

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 05 05 00 (SECTION 05050) - COMMON WORK RESULTS FOR METALS

SPECIFIER NOTE:

resource management: Mining raw materials (iron, limestone, coal) can produce soil erosion, pollutant runoff, and habitat loss. Ore refinement produces heat, combustion emissions and requires significant amounts of water. Supply of some of the raw materials (nickel, chromium, and manganese) is very limited.

The iron and steel industry sector has multi-media impacts, including air emissions (CO, SO_x, NO_x, PM_{2.5}), wastewater contaminants, hazardous and solid wastes. As an industry, minimills are the largest U.S. consumers of recycled steel scrap, but also face issues related to contaminants in scrap products.

Refer to the Steel Recycling Institute (SRI) www.recycle-steel.org

The energy used by minimills generates greenhouse gas emissions from power generation. An emerging trend to generate heat on-site by burning carbon may improve energy efficiency but may also increase emissions. Refer to <http://www.epa.gov/sectors/sectorinfo/sectorprofiles/steel.html>

EPA partnerships have addressed environmental impacts from metal finishing; refer to <http://www.epa.gov/sectors/sectors/finishing.html>

and from die casting; refer to <http://www.epa.gov/sectors/sectorinfo/sectorprofiles/casting.html>

Aluminum is fabricated from bauxite, a mineral found primarily in tropical areas. A significant factor in the clear-cutting of tropical rainforests is the desire to gain access to bauxite mines.

Aluminum is extensively recycled from both post-industrial sources, such as stamping offal and head, butt and edge trim from rolling or extrusion operations, and post-consumer sources, such as used beverage cans, scrapped automobiles and end-of-life building products. Mass produced aluminum is a relatively young building material. This fact coupled with the long life of aluminum building components, means that aluminum is only beginning to be recycled from building applications. To produce aluminum from recycled material requires only 5 percent of the energy and greenhouse gas emissions required to produce aluminum from bauxite ore, and each ton of recycled aluminum saves 4 tons of bauxite. In addition, using recycled aluminum instead of raw materials reduces the generation of air pollution, such as SO_x and NO_x, by 95 percent and water pollution by 97 percent. About one third of the aluminum used in the United States comes from recycled material with post-consumer scrap contributing about 40 percent of that total.

toxicity/IEQ: Metal is considered inert. Factory applied finishes emit considerably less VOCs in situ than field applied coatings because the primary outgassing occurs at the plant under controlled conditions.

performance: Performance is comparable for green methods and standard methods. Where feasible, use mechanical connections to allow for deconstruction and reuse.

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. Steel.
 - 2. Aluminum.

3. Copper.
4. [xxxx].

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.

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

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/mouhighperfsustainfedfac.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. Steel:

SPECIFIER NOTE:

US-EPA Comprehensive Procurement Guidelines (CPG) discusses steel manufactured in either a Basic Oxygen Furnace (BOF) or an Electric Arc Furnace (EAF). Steel from the BOF process contains 25-30 percent total recovered materials, of which 16 percent is post-consumer steel. Steel from the EAF process contains a total of 100 percent recovered steel, of which 67 percent is post-consumer. Recommendations for recycled content in steel reinforcing are not stated.

Typical BOF products include: hollow structural sections, steel studs, steel deck, plate, purlins, and wall studs. Typical EAF products include: beams and columns, channels, angles, plate, steel deck, and piling.

The amount of recycled content in steel products varies over time, both as a function of the cost of steel scrap and its availability.

BOF Steel Recycled Content Value for Typical Product:

Steel Stud Framing

Value = (\$XXXX) (23.0 % + ½ 7.3 %) = (\$XXXX) (26.65 %)

EAF Steel Recycled Content Value for Typical Product:

Wide Flange Structural Steel Framing

Value = (\$XXXX) (58.6 % + ½ 32.6 %) = (\$XXXX) (74.90 %)

For more information, refer to SRI at www.recycle-steel.org which includes detailed information on recycling rates, recycling databases, and the environmental benefits of steel for homes building, steel roofing, and bridges; and, the American Institute of Steel Construction at www.aisc.org/sustainability which includes detailed information on how steel factors into the LEED rating system, steel mill recycled content documentation, and articles about the use of steel in sustainable projects.

1. Recycled Content: Minimum **[23] [58] [xxxx]** percent post-consumer recycled content, or minimum **[7] [32] [xxxx]** percent pre-consumer recycled content at contractor's option.

B. Aluminum:

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.

C. Copper:

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 FACTORY FINISHING

SPECIFIER NOTE:

Specify factory finishing rather than field-coating where possible. Plant fabrication/finishing handles raw materials and by-products at a single location that typically allows greater efficiency and better pollution prevention than job site fabrication/finishing.

Powder coating is preferable to solvent based coating application systems. Powder coating uses an electrostatic charge to adhere colored powder to metal. The powder remaining in the electrostatic chamber is 'vacuumed' out and reused.

Consider factory finishing that utilizes mechanical process rather than chemical. Mechanical processes such as abrasive blasting, grinding, buffing, and polishing do not generate as much hazardous waste as chemical and electrical processes.

When electroplating is necessary, select one of the available replacement technologies listed by the US EPA. The EPA has identified as toxic and/or polluting cadmium plating materials, chromium plating materials, cyanide-based electroplating, and copper/ formaldehyde-based electroless copper solutions. Available replacement technologies include the following: Non-cyanide copper plating, metal stripping and zinc-plating; ion vapor deposition (IVD); Physical vapor deposition (PVD); Chromium-free substitutes for selected immersion processes; Metal spray coating; and Trivalent chromium plating for decorative applications.

A. Finishing System:

1. Toxicity: **[Solvent coating systems are not permitted.] [Electroplated coating systems are not permitted.]**
2. Anti-Corrosive Paint: Comply with GS-11.

PART 3 - EXECUTION

END OF SECTION