often include credit for materials of recycled content. USGBC-LEED™ v3, for example, includes credit for materials with recycled content, calculated on the basis of pre-consumer and post-consumer percentage content, and it includes credit for use of salvaged/recovered materials. Green Globes US also provides points for reused building materials and components and for building materials with recycled content.

- 1. Recycled Content:
  - a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
  - b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.

**SPECIFIER NOTE:**

Specifying local materials may help minimize transportation impacts; however it may not have a significant impact on reducing the overall embodied energy of a building material because of efficiencies of scale in some modes of transportation. Green building rating systems frequently include credit for local materials. Transportation impacts include: fossil fuel consumption, air pollution, and labor. USGBC-LEED™ v3 includes credits for materials extracted/harvested and manufactured within a 500 mile radius from the project site. Green Globes US also provides points for materials that are locally manufactured.

2. Local/Regional Materials:
  - a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
  - b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
  - c. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
  - d. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

**SPECIFIER NOTE:**

Green building rating systems may include credit for low emitting materials. USGBC-LEED™ v3, for example, includes credits for low-emitting materials, including: adhesives and sealants, paints and coatings, carpets, and composite wood and agrifiber products. Under LEED™ v3, adhesives and sealants are to comply with California's South Coast Air Quality Management District (SCAQMD) #1168; aerosol adhesives are to comply with Green Seal GS-36; interior architectural paints are to comply with Green Seal GS-11; anti-corrosive paints are to comply with Green Seal GS-03 (note – Green Seal has withdrawn GS-03; as of November 2008, anti-corrosive paints are included in a revised GS-11); clear wood finishes are to comply with SCAQMD #1113; carpet with the Carpet and Rug Institute (CRI) Green Label Plus; carpet cushion with CRI Green Label program; and, composite wood and agrifiber products are to contain no added urea-formaldehyde.

As per USGBC published Credit Interpretations, the credits for low-emitting materials are directed towards interior, site-installed (i.e. not prefabricated) products. Verify project requirements for low VOC roofing products.

Both the Adhesive and Sealant Council (ASC) and the SCAQMD have indicated that low VOC adhesives may have performance difficulties in extreme temperature and humidity conditions.

Green Seal, an independent, non-profit organization, certifies low-emitting products using internationally recognized methods and procedures. Green Seal certification meets the criteria of ISO 14020 and 14024, the environmental standards for ecolabeling set by the International Organization for Standardization (ISO); the U.S. Environmental Protection Agency's criteria for third-party certifiers of environmentally preferable products; and the criteria for bona fide ecolabeling bodies of the Global Ecolabeling Network.

3. VOC data:
  - a. Adhesives:
    - 1) Submit manufacturer's product data for adhesives. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
  - B. Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under work of this Section.
  - C. Operating And Maintenance Manuals Submittals:

Society of Plastic Inc. resin codes are easily recognized by the consumer. These are the numerical designations within chasing arrows. At the present time there is not a separate resin code for PLA (bio-resins). PLA (bio-resins) are classified as #7 (Other). Nor are there specific indications for additives or blends. The Society of Plastics resin code symbols are common for plastic packaging materials; for example:



ASTM D1972 standard specifies a resin code that provides substantially more information regarding the plastic resin, including blends and additives. ASTM D1972 labeling protocols are not common for packaging materials; however, they are recognized and utilized in the construction industry and other industry sectors. Many construction products are labeled according to ASTM D1972. Such detailed information is anticipated to be necessary data for future deconstruction (and recycling) efforts. Therefore, plastic construction products and plastic components of assemblies should be labeled in accordance with ASTM D1972. Example for a polypropylene containing 30 mass percentage of mineral powder use:

>PP-MD30<

- a. Verify that plastic products, including plastic components in assemblies, to be incorporated into the Project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in Operation and Maintenance Manual.
  - 1) Products made from compositions containing a single filler, reinforcing, or other modifying material in a concentration of more than one percent by mass shall be marked with the abbreviated term for the polymer, followed by a dash, then the abbreviated term or symbol for the additive, with its percentage by mass, arranged as shown in the example and set off with brackets. For example, a polypropylene containing 30 mass percentage of mineral powder use would be labeled: >PP-MD30<

D. Closeout Submittals:

1. Roof Inspection Reports: Submit reports and certification for Inspections.
2. Results of EFVM surveys: Submit report of results of EFVM surveys and corrective actions taken.
3. Warranty.

### 1.3 QUALITY ASSURANCE

A. Roofing Inspection:

1. **[The Owner's Independent Roofing Inspector will conduct] [Provide]** roof construction inspections as follows:
  - a. Provide full time inspection during roof installation and vegetated roof covering installation.
  - b. Conduct EFVM (Electric Field Vector Mapping) surveys. Conduct one EFVM survey after installation of roofing system and before installation of vegetated roof covering. Conduct one EFVM survey after installation of vegetated roof covering. The compatibility of EFVM with a specific waterproofing system must be established in advance of roofing membrane installation by the EFVM service provider. Identify and repair leaks in accordance with roofing system manufacturer's written recommendations and in a manner so as not to void and/or limit the

- Warranty.
  - c. Complete Roof Inspection Report once prior to installation of vegetated roof covering and once after installation of vegetated roof covering.
  - d. Issue Certification of Quality of Roof Construction upon completion of roof installation.
- B. Pre-Construction Meeting: After award of Contract and prior to the commencement of the Work of this Section, schedule and conduct meeting to discuss the Work of this Section and to coordinate with related Work. Coordinate with pre-construction meeting specified in Section 07 33 63 (02930). Convene pre-construction meeting to comply with requirements of Division 01 (1) and as follows:
- 1. Notify all attendees at least two weeks prior to the conference.
  - 2. Require attendance of parties directly affecting Work of this Section, including, but not limited to:
    - a. Owner,
    - b. Contractor,
    - c. Architect,
    - d. Vegetated Green Roof System Provider/Installer,
    - e. Roofing Membrane Provider,
    - f. Roofing Membrane Installer, and
    - g. Mechanical and Plumbing Installers.
  - 3. Review methods and procedures related to installation and operation of Work of this Section, including coordination with related Work.
  - 4. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

#### 1.4 SEQUENCING AND SCHEDULING

- A. Contractor shall coordinate the Work with installation of vegetated roof covering as specified in Section 07 33 63 (02930).

#### 1.5 WARRANTY

- A. Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer states compatibility of roofing membrane with specified vegetated roof covering and agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
- 1. Warranty Period: [10] [15] [20] years from date of Substantial Completion.
- B. Under no circumstances will Manufacturer remove or replace vegetated roof covering. Vegetated roof covering shall be removed and replaced as necessary to access Roofing System by Owner under separate Warranty provisions.
- C. Specifically excluded from this Warranty is any and all failure of the Vegetated Roof Covering.
- D. The Manufacturer verifies that the Vegetated Roof Covering and Walkways have been furnished and installed in accordance with Manufacturer's recommendations for their use with the Roofing System. None of the provisions of this Warranty are limited by the Vegetated Roof Covering and/or Walkways.

#### PART 2 - PRODUCTS

##### SPECIFIER NOTE:

EO 13423 includes requirements for Federal Agencies to use "sustainable environmental practices, including acquisition of biobased, environmentally preferable, energy-efficient, water-efficient, and recycled-content products"

Specifically, under the Sustainable Building requirements per Guiding Principle #5 Reduce Environmental Impact of Materials, EO13423 directs Federal agencies to “use products meeting or exceeding EPA’s recycled content recommendations” for EPA-designated products and for other products to “use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.”

Executive Order 13514; *Federal Leadership in Environmental, Energy, and Economic Performance*; was signed on October 5, 2009. <http://www.ofee.gov/execorders.asp> It expands upon the environmental performance requirements of EO 13423.

[http://www1.eere.energy.gov/femp/regulations/printable\\_versions/eo13423.html](http://www1.eere.energy.gov/femp/regulations/printable_versions/eo13423.html)

EO 13514 sets numerous federal requirements in several areas, including sustainable buildings and communities. Federal agencies must implement high performance sustainable federal building design, construction, operation and management, maintenance, and deconstruction, including:

- Ensuring all new Federal buildings, entering the design phase in 2020 or later, are designed to achieve zero net energy by 2030.
- Ensuring all new construction, major renovations, or repair or alteration of Federal buildings comply with the Guiding Principles of Federal Leadership in High Performance and Sustainable Buildings <http://www1.eere.energy.gov/femp/pdfs/mouhighperfsustainfedfacs.pdf>
- Ensuring at least 15% of existing agency buildings and leases (above 5,000 gross square feet) meet the Guiding Principles by fiscal year 2015 and that the agency makes annual progress towards 100% compliance across its building inventory.

## 2.1 MATERIALS

### A. Membrane: Compatible with specified Vegetated Roof Covering and EFVM system.

#### SPECIFIER NOTE:

Green building rating systems often include credit for materials of recycled content and may distinguish allowable credit for post-consumer and post-industrial (or pre-consumer) recycled content. USGBC-LEED™ v3, for example, factors 100 percent of post-consumer recycled content but only 50 percent of pre-consumer (post-industrial) recycled content into calculations for its recycled content materials credit. LEED v3 grants one credit to a project for using materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial content constitutes at least 10 percent of the total value of the materials in the project; 10% (post-consumer + 1/2 post-industrial). It grants an additional point for 20% (post-consumer + 1/2 post-industrial).

Green Globes US also provides points for reused building materials and components and for building materials with recycled content.

Recycled content is typically determined by calculating the weight of the recycled material divided by the total weight of the product and expressed as a percentage by weight. (The recycled content “value” of a product as assessed under LEED is determined by multiplying the recycled content percentage and the cost of the product.)

Verify with manufacturer for product availability and recycled content.

1. Recycled Content: Minimum [5] [10] [xxxx] percent post-consumer recycled content, or minimum [20] [40] [xxxx] percent pre-consumer recycled content at contractor’s option.

## 2.2 BALLAST

### A. Vegetated Roof Covering as specified in Section 07 33 63 (02930).

## PART 3 - EXECUTION

3.1 MAINTENANCE AND REPAIR DURING CONSTRUCTION

- A. The Contractor shall maintain the entire roofing system and related work from the time of roofing completion until occupancy. Repair material and installation defects and damage resulting from any subsequent work on the roof, including installation of vegetated roof covering as specified in Section 07 33 63 (02930), and from weather related damage.
- B. Maintain the roof system in a watertight condition.

END OF SECTION