

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 12 59 00 (SECTION 12700) – SYSTEMS FURNITURE

SPECIFIER NOTE:

*resource management:* Several modular office furniture manufacturers have environmental lines including reclaimed, refurbished furniture, furniture with recycled materials, and furniture with organic fibers/fabric.

A variety of green furniture products are available including products manufactured from sustainably harvested wood, recycled metal, recycled plastic, alternative agricultural materials, and organically grown fibers.

Typical fabrics used in building products include: wool, worsted wool, wool and polyester blend, polyester, vinyl, modacrylic, cotton, silk and flax, and nylon.

Wool, a natural fiber obtained from domesticated sheep is valued for its absorbency, resiliency, insulation, and ability to take dye well. Wool has some environmental concerns relative to animal husbandry, including soil erosion due to over-foraging and pesticide runoff due to the immersion treatment (for parasites on sheep).

Polyester is produced from petroleum and natural gas. Manufacture of polyester fiber generates air emissions including polymer dust, volatilized residual monomer, and fiber lubricants.

A variety of dyes are used, depending on the fabric and color desired. Many fabric dyes contain petrochemicals. Dyeing fabric is water intensive and can generate toxic pollutants.

Draperies, upholstery, and wall coverings manufactured from organically grown natural fibers with non-toxic dyes are available. Organically grown cotton grown in certain colors is available. Some fabrics are also available that have recycled plastic (generally PET - soda pop bottles) content.

*toxicity/IEQ:* System furniture may be constructed from various materials including composite wood products, insulations, and adhesives that are all potential sources of VOC emissions. Free-standing, partial height partitions (or panels) can interfere with the proper distribution of ventilation air. Install panels according to plans prepared after the design of the HVAC system. Raising partition bottoms above the floor may improve air flow at work stations contained within partial height panel systems.

Fabric coverings may act as sinks for VOCs. Dyes and fabric treatments, such as wrinkle-free or fire-resistant, can be toxic. Chemical used for finishes and other purposes on fabrics can be sources of VOCs. Cornstarch and tapioca are used as sizing. Copper compounds, chromium compounds, and chlorinated phenol are used to inhibit mold and mildew. Silico-fluorides, and chromium-fluorides, camphor, naphthalene, paradichlorobenzene are used for mothproofing. Organic halogenphosphorous compounds, aryl bromophosphate, triethanolamine, and trimethylol melamine are used as flame retardants.

The Business and Institutional Furniture Manufacturers Association (BIFMA), with input from government, commercial testing and manufacturing organizations, has developed standards associated with VOCs, BIFMA M7.1 and BIFMA X7.1. Both of these documents are available on the BIFMA website: <http://www.bifma.com/standards/standards.html>

*performance:* Performance is comparable for green methods and standard methods. Fabric produced from natural fibers, especially when dyed with natural, non-toxic dyes, is biodegradable.

Do not specify artwork or furnishings that require tight humidity controls of the mechanical systems. Comfort standards typically allow humidity to fluctuate to save energy costs.

## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Workstations.
  2. Tables.
  3. Chairs.
  4. Partitions.
  5. Storage, filing, and shelving units.

### 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. Prefabricated Wood:
    - 1) Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
    - 2) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
    - 3) If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
    - 4) If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
  - b. Salvaged Lumber: Provide documentation certifying products are from salvaged lumber sources.
  - c. Recovered Lumber: Provide documentation certifying products are from recovered lumber sources.

**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 – Field Applied:

- 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.]**

- b. Engineered Wood Products: Provide documentation that composite wood and agrifiber products **[are third-party certified as meeting ANSI standard requirements for formaldehyde emissions] [contain no added urea-formaldehyde resins.]**

**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.

**SPECIFIER NOTE:**

The EPA has developed minimum energy efficiency standards for Energy Star labeled products. EPA Energy Star categories include: appliances, HVAC, residential equipment, office equipment, and lighting.

5. Energy Efficiency:
  - a. Indicate EER (Energy Efficiency Rating) for equipment provided under work of this Section.
  - b. Submit documentation for Energy Star qualifications for equipment provided under work of this Section.

**SPECIFIER NOTE:**

USGBC-LEED™ v3 includes credit for use of sustainably harvested wood certified under Forest Stewardship Council Guidelines. Under LEED™ v3, a minimum of 50 percent of wood-based materials and products incorporated into the Project must be certified in accordance with the Forest Stewardship Council Guidelines.

Green Globes US also provides points for wood products that originate from certified sources, such as, Forest Stewardship Council, Sustainable Forestry Initiative, and the CSA Sustainable Forest Management Program.

- B. Letter of Certification(s) for Sustainable Forestry:
  1. Forest Stewardship Council (FSC): Provide letter of certification signed by lumber supplier. Indicate compliance with FSC "Principles for Natural Forest Management" and identify certifying organization.
    - a. Submit FSC certification numbers; identify each certified product on a line-item basis.
    - b. Submit copies of invoices bearing the FSC certification numbers.
  2. Sustainable Forestry Board: Provide letter of certification signed by lumber supplier. Indicate compliance with the Sustainable Forestry Board's "Sustainable Forestry Initiative" (SFI) and identify certifying organization.
    - a. Submit SFI certification numbers; identify each certified product on a line-item basis.
    - b. Submit copies of invoices bearing the SFI certification numbers.
  3. Canadian Standards Association (CSA): Provide letter of certification signed by lumber supplier. Indicate compliance with the CSA and identify certifying organization.
    - a. Submit CSA certification numbers; identify each certified product on a line-item basis.
    - b. Submit copies of invoices bearing the CSA certification numbers.
- C. Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under work of this Section.
- D. Submit documentation of compliance with BIFMA e3 **[level 1] [level 2] [level 3]**.

**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. Green leasing is a new, but dramatic shift in the traditional perspective of leased equipment. Under a green lease, the product manufacturer is responsible for the disposition of the product at all times. Thus, when the customer no longer requires the use of the particular product or requires an updated model, the manufacturer is obligated to reclaim it and refurbish it or disassemble it for recycling as appropriate. This approach necessitates a revision of administrative services. It also requires a basic redesign of products in order to allow for future disassembly and upgrade. This has the potential to be cost effective for manufacturers and customers alike. It is also extremely resource efficient.

- F. Documentation of manufacturer’s **[maintenance agreement] [take-back program] [green lease]** for system furniture. Include the following:
  1. Appropriate contact information.
  2. Overview of procedures.
    - a. Indicate manufacturer’s commitment to reclaim materials for recycling and/or reuse.
  3. Limitations and conditions, if any, applicable to the project.

### 1.3 QUALITY ASSURANCE

**SPECIFIER NOTE:**

BIFMA and NSF have a standard for multi-attribute evaluation of environmental preferability:

**BIFMA e3-2008 Furniture Sustainability Standard**

The standard compares and assesses sustainable product characteristics of business and institutional furniture. Assessment is implemented through a point system that addresses: materials, water efficiency, energy conservation, air quality, and social issues.

In June 2009, BIFMA announced a product certification program, called level™, based on the BIRMA e3 standard. Three levels of achievement or compliance are attainable to reflect increasing movement toward sustainability with level 3 certification being the highest.

Edit below to suit project and to reflect latest published standard.

Coordinate with material requirements in Part 2. Note that BIFMA e3 utilizes a point system that allows products to claim credit for a variety of attributes. Thus, certification may or may not include compliance with the attributes specified in Part 2. If the attributes cited in Part 2 are important to the project, clarify that BIFMA compliance is required AND so are the material performance requirements as indicated in Part 2.

- A. Provide business and institutional furniture compliant with BIFMA e3 **[level 1] [level 2] [level 3]**.

1.4 MAINTENANCE

- A. Operational Service: Provide manufacturer's **[maintenance agreement] [take-back program] [green lease]** service for system furniture installed in project. Service shall reclaim materials for recycling and/or reuse. Service shall not landfill or burn reclaimed materials.

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.

Additionally, for USDA-designated biobased products, Federal agencies must use products meeting or exceeding USDA's biobased content recommendations; and for other products, biobased products made from rapidly renewable resources and certified sustainable wood products.

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.”

## 2.1 MATERIALS

### A. Metal:

#### SPECIFIER NOTE:

US-EPA Comprehensive Procurement Guidelines (CPG) recommends office furniture fabricated from 16 percent post-consumer content for steel, 75-100 percent recovered materials content for aluminum, 80-100 percent recovered materials content for particleboard/fiberboard, 70-75 percent post-consumer content for HDPE plastic, and 100 percent post-consumer content for PET fabric.

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. steel: Minimum 16 percent post-consumer recycled content.
- b. aluminum: Minimum **[75] [xxxx]** percent recycled content.

### B. Wood:

1. Lumber as specified in Section 06 10 00 (06100) – Rough Carpentry.
2. Sheathing as specified in Section 06 16 00 (06160) - Sheathing.

### C. Linoleum: As specified in Section 09 65 16.13 (09654) - Linoleum.

### D. Fabric:

#### 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.

1. Biobased Content: Minimum [xxxx] percent biobased material.
  2. Recycled Content: Minimum 100 percent post-consumer recycled [PET] content,.
  3. Toxicity/IEQ: Chemical treatments, including wrinkle-resistant treatment, fire-resistant treatment, and moth treatment, are **[permitted with written approval from the Owner.] [not permitted.]**
- E. Plastic: As specified in Section 06 60 00 (06600) – Plastic Fabrications.
- F. Paints and coatings:
1. Factory applied:
  2. Field applied: As specified in Section 09 90 00 (09900) – Painting & Coating.
- G. Adhesives: Water-resistant.
1. Biobased Content: Minimum [xxxx] percent biobased adhesive material.
  2. Factory applied:
  3. Field applied:
    - a. Toxicity/IEQ: Comply with applicable regulations regarding toxic and hazardous materials, GS-36 for Commercial Adhesive, **[South Coast Air Quality Management District Rule 1168] [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]**, and as specified.

## 2.2 FABRICATED SYSTEMS

- A. Furniture System: Comply with BIFMA e3 **[level 1] [level 2] [level 3]** and the following:
1. Toxicity/IEQ: Provide light colored furniture and panel fabric with a minimum reflectivity of 40 percent.
- B. Work Station Task Lighting: **[Provide adjustable arm task lights equipped with linear, circular, or compact fluorescent lamp technology; provide adjustable, fully articulated and balanced head and arms; provide cord set for plug in; provide wall bracket, panel bracket, table clamps or weighted table base options as appropriate for selected furniture systems and occupant needs; provide built in reflector.]**  
Provide under-shelf task lights equipped with linear or compact fluorescent lamp technology and with a shielding device that prevents direct glare into an occupant's eyes when the occupant is in a typical working posture; provide built in reflector. Provide fixtures and lamps as specified in Section 26 50 00 (16500) – Lighting and as follows:
1. Linear fluorescent lighting systems:
    - a. Minimum Color Rendering Index (CRI) of 75
    - b. Option of common Color Temperature lamps (CCT) (27000 K through 41000 K)
    - c. Minimum power factor of 97 percent
    - d. Minimum system efficacy of 76 lumens per watt
    - e. High frequency electronic ballast
    - f. Maximum Total Harmonic Distortion (THD) of 20 percent
    - g. Minimum lamp life of 15,000 hours
  2. Compact fluorescent lighting systems:
    - a. Minimum Color Rendering Index (CRI) of 75



- b. Option of common Color Temperature lamps (CCT) (27000 K through 41000 K)
- c. Minimum power factor of 97 percent
- d. Minimum system efficacy of 50 lumens per watt
- e. Electronic ballast
- f. Maximum Total Harmonic Distortion (THD) of 20 percent] percent
- g. Minimum lamp life of 10,000 hours

### PART 3 - EXECUTION

#### 3.X SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality:
  - 1. Temporary ventilation: Provide temporary ventilation as specified in Section 01 57 19.11 (01352) – Indoor Air Quality (IAQ) Management, and as follows:
    - a. Ventilate products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by Architect.
  - 2. Final cleaning: As specified in Section 01 74 13 (01740) – Progress Cleaning.
- B. Resource Management:
  - 1. Energy Efficiency: Verify equipment is properly installed, connected, and adjusted. Verify that equipment is operating as specified.
  - 2. Coordinate with manufacturer for **[maintenance agreement] [take-back program] [green lease]**.

END OF SECTION