

CHAPTER 9 MATERIALS AND RESOURCES

901.1 (9.1) Scope This section specifies requirements related to the environmental and human health impacts of materials, including resource conservation, reduced life-cycle impacts of building materials, impacts on the atmosphere, product transparency, and waste management.

901.2 (9.2) Compliance The building materials shall comply with Section 901.3 (9.3), "Mandatory Provisions," and either

- a. Section 901.4 (9.4), "Prescriptive Option," or
- b. Section 901.5 (9.5), "Performance Option."

901.3 (9.3) Mandatory Provisions

901.3.1 (9.3.1) Construction Waste Management

901.3.1.1 (9.3.1.1) Diversion A minimum of 50% of nonhazardous construction and demolition waste material generated prior to the issuance of the final certificate of occupancy shall be diverted from disposal in landfills and incinerators by reuse, recycling, repurposing, and/or composting. Excavated soil and land-clearing debris shall not be included in the waste diversion calculation. *Alternative daily cover* and waste-to-energy incineration shall not be included as diverted material. All diversion calculations shall be based on either weight or volume, but not both, throughout the construction process.

Informative Note: Reuse includes donation of materials to charitable organizations; salvage of existing materials on-site; reclamation of products by manufacturers; and return of packaging materials to the manufacturer, shipper, or other source for reuse as packaging in future shipments.

901.3.1.3 (9.3.1.3) Construction Waste Management Plan Prior to issuance of a demolition or building permit, a preconstruction waste management plan shall be submitted to the *owner*. The plan shall:

- a. identify the construction and demolition waste materials expected to be diverted,
- b. determine whether construction and demolition waste materials are to be source-separated or comingled,
- c. identify service providers and designate destination facilities for construction and demolition waste materials generated at the job *site*, and
- d. identify the average diversion rate for facilities that accept or process comingled construction and demolition materials. Separate average percentages shall be included for those materials collected by construction and demolition materials processing facilities that end up as *alternative daily cover* and incineration.

901.3.3 (9.3.3) Refrigerants Chlorofluorocarbon (CFC) based refrigerants in HVAC&R systems shall not be used. Fire suppression systems shall not contain ozone-depleting substances (CFCs, hydrochlorofluorocarbons [HCFCs], or halons).

901.3.4 (9.3.4) Areas for Storage and Collection of Recyclables and Discarded Goods Areas for recyclables and discarded goods shall be provided as described in this section. These areas shall be coordinated with the anticipated collection services to maximize the effectiveness of the dedicated areas. Instructions regarding the identification and handling of recyclables and discarded goods in these areas shall be posted in or adjacent to each dedicated area.

901.3.4.1 (9.3.4.1) Recyclables There shall be areas that serve the entire building and are dedicated to the collection and storage of nonhazardous materials for recycling, including paper, corrugated cardboard, glass, plastics, and metals.

~~**901.3.4.2 (9.3.4.2) Reusable Goods** For building projects with residential spaces, there shall be an area that serves the entire building and is designed, identified, and posted for the collection and storage of discarded but clean items in good condition~~

901.3.4.3 (9.3.4.3) Fluorescent and High-Intensity Discharge (HID) Lamps and Ballasts An area shall be provided that serves the entire building, is designed for the collection and storage of fluorescent and HID lamps and ballasts, and facilitates proper disposal and/ or recycling according to jurisdictional hazardous waste requirements.

901.3.4.4 (9.3.4.4)Electronics and Batteries Separate containers or areas shall be provided that serve the entire building; are designed for the collection and storage of *electronics*, alkaline batteries, and rechargeable batteries; and facilitate disposal and/or recycling according to jurisdictional requirements.

901.3.5 (9.3.5)Mercury Content Levels of Lamps Electric lamps used in the *building project* shall not contain mercury in an amount exceeding, per lamp, the maximum mercury content levels of Table 901.3.5 (9.3.5).

Exceptions:

- 1.Eight-foot models of straight fluorescent T8 lamps.
- 2.High-output and very-high-output, straight fluorescent lamps greater than 1.25 in. (32 mm) in diameter.
- 3.Mogul bi-pin-based lamps.
- 4.Preheat straight fluorescent lamps of any size.
- 5.U-bend and circline fluorescent lamps.
- 6.HID lamps.
- 7.Induction lamps.
- 8.Special-purpose lamps: appliance, black light, germicidal, bug, colored, grow, straight fluorescent reflector, reprographic, shatter resistant, cold temperature, and three-way lamps.

901.4 (9.4) Prescriptive Option

901.4.1 (9.4.1)Reduced Impact Materials The *building project* shall comply with any two of the following: Sections 901.4.1.1, 901.4.1.2, 901.4.1.3, or 901.4.1.4 (9.4.1.1, 9.4.1.2, 9.4.1.3, or 9.4.1.4). Calculations shall only include materials *permanently installed* in the project. A value of 45% of the total construction cost shall be permitted to be used in lieu of the actual total cost of materials.

901.4.1.1 (9.4.1.1)Recycled Content and Salvaged Material Content The sum of the *recycled content* and the *salvaged material content* shall constitute a minimum of 10%, based on cost, of the total materials in the *building project*.

901.4.1.1.1 (9.4.1.1.1)Recycled Content The *recycled content* of a material shall be the *postconsumer recycled content* plus one-half of the *preconsumer recycled content*, determined by weight (mass). The recycled fraction of the material in a product or an assembly shall then be multiplied by the cost of the product or assembly to determine its contribution to the 10% requirement.

The annual average industry values, by country of production, for the *recycled content* of steel products manufactured in basic oxygen furnaces and electric arc furnaces shall be permitted to be used as the *recycled content* of the steel. For the purpose of calculating the *recycled content* contribution of concrete, the constituent materials in concrete (*Informative Note*: e.g., the cementitious materials, aggregates, and water) shall be permitted to be treated as separate components and calculated separately.

901.4.1.1.2 (9.4.1.1.2)Salvaged Material Content The *salvaged material content* shall be determined based on the actual cost of the *salvaged material* or the cost of a comparable alternative component material.

901.4.1.2 (9.4.1.2)Regional Materials A minimum of 15% of building materials or products used, based on cost, shall be regionally extracted/harvested/recovered or manufactured within a radius of 500 mi (800 km) of the project *site*. If only a fraction of a product or material is extracted/harvested/recovered or manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

Exception: For building materials or products shipped in part by rail or water, the total distance to the project shall be determined by weighted average, whereby that portion of the distance shipped by rail or water shall be multiplied by 0.25 and added to that portion not shipped by rail or water, provided that the total does not exceed 500 mi (800 km).

901.4.1.3 (9.4.1.3)Biobased Products A minimum of 5% of building materials used, based on cost, shall be *biobased products*. *Biobased products* shall:

- a.comply with the minimum biobased contents of the USDA's BioPreferred Program;
- b.contain the "USDA Certified *Biobased Product*" label; or
- c.be composed of solid wood, engineered wood, bamboo, wool, cotton, cork, agricultural fibers, or other biobased materials with at least 50% biobased content.

901.4.1.3.1 (9.4.1.3.1)Wood Building Components Wood building components, including but not limited to structural framing, sheathing, flooring, subflooring, wood window sash and frames, doors, and architectural millwork, used to comply with this requirement shall contain not less than 60% certified wood content tracked through a chain of custody process, either by physical separation or percentage-based approaches, or wood that qualifies as a *salvaged material*. Certified wood content documentation shall be provided by sources certified through a forest certification system with principles, criteria, and standards developed using ISO/IEC Guide 59 or the WTO Technical Barriers to Trade. Wood building components from a *vendor* shall be permitted to comply when the annual average amount of certified wood products purchased by the *vendor*, for which they have chain of custody *verification* not older than two years, is 60% or greater of their total annual wood products purchased.

**TABLE 901.3.5 (TABLE 9.3.5)
MAXIMUM MERCURY CONTENT FOR ELECTRIC LAMPS**

LAMP	MAXIMUM MERCURY CONTENT
Screw-base compact fluorescent lamps < 25 W	4mg
Screw-base compact fluorescent lamps ≥ 25 W and < 40 W	5mg
Pin-base compact fluorescent lamps, all wattages	5mg
Straight fluorescent T5 normal lifetime lamps ^a	3mg
Straight fluorescent T8 normal lifetime lamps ^a	4mg
Straight fluorescent T5 and T8 long lifetime lamps ^b	5mg
T12 eight-foot straight fluorescent lamps	15 mg

a. Electric lamps with a rated lifetime less than 25,000 hours when tested on an electronic fluorescent ballast, including T8 instant-start ballasts and T5 programmed-start ballasts, and turned OFF and ON every three hours.

b. Electric lamps with a rated lifetime equal to or greater than 25,000 hours when tested on an electronic fluorescent ballast, including T8 instant-start ballasts and T5 programmed-start ballasts, and turned OFF and ON every three hours.

901.4.1.4 (9.4.1.4)Multiple-Attribute Product Declaration or Certification A minimum of ten different products installed in the *building project* at the time of issuance of certificate of occupancy shall comply with one of the following subsections. Declarations, reports, and assessments shall be submitted to the *authority having jurisdiction (AHJ)* and shall contain documentation of the critical peer review by an independent third party, results from the review, the reviewer's name, company name, contact information, and date of the review or certification.

901.4.1.4.1 (9.4.1.4.1)Industry-Wide Declaration A Type III industry-wide environmental product declaration (EPD) shall be submitted for each product. Where the program operator explicitly recognizes the EPD as fully representative of the product group on a national level, it is considered industrywide. In the case where an industry-wide EPD represents only a subset of an industry group, as opposed to being industry-wide, the manufacturer shall be explicitly recognized as a participant by the EPD program operator. All EPD shall be consistent with ISO Standards 14025 and 21930, with at least a cradle-to-gate scope. Each product complying with this section shall be counted as one product for compliance with Section 901.4.1.4 (9.4.1.4).

901.4.1.4.2 (9.4.1.4.2)Product-Specific Declaration A product-specific Type III EPD shall be submitted for each product. The product-specific declaration shall be manufacturer-specific for a product family. Type III EPDs shall be certified as complying with the goal and scope for the cradle-to-gate requirements in accordance with ISO Standards 14025 and 21930. Each product complying with this section shall be counted as two products for compliance with Section 901.4.1.4 (9.4.1.4).

901.4.1.4.3 (9.4.1.4.3)Third-Party Multiattribute Certification A material-specific assessment shall be submitted for each product in accordance with one of the following standards, where applicable. The assessment shall be certified as meeting the minimum performance level specified in each standard. Each product complying with this section shall be counted as two products for compliance with Section 901.4.1.4 (9.4.1.4).

- a. ANSI/BIFMA e3
- b. NSF/ANSI 140
- c. NSF/ANSI 332
- d. NSF/ANSI 336
- e. NSF/ANSI 342

f.NSF/ANSI 347 g. NSC 373
h.ANSI A138.1
i.UL 100 j. UL 102

901.4.1.4.4 (9.4.1.4.4)Product Life Cycle A report by a third-party that has critically reviewed the *life-cycle assessment (LCA)* of a product, based on ISO Standards 14040 and 14044, shall be submitted. The report shall demonstrate compliance with the goal and scope for the cradle-to-gate requirements. Each product complying with this section shall be counted as two products for compliance with Section 901.4.1.4(9.4.1.4).

901.5 (9.5) Performance Option

901.5.1 (9.5.1)Life-Cycle Assessment (LCA) An *LCA* shall be performed in accordance with ASTM E2921 and ISO Standard 14044, as modified by this section, for a minimum of two building alternatives, both of which shall conform to the *owner's project requirements (OPR)*.

901.5.1.1 (9.5.1.1)LCA Performance Metric The *LCA* shall demonstrate that the final building design achieves one of the following minimum improvements over the reference building design assessed in the *LCA*.

a. Ten percent (10%) improvement in a minimum of each of two impact categories, one of which must be global warming.

b. Five percent (5%) improvement in a minimum of each of three impact categories, one of which must be global warming.

The following impact categories shall be used to determine compliance with this section and shall be included in the report described in Section 901.5.1.3 (9.5.1.3): land use, resource use, global warming, ozone layer depletion, human health effects, ecotoxicity, smog, acidification, and eutrophication.

901.5.1.2 (9.5.1.2)Procedure The *LCA* shall be performed in accordance with the service lives, life-cycle stages, study boundaries, and comparison methodologies of ASTM E2921 with the following modifications:

a. Each building alternative shall comply with Chapters 6, 7 and 8 (Sections 6, 7, and 8) of this code.

b. The service life of the buildings shall not be less than that determined using Table 1001.3.2.3 (10.3.2.3), except that the service life of long-life buildings shall be no less than 75 years.

c. Operating energy consumption shall be included or excluded at the discretion of the project team.

d. The *LCA* tool (or tools) or software shall include a published third-party impact indicator method.

e. The estimate of structural system material quantities shall be verified by a design professional or other approved source.

901.5.1.3 (9.5.1.3)Reporting A report that includes a description of the building alternatives and their physical differences shall be prepared and shall comply with the reporting requirements stated in ASTM E2921. The name and address of the *design professional* or other approved source verifying structural system material quantities shall be included. A critical review shall be performed by an external expert independent of those performing the *LCA*.

The report shall be submitted to the *AHJ* and include documentation of critical peer review by a third party, results from the review, and the reviewer's name and contact information.