

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.

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## SECTION 06 60 00 (SECTION 06600) –PLASTIC FABRICATIONS

**SPECIFIER NOTE:**

*resource management:* Plastic lumber is generally fabricated from 100 percent recycled pre and post consumer plastics. It may also contain recycled cellulose.

*toxicity/IEQ:* As a substitute for treated lumber, it reduces potential leaching of chemicals used in wood treatment. Refer to Section 06 05 73 (06070) - Wood Treatment.

*performance:* Plastic lumber is a durable, weather-resistant, and low maintenance material. Plastic lumber is integrally colored and homogenous and so does not require painting. It is recyclable. 100 percent recycled content plastic lumber may not perform well in lengths greater than 6 feet or where deflection and creep are significant considerations (eg: fencing, decking, and bollards). For such uses, consider plastic lumber with fiber such as cellulose or glass. The fiber improves stability and resistance to screw pullout.

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes:
  - 1. Plastic Fabrications.
  - 2. Plastic Lumber.

#### 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.
  - c. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.

- d. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.

**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; hard surface flooring with FloorScore; tile setting adhesives and grout with SCAQMD #1168; 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.
    - 2) Submit Green Seal Certification to GS-36 and description of the basis for certification.
    - 3) **[Submit manufacturer's certification that products comply**

**with SCAQMD #1168.] [Submit manufacturer's certification that products comply with SCAQMD Rule 1168 in areas where exposure to freeze/thaw conditions and direct exposure to moisture will not occur. In areas where freeze/thaw conditions do exist or direct exposure to moisture can occur, submit manufacturer's certification that products comply with Bay Area AQMD Reg. 8, Rule 51 for containers larger than 16 oz and with California Air Resources Board (CARB) for containers 16 oz or less.]**

**SPECIFIER NOTE:**

The Food, Conservation, and Energy Act of 2008 (also known as the 2008 U.S. Farm Bill) largely continues programs of the Farm Security and Rural Investment Act of 2002 ([2002 Farm Bill](http://www.usda.gov/farmbill/)) <http://www.usda.gov/farmbill/>. Section 9002 requires each Federal Agency to develop a procurement program which will assure that items composed of biobased products will be purchased to the maximum extent practicable and which is consistent with applicable provisions of Federal procurement law. USDA designates biobased products for preferred Federal procurement and recommends biobased content levels for each designated product.

USGBC-LEED™ v3 includes credits for use of rapidly renewable materials, which USGBC describes as plants harvested within a ten-year cycle.

Green Globes – US, provides credit for integration of materials from renewable sources that have been selected based on life-cycle assessment.

4. Biobased materials:

- a. Indicate type of biobased material in product.
- b. Indicate the percentage of biobased content per unit of product.
- c. Indicate relative dollar value of biobased content product to total dollar value of product included in project.

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:

**SPECIFIER NOTE:**

The marking system indicated below is intended to provide assistance in identification of products for making subsequent decisions as to handling, recycling, or disposal.

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<

**SPECIFIER NOTE:**

Identify special maintenance agreements. Maintenance agreements are standard practice in the building industry. Take-back programs refer to programs in which the product manufacturer “takes-back” scrap material and/or packaging associated with its product.

- D. Documentation of manufacturer’s **[take-back program]** for plastic fabrications. Coordinate with construction waste management. Include the following:
  1. Appropriate contact information.
  2. Overview of procedures.
  3. Limitations and conditions, if any, applicable to the project.

### 1.3 QUALITY ASSURANCE

- A. Plastic fabrications intended for use in exterior applications shall perform as follows as tested in accordance with ASTM D1435 for a period of **[1 year] [3 years] [5 years] [xxxxx]**.
  1. Color change: No fading or discoloration.
  2. Dimensional stability: No change.
- B. Plastic lumber shall comply with the following:
  1. Shear Parallel to Length: Maximum 1,000 psi in accordance with ASTM D2344.
  2. Compressive Strength:
    - a. Secant Modulus: Minimum 70,000 psi in accordance with ASTM D-6108.
    - b. Stress at 3 percent strain: Minimum 1,500 psi in accordance with ASTM D-6108.
    - c. Compression Parallel to Grain: Minimum 3,000 psi in accordance with ASTM D6112.
    - d. Compression Perpendicular to Grain: minimum 1,000 psi in accordance with ASTM D6112.
  3. Flexural Strength: Minimum 2,000 psi in accordance with ASTM D 6109.
  4. Tensile Strength: Minimum 1250 psi in accordance with ASTM D198.
  5. Coefficient of thermal expansion: Maximum 0.000080 in/in/degree F in accordance with ASTM D696.
  6. Screw Withdrawal: 350 lbs in accordance with ASMT D6117.
  7. Nail Withdrawal: 150 lbs in accordance with ASTM D6117.

- C. Compostable Plastic: Establish the compostability of environmentally degradable plastics in accordance with ASTM D6002.

**SPECIFIER NOTE:**

Changes to the material properties of a plastic within a compost unit can affect the degradation of other materials and the resulting composition and appearance of the composed material. Edit below to suit location and project.

1. Where the proposed Environmental Management Plan incorporates composting of plastics, assess the potential effect of each type of plastic to be included on the composting process in accordance with ASTM D6002.

**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.”

And, under the Sustainable Building requirements per Guiding Principle #4 Enhance Indoor Environmental Quality, EO13423 directs Federal agencies to use “materials and products with low pollutant emissions, including adhesives, sealants, paints, carpet systems, and furnishings.”

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. Plastic fabrications:**

1. Polyolefin-Based Plastic Lumber Decking Boards: Comply with ASTM D6662.
2. Extruded and Compression Molded Basic Shapes Made from Thermoplastic Polyester (TPES): Comply with ASTM D6261.
3. Extruded, Compression Molded, and Injection Molded Basic Shapes of Poly(aryl ether ketone) (PAEK): Comply with ASTM D6262.
4. Ultra-High-Molecular-Weight Polyethylene (UHMW-PE) Solid Plastic Shapes: Comply with ASTM D6712.

5. Compostable Plastics: Comply with ASTM D6400.

B. Plastic Lumber:

SPECIFIER NOTE:

US-EPA Comprehensive Procurement Guidelines (CPG) recommends 25-100 percent post-consumer content for HDPE plastic lumber, 50 percent for mixed plastics/cellulose, 75 percent for HDPE/fiberglass, and 50 – 100 percent for other resins.

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:
  - a. HDPE: Minimum **[25] [xxxx]** percent post-consumer recycled content.
  - b. Mixed plastics/cellulose: Minimum **[50] [xxxx]** percent post-consumer recycled content.
  - c. HDPE/fiberglass: Minimum **[75] [xxxx]** percent post-consumer recycled content.
  - d. Other mixed resins: Minimum **[50] [xxxx]** percent post-consumer recycled content.

SPECIFIER NOTE:

For current designations under the Federal Biobased Products Preferred Procurement Program (FB4P), refer to [www.biobased.oce.usda.gov](http://www.biobased.oce.usda.gov). As of January 4, 2010, the Federal Register includes designations for approximately 60 product types. The requirements for purchasing biobased items apply to those items directly purchased by the federal agency. Under a construction contract, the contractor's use of hydraulic fluid in its bulldozers and backhoes is incidental to the purpose of its contract, so the contractor is not required to use biobased hydraulic fluids. The Office of the Federal Environmental Executive (OFEE) recommends that agencies encourage the use of these items, however.

Currently designated items that affect construction include:

- Roof Coatings
- Water Tank Coatings
- Adhesive and Mastic Removers
- Composite Panels
- Fertilizers
- Plastic Insulating Foam
- Carpet and Upholstery Cleaners
- Carpets
- Dust Suppressants
- Packaging Films
- Glass Cleaners
- Hydraulic Fluids – Stationary Equipment
- Wood and Concrete Sealers
- Cleaners

The USDA currently has identified about 150 items for which it is collecting test data needed for the additional designations of items that will extend preferred procurement status to include all qualifying biobased products.

2. Biobased content:
  - a. Plastic Lumber: Engineered products suitable for non-structural outdoor needs such as exterior signs, trash can holders, and dimensional letters. Provide minimum 23% biobased content.
- C. Compostable Plastic: Plastic fabrications intended for temporary use, including but not limited to landscaping identification tags, tie and stakes, shall be fabricated from compostable plastic. Coordinate with work of related Sections.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions and as follows:
  1. Plastic lumber: Install with screws; unless otherwise indicate, installation with nails is not permitted. Space boards as necessary to allow for expansion and contraction. Provide adequate support as appropriate to the application, climate, and modulus of elasticity of the product.

### 3.X SITE ENVIRONMENTAL PROCEDURES

- A. Waste Management: As specified in Section 01 74 19 (01351) – Construction Waste Management and as follows:
  1. Coordinate with manufacturer for **[take-back program]**. Set aside scrap to be returned to manufacturer for recycling into new product.

END OF SECTION