



# **GS-54**

## **GREEN SEAL™ STANDARD FOR ARCHITECTURAL THERMAL INSULATION MATERIALS**

**EDITION 1.1  
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THE MARK OF ENVIRONMENTAL RESPONSIBILITY

## GREEN SEAL

Green Seal is a nonprofit organization whose mission is to use science-based programs to empower consumers, purchasers, and companies to create a more sustainable world. Green Seal sets leadership standards that aim to reduce, to the extent technologically and economically feasible, the environmental, health, and social impacts throughout the life-cycle of products, services, and companies. The standards may be used for conformity assessment, purchaser specifications, and public education.

Green Seal offers certification of products, services, and companies in conformance with its standards. For additional information on Green Seal or any of its programs, contact:

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**GREEN SEAL STANDARD FOR  
ARCHITECTURAL THERMAL INSULATION MATERIALS, GS-54**

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## FOREWORD

**Edition.** This Standard is Edition 1.1, from June 29, 2017, which replaces Edition 1.0 from July 26, 2016. This edition includes substantive changes.

**General.** The requirements in the standard are based on an assessment of the environmental and health impacts associated with the products covered in the scope of the standard. These requirements are subject to revision, and generally cover aspects above and beyond regulatory compliance. This standard neither modifies nor supersedes laws and regulations. Any conformity assessment to this standard requires compliance with all applicable laws and regulations for the manufacturing and marketing of the products.

Provisions for safety have not been included in this standard, since they are overseen by regulatory agencies. Adequate safeguards for personnel and property should be employed for all stages of production, and for all tests that involve safety considerations.

Products that are substantially similar to those covered by this standard in terms of function and life cycle considerations may be evaluated against the intent of the requirements of this standard, accounting for relevant differences between the intended scope of the standard and the actual product to be evaluated.

This standard may not anticipate a feature of the product that may significantly, and undesirably, increase its impact on the environment, health, or society. In such a situation, Green Seal will ordinarily amend a standard to account for the unanticipated environmental, health, or societal impacts.

Normative references (e.g., other standards) in this standard intend to refer to the most recent edition of the normative reference. Test methods may be required for product evaluation. Unless explicitly stated that a specified method is the only acceptable one, the intent of the standard is that an equivalent test method may be accepted at Green Seal's sole discretion.

Certification to this standard shall be awarded only by Green Seal, or, with Green Seal's explicit written permission, by a third-party certification program conducting on-site audits.

**Disclaimer of Liability.** Green Seal, as the developer of this standard, shall not incur any obligations or liability for any loss or damages, including, without limitation, indirect, consequential, special, or incidental damages, arising out of or in connection with the interpretation or adoption of, reliance upon, or any other use of this standard by any party. Green Seal makes no express or implied warranty of merchantability or fitness for a particular purpose, nor any other express or implied warranty with respect to this standard.

## ACRONYMS AND ABBREVIATIONS

**ASTM.** ASTM International

**CFR.** Code of Federal Regulations

**EPA.** United States Environmental Protection Agency

**FTC.** Federal Trade Commission

**GHS.** Globally Harmonized System of Classification and Labeling of Chemicals

**ISO.** International Organization for Standardization

**IPCC.** Intergovernmental Panel on Climate Change

**NFPA.** National Fire Protection Association

**OSHA.** Occupational Safety and Health Administration

**VOC.** Volatile Organic Compound

## GREEN SEAL STANDARD FOR ARCHITECTURAL THERMAL INSULATION MATERIALS, GS-54

### 1.0 SCOPE

This standard establishes environmental, health, and performance requirements for insulation materials that provide thermal resistance and are used in buildings. Insulation materials may be in the form of batts, blankets, rolls, boards, blown-in / loose fill, spray foam, rigid foam, low-density foam, rigid fiber, or *reflective insulation*.

The scope includes products made from fiberglass, rock wool, and other mineral wools; polyurethane; polystyrene; polyisocyanurate; paper, wood, and other cellulose materials; denim and other fabrics; vermiculite; perlite; animal wool; and other materials that provide thermal resistance.

Polyurethane foam manufactured in a controlled facility is included in the scope of the standard. Components of spray polyurethane foam intended to be mixed and reacted on-site are also included in the scope of this standard. In order to promote on-site installation by trained professionals, the scope includes only those component systems that are intended exclusively for such professional installation and sold in 55-gallon drums or larger containers.

Products that contain insulation materials (e.g., insulation materials with facing, structural insulating panels, insulated concrete forms, or foam-core panels) and other architectural thermal-resistance materials may also be considered for certification, provided that the product meets all of the relevant requirements in this standard.

The scope of the standard excludes *radiant barriers* and spray polyurethane foam sold in containers smaller than 55-gallon drums, as well as insulation materials that are used for non-architectural purposes, such as mechanical insulation and those materials used in ovens, cryogenic vessels, aircraft, marine vessels, or automobiles. Also excluded are secondary products, e.g., jacketing, sheathing, moisture barriers.

See Appendix 1 for a sample list of products that are or are not included in this standard.

**Words and phrases described in the standard that appear in *italics* have a corresponding definition located in the definition section of the standard, Annex A.**

### 2.0 PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS

**2.1 Industry Standard Specifications.** The product shall meet the requirements for R-value and all other requirements in the ASTM specification for its product category (Appendix 2), or equivalent.

If the specification does not refer to the R-value, it shall be tested according to the FTC requirements for Marketing of Insulation materials, 16 CFR 460.5.<sup>1</sup>

Fabric insulation shall meet the specifications for cellulose.<sup>2</sup>

**2.2 Fire Safety – Fire Spread and Smoke Development.** The product shall meet the fire spread and smoke development requirements in the fire codes of the international construction code set by the International Code Council<sup>3</sup> or the relevant regulatory authority.<sup>4</sup>

**2.3 Functional Claims.** The product shall be tested for each performance parameter in this section that is included on the product labeling or marketing materials. Each test shall demonstrate that the product performs as well or better than a *benchmark product* in its product class, using the listed method or an equivalent.

**2.3.1 Compressive Strength.** ASTM C165.

**2.3.2 Flexural Strength.** ASTM C203.

**2.3.3 Sound Absorption (Noise Reduction Coefficient).** ASTM C423.

**2.3.4 Water Vapor Transmission (permeance).** ASTM E96.

**2.3.5 Corrosivity/Corrosion Under Insulation.** ASTM C1617.

**2.3.6 Resistance to Freeze/Thaw Cycles.** ASTM C1512.

**2.3.7 Fungi Resistance.** ASTM C1338.

**2.3.8 Roof Insulation Panels: Uplift Resistance.** ASTM E907.<sup>5</sup>

**2.4 Alternative Performance Requirements.** Alternatively, the product shall demonstrate that it performs as well as or better than a *benchmark product* in its product class for

- thermal resistance (R-value), tested according to the requirements in the FTC requirements for Marketing of Insulation materials, 16 CFR 460.5<sup>6</sup>

AND

- the other key parameters required for it to fulfill the intended function(s), as defined in the appropriate subsections of Section 2.0

This comparison shall be conducted using an objective, scientifically-validated method conducted under controlled and reproducible laboratory conditions. Test methodology and results shall be documented in sufficient detail.

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<sup>1</sup> [http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5;node=16%3A1.0.1.4.61#se16.1.460\\_15](http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5;node=16%3A1.0.1.4.61#se16.1.460_15)

<sup>2</sup> unless there is a relevant industry standard for fabric insulation.

<sup>3</sup> The 2015 version of the fire and smoke safety codes can be found at

<http://codes.iccsafe.org/app/book/content/2015-I-Codes/2015%20IBC%20HTML/Chapter%207.html>

<sup>4</sup> The testing shall be conducted according to the methods specified in those codes or by the relevant regulatory authority.

<sup>5</sup> This standard method (or an equivalent method) shall be used even though it has been withdrawn by ASTM.

<sup>6</sup> [http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5;node=16%3A1.0.1.4.61#se16.1.460\\_15](http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5;node=16%3A1.0.1.4.61#se16.1.460_15)

### 3.0 PRODUCT-SPECIFIC HEALTH AND ENVIRONMENTAL REQUIREMENTS

**3.1 Recovered Content.** The product shall contain at least the following amounts of recovered content:

Material	% Recovered Content
Rock Wool	75
Fiberglass	40
Extruded Polystyrene	20
Expanded Polystyrene	10
Paper Cellulose	80 (postconsumer)
Cotton	80 (postconsumer)
Perlite Composite Board	23 (postconsumer paper)

For product categories not listed in the table, there are no requirements for recovered content.

**3.2 Global Warming Potential.** Blowing agents shall have a 100-year Global Warming Potential rating that does not exceed 25, as established in the IPCC Fourth Assessment Report (AR4)<sup>7</sup> or the EPA fact sheet on Low-GWP Alternatives in Building/Construction Foams.<sup>8</sup>

**Exemption:** Blowing agents for extruded polystyrene foam may have a Global Warming Potential that does not exceed 1500,<sup>9</sup> until January 1, 2019.

**3.3 Ozone Depletion Potential.** Blowing agents shall have an Ozone Depletion Potential of zero as defined by the EPA, following the Montreal Protocol and its appendices.<sup>10</sup>

**3.4 Volatile Organic Compound (VOC) Emissions.** Products shall meet the requirements specified in California Department of Public Health (CDPH) Standard Method V1.2-2017,<sup>11</sup> for all scenarios (classroom, office, or residential) that are consistent with the intended uses listed in their labeling or marketing materials. Products labeled for use only in commercial structures shall meet the requirements using the office scenario.

**Note:** Products that were not tested using the residential scenario shall include a statement on the label: “VOC emissions have not been evaluated for use in residential settings.”<sup>12</sup>

<sup>7</sup> [https://www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/ch2s2-10-2.html](https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html), Table 2.14 from the column titled “100-yr” (not “SAR (100-yr)”).

<sup>8</sup> [https://www.epa.gov/sites/production/files/2015-07/documents/transitioning\\_to\\_low-gwp\\_alternatives\\_in\\_building\\_and\\_construction\\_foams.pdf](https://www.epa.gov/sites/production/files/2015-07/documents/transitioning_to_low-gwp_alternatives_in_building_and_construction_foams.pdf)

<sup>9</sup> This value is intended to allow the use of HFC-134a, HFC-245fa, and HFC365mfc.

<http://www.epa.gov/snap/substitutes-polystyrene-extruded-boardstock-and-billet>

<sup>10</sup> Ozone Depleting Chemicals have been phased out in the United States. This criterion is included to prevent certification of products that contain materials that are prohibited in the U.S.

<sup>11</sup> Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers – V1.2, 2017, California Specification 01350. See Appendix 3 for threshold levels. [https://archive.cdph.ca.gov/programs/IAQ/Documents/CDPH-IAQ\\_StandardMethod\\_V1\\_2\\_2017.pdf](https://archive.cdph.ca.gov/programs/IAQ/Documents/CDPH-IAQ_StandardMethod_V1_2_2017.pdf)

<sup>12</sup> See Section 5.2

**3.5 Bleaching.** Materials used in the product shall not be bleached during the process of manufacturing the insulation.

**3.6 Prohibited and Restricted Substances.** *Components* present in the insulation product at 0.01% by weight or more, and *components* present in blowing agents at 1% by weight or more,

- shall not be classified as known or probable carcinogens by IARC (Class 1 or 2A),<sup>13</sup> the National Toxicology Project<sup>14</sup> (Groups 1 and 2), EPA Integrated Risk Information System<sup>15</sup> (Carcinogenic to Humans and Likely to be Carcinogenic to Humans, Group A, B1, or B2), or OSHA (29 CFR 1910.1003(a)(1));<sup>16</sup>
- shall not be listed by California Proposition 65<sup>17</sup> as a reproductive toxin;
- and shall not carry the following GHS hazard statements:<sup>18</sup>

H310 Fatal in contact with skin (acute dermal toxicity) (Category 1 & 2)

H330 Fatal if inhaled (acute toxicity, inhalation) (Category 1 & 2)

H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled, respiratory sensitization (Category 1)

H340 May cause genetic defects (germ cell mutagenicity) (Category 1A & 1B)

H350 May cause cancer (carcinogenicity) (Category 1A & 1B)

H350i May cause cancer by inhalation (carcinogenicity) (Category 1A & 1B)

H351 Suspected of causing cancer (carcinogenicity) (Category 2)

H360 May damage fertility or the unborn child (reproductive toxicity) (Category 1A & 1B)

H370 Causes damage to organs (specific target organ toxicity, single exposure) (Category 1)

**Exemption:** MDI (methylene diphenyl diisocyanate, CAS 101-68-8) is allowed as a functional ingredient in spray polyurethane foam and polyisocyanurate foam products.

**Exemption:** Sodium borate (CAS 1330-43-4; 1303-96-4; 13840-56-7) and boron oxide (CAS 1303-86-2) are allowed as functional ingredients up to 30% in the product.

**Note:** According to IARC,<sup>19</sup> “insulation glass wool (i.e., fiberglass), continuous glass filament, rock (stone) wool and slag wool are not classifiable as to their carcinogenicity to humans (Group 3),” and are therefore not prohibited.

The following *components* shall not be *intentionally introduced* into the product:

- Polybrominated diphenyl ether (PBDE) flame retardants

<sup>13</sup> <http://monographs.iarc.fr/ENG/Classification/index.php>

<sup>14</sup> <http://ntp.niehs.nih.gov/pubhealth/roc/criteria/index.html>

<sup>15</sup> EPA 2005. Guidelines for Carcinogen Risk Assessment. [http://www.epa.gov/sites/production/files/2013-09/documents/cancer\\_guidelines\\_final\\_3-25-05.pdf](http://www.epa.gov/sites/production/files/2013-09/documents/cancer_guidelines_final_3-25-05.pdf)

<sup>16</sup> [https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10007](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10007)

<sup>17</sup> The Safe Drinking Water and Toxic Enforcement Act of 1986.

[http://oehha.ca.gov/prop65/prop65\\_list/Newlist.html](http://oehha.ca.gov/prop65/prop65_list/Newlist.html)

<sup>18</sup> [http://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs\\_rev04/English/07e\\_annex3.pdf](http://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev04/English/07e_annex3.pdf) as listed by the European Chemical Agency, <http://echa.europa.eu/information-on-chemicals/cl-inventory-database>

<sup>19</sup> <http://monographs.iarc.fr/ENG/Monographs/vol81/mono81.pdf>

- Brominated paraffin flame retardants
- Short-chain (C10-C13) chlorinated paraffin flame retardants
- Hexabromocyclododecane (HBCD, CAS 3194-55-6)<sup>20</sup>
- Chemical compounds containing formaldehyde, including formaldehyde, urea-formaldehyde, phenol-formaldehyde and urea-extended phenol formaldehyde
- Neonicotinoid pesticides<sup>21</sup>
- Triclosan
- Compounds containing the heavy metals tin, lead, mercury, cadmium, chromium, antimony, and selenium. **Exemption:** organic tin compounds used as part of the catalyst package for spray foam formulations may be allowed up to 0.1% of the polyol blend
- The following phthalates: di (2-ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, diethyl phthalate, dimethyl phthalate

The following substances are prohibited under other restrictions in the standard:

- Asbestos (at 0.01% and above)
- Arsenic (at 0.01% and above)
- CFCs, HCFCs, HFCs<sup>22</sup>
- Tris(1,3-dichloro-2-propyl)phosphate (TDCPP) (CAS 13674-87-8) (at 0.01% and above)
- Tris(2-chloroethyl)phosphate (TCEP) (CAS 115-96-8) (at 0.01% and above)
- Acrylamide (CAS 79-06-1)

### 3.7 Embodied Energy. [Reserved]

## 4.0 PACKAGING REQUIREMENTS

**4.1 Plastic Package.** Plastic packaging shall be recyclable and shall not contain *intentionally introduced* phthalates or halogenated substances.

**4.2 Paper and Cardboard Package.** Paper and cardboard packaging shall be made from a minimum of 10% *recovered material*.

**4.3 Heavy Metal Restrictions.** The sum of the concentrations of lead, mercury, cadmium, and hexavalent chromium in packaging shall not exceed 0.01% by weight.

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<sup>20</sup> HBCD that is present due to its existence in recovered material used in the manufacture of the product shall be exempted from this prohibition, since it is not intentionally added.

<sup>21</sup> i.e. imidacloprid (138261-41-3), acetamiprid (CAS# 135410-20-7), clothianidin (210880-92-5), nitenpyram (150824-47-8), nithiazine (58842-20-9), thiacloprid (111988-49-9), and thiamethoxam (153719-23-4).

<sup>22</sup> The requirements for Global Warming Potential and Ozone Depletion effectively prohibit CFCs, HCFCs, and HFCs, except in the case of HFCs used in extruded polystyrene foam.

## 5.0 CONSUMER INFORMATION AND LABELING REQUIREMENTS

**5.1 Instructions for Proper Installation.** The product manufacturer shall provide training materials on the proper installation of the product, any required safety measures, and any recommended personal protection equipment for each stage of the installation, up to and including the entry of unprotected occupants. The manufacturer may provide this material or direct the purchaser to materials provided by a distributor or a competent third party, e.g., a professional trade group.

Installation instructions for insulation products shall comply with the relevant ASTM or other industry-accepted standard practice:

- Loose fill (cellulose and mineral fiber): ASTM C1015
- Mineral fiber batts and blankets (light frame construction): ASTM C1320
- Spray Polyurethane Foam: Guidance Documents from the Spray Foam Coalition,<sup>23</sup> the Center for the Polyurethane Industry's (CPI) website,<sup>24</sup> the Spray Polyurethane Foam Alliance,<sup>25</sup> or equivalent
- Reflective insulation: ASTM C727

Training materials shall cover at least the following topics:

- Safety precautions for site preparation including tools, lighting, ventilation, and emergency procedures
- Safety precautions for product handling, including cutting the product after installation
- Health risks to users/installers, including air contaminants, dermal exposure, and flammable components
- Specific measures for the reduction of health risks, including required safety procedures, personal protective equipment measures to prevent heat-related illness
- Installation procedures
- Post-installation and clean-up procedures and inspection, including: collection and disposal of dust, debris, and waste
- Procedures and talking points for communications with homeowners or building occupants before and after installation

**Note:** For installation and training involving spray polyurethane foam, see additional requirements in Section 5.4.

The appropriate product and/or equipment training information, including Safety Data Sheets (SDSs) and technical data sheets, shall be made available upon request electronically as well as in hard copy.

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<sup>23</sup> <http://polyurethane.americanchemistry.com/Spray-Foam-Coalition/Guidance-on-Best-Practices-for-the-Installation-of-Spray-Polyurethane-Foam.pdf>

<sup>24</sup> <http://www.spraypolyurethane.org/>

<sup>25</sup> e.g., [http://www.sprayfoam.org/files/docs/HealthSafety/SPF\\_2015\\_Exterior%20HealthSafetyQA\\_Formatted.pdf](http://www.sprayfoam.org/files/docs/HealthSafety/SPF_2015_Exterior%20HealthSafetyQA_Formatted.pdf) and many others.

**5.2 Labels and Marketing Materials.** Labels and marketing materials for all product categories shall refer the purchaser to instructions for proper handling and installation, including safety measures and protective equipment (see Section 5.1).

For spray polyurethane foam products, the labels, marketing materials, or technical data sheets shall include:

- the range of recommended curing times and safe re-entry times
- instructions that supplied-air respirators should be used for applications in interior spaces
- prominent statements that installation should be performed only by trained insulation professionals

Products that contain respiratory sensitizers<sup>26</sup> shall include on the label and in marketing materials a statement that “This product contains material that may cause or aggravate asthma.”

Products that were not tested for VOC emissions using the residential scenario<sup>27</sup> shall include a statement on the label: “VOC emissions have not been evaluated for use in residential settings.”

**5.3 Disposal Directions.** The product label, website, or literature shall have explicit disposal, recycling, or reuse instructions, including appropriate precautions and recommendations for the use of personal protective equipment.

**5.4 Product Stewardship.** For polyurethane foam products intended for in-situ spray application, the manufacturer shall establish a documented program to limit the use of their product to insulation professionals who have been trained on the following topics:

- SPF Chemical Health and Safety
- Basics of Spray Polyurethane Foam
- Substrate Preparation
- SPF Installation Methodology
- SPF Troubleshooting and Repair
- SPF Equipment

## 6.0 CERTIFICATION REQUIREMENTS

**6.1 Certification Mark.** The Green Seal<sup>®</sup> Certification Mark may appear on the product, packaging, secondary documents, and promotional materials, only in conjunction with the certified product. Use of the Mark must be in accordance with *Rules Governing the Use of the Green Seal Certification Mark*.<sup>28</sup>

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<sup>26</sup> e.g., MDI (methylene diphenyl diisocyanate, CAS 101-68-8)

<sup>27</sup> see Section 3.4

<sup>28</sup> <http://www.greenseal.org/TrademarkGuidelines>

The Green Seal Certification Mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the certification.

Green Seal must review all uses of the Certification Mark prior to printing or publishing.

**6.2 Use With Other Claims.** The Green Seal Certification Mark shall not appear in conjunction with any human health or environmental claims, unless verified and approved in writing by Green Seal.

**6.3 Statement of Basis for Certification.** Wherever the Green Seal Certification Mark appears, it shall be accompanied by a description of the basis for certification. The description shall be in a location, style, and typeface that are easily readable.

The description shall read as follows, unless an alternate version is approved in writing by Green Seal:

This product meets Green Seal™ Standard GS-54 based on energy efficiency, recovered material content, and protective limits on VOCs, greenhouse gas emissions, and toxic materials. [GreenSeal.org/GS54](http://GreenSeal.org/GS54)

For products that do not have requirements for recovered material content:

This product meets Green Seal™ Standard GS-54 based on energy efficiency, and protective limits on VOCs, greenhouse gas emissions, and toxic materials.  
[GreenSeal.org/GS54](http://GreenSeal.org/GS54)

For products that do not contain blowing agents:

This product meets Green Seal™ Standard GS-54 based on energy efficiency, recovered material content, and protective limits on VOCs and toxic materials.  
[GreenSeal.org/GS54](http://GreenSeal.org/GS54)

## ANNEX A – DEFINITIONS (Normative)

Note that the defined terms are italicized throughout the standard.<sup>29</sup>

**Batt.** Blanket insulation manufactured to dimensions as required by a specific application.

**Benchmark Product.** A product used for comparison in performance testing; for the purposes of this standard this is considered a national market-leading product, typically selected from the top three or four selling brands or companies for its product class from nation-wide data.<sup>30</sup>

**Blanket Insulation.** A relatively flat and flexible insulation in coherent sheet form furnished in units of substantial area.

**Block Insulation.** Rigid insulation preformed into rectangular units.

**Cellulosic Fiber.** Insulation composed principally of cellulose fibers usually derived from paper, paperboard stock, or wood, with or without binders.

**Component.** Any constituent of a product that is intentionally added or present as contaminant. For products composed of multiple parts that are mixed on site (multi-component products), any threshold applies to the total weight of all parts added together (i.e., the combined parts).

**Intentional Introduction.** The act of deliberately using a material where its continued presence is desired in the final product to provide a specific characteristic, appearance, or quality. Intentional introduction does not include the use of the material as a processing aid or intermediate during manufacturing, where the presence of a residual of that material in the final product is not desired or deliberate.

**Loose Fill Insulation.** Insulation in granular, nodular, fibrous, powdery, or similar form designed to be installed by pouring, blowing, or hand placement.

**Primary Package.** Package material that physically contains and contacts the product.

**Radiant Barrier.** Reflective material that faces an open air space, either interior or exterior.

**Recovered Material.** Includes both preconsumer and postconsumer recovered materials.

**Preconsumer Material.** Material diverted from a waste stream during the manufacturing process, excluding material such as rework, regrind, or scrap generated in a process and capable of being reused within the same process that generated it.

**Postconsumer Material.** Material that has completed its intended end use and would otherwise be disposed of as solid waste. Postconsumer material does not include

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<sup>29</sup> Definitions for insulation materials are taken from ASTM C168 <http://www.astm.org/Standards/C168.htm>

<sup>30</sup> It is recommended that manufacturers discuss their product testing with Green Seal before the testing is performed to ensure that the choice of comparison product(s) is appropriate.

materials, agricultural residue, or by-products generated from, and commonly reused within, an original manufacturing and fabrication process.

**Recyclable.** The package can be collected in a substantial majority of communities, separated or recovered from the solid waste stream and used again, or reused in the manufacture or assembly of another package or product through an established recycling program.

**Reflective Insulation.** Thermal insulation consisting of one or more low emittance surfaces, bounding one or more enclosed air spaces.

**Thermal Insulation.** A material or assembly of materials used to provide resistance to heat flow.

**APPENDIX 1 – SCOPE EXAMPLES (Informative)****Products and Materials Included in GS-54**

- Batts and Blankets
- Rolls
- Boards
- Blown-in / Loose fill
- Spray foam
- Rigid foam
- Low-density foams
- Rigid fiber
- Reflective Insulation
- Fiberglass and glass wool
- Rock wool
- Other mineral wool
- Expanded polystyrene
- Extruded polystyrene
- Polyisocyanurate foam (PIR)
- Polyurethane (open or closed cell)
- Cotton and denim
- Paper
- Wood
- Other cellulose materials
- Animal wool
- Vermiculite
- Perlite

**Products and Materials Excluded from GS-54**

- Spray Polyurethane Foam components sold in containers other than 55 gallon drums
- Oven insulation
- Mechanical insulation
- Cryogenic insulation
- Aircraft, automotive, marine, or cryogenic insulation
- Vacuum insulation panels
- Gas-filled panels
- Aerogels
- Phase change materials
- Secondary products, e.g., jacketing, sheathing, moisture barriers
- Radiant Barriers

**APPENDIX 2 (Informative).** ASTM Specifications for Representative Insulation Categories

<b>Product Category</b>	<b>ASTM Specification</b>
<b>Mineral Fiber – Rock, Slag, or Glass</b>	
Blanket	C553 or C665
Block and Board	C612
Roof Insulation Board	C726
Loose-Fill	C764
Blanket, Light Density, for Light Frame Construction or Manufactured Houses	C665
Spray-applied	C1014
<b>Foam</b>	
Extruded or Expanded Polystyrene	C578
Un-faced Polyisocyanurate	C591
Faced Polyisocyanurate	C1289
Spray-applied Polyurethane	C1029
<b>Perlite &amp; Vermiculite</b>	
Perlite, Loose-fill	C549
Perlite, Board	C728
Vermiculite, Loose-fill	C516
<b>Cellulosic Fiber</b>	
Board	C208
Loose-fill	C739
Spray	C1149
<b>Reflective</b>	
Reflective Insulation	C1224 or C1668 or STP 1116

**APPENDIX 3 (Informative).** Table 4-1, Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers (California Specification 01350), Version 1.2 (2017)<sup>31</sup>

**Table 4-1** Target CREL VOCs and their maximum allowable concentrations

No.	Compound Name	CAS No.	Allowable Conc. <sup>a</sup> ( $\mu\text{g}/\text{m}^3$ )
1	Acetaldehyde	75-07-0	70
2	Benzene	71-43-2	1.5 <sup>b</sup>
3	Carbon disulfide	75-15-0	400
4	Carbon tetrachloride	56-23-5	20
5	Chlorobenzene	108-90-7	500
6	Chloroform	67-66-3	150
7	Dichlorobenzene (1,4-)	106-46-7	400
8	Dichloroethylene (1,1)	75-35-4	35
9	Dimethylformamide (N,N-)	68-12-2	40
10	Dioxane (1,4-)	123-91-1	1,500
11	Epichlorohydrin	106-89-8	1.5
12	Ethylbenzene	100-41-4	1,000
13	Ethylene glycol	107-21-1	200
14	Ethylene glycol monoethyl ether	110-80-5	35
15	Ethylene glycol monoethyl ether acetate	111-15-9	150
16	Ethylene glycol monomethyl ether	109-86-4	30
17	Ethylene glycol monomethyl ether acetate	110-49-6	45
18	Formaldehyde	50-00-0	9 <sup>c</sup>
19	Hexane (n-)	110-54-3	3,500
20	Isophorone	78-59-1	1,000
21	Isopropanol	67-63-0	3,500
22	Methyl chloroform	71-55-6	500
23	Methylene chloride	75-09-2	200
24	Methyl <i>t</i> -butyl ether	1634-04-4	4,000
25	Naphthalene	91-20-3	4.5
26	Phenol	108-95-2	100
27	Propylene glycol monomethyl ether	107-98-2	3,500
28	Styrene	100-42-5	450
29	Tetrachloroethylene	127-18-4	17.5
30	Toluene	108-88-3	150
31	Trichloroethylene	79-01-6	300
32	Vinyl acetate	108-05-4	100
33-35	Xylenes, technical mixture (m-, o-, p-xylene combined)	108-38-3, 95-47-6, 106-42-3	350

- a) Refer to [http://www.oehha.ca.gov/air/chronic\\_rels/AllChrels.html](http://www.oehha.ca.gov/air/chronic_rels/AllChrels.html). All maximum allowable concentrations are one-half the corresponding CREL adopted by Cal/EPA OEHHA with the exception of formaldehyde. For any future changes in the CREL list by OEHHA, values in Table 4.1 shall continue to apply until these changes are published in the Standard Method.
- b) Benzene has a CREL of 3  $\mu\text{g}/\text{m}^3$  (June 2014); guidance value established by this Standard Method at 30  $\mu\text{g}/\text{m}^3$  before March 31<sup>st</sup>, 2017 and at 1.5  $\mu\text{g}/\text{m}^3$  starting from April 1<sup>st</sup>, 2017. See Addendum 2017-01 for details.
- c) Formaldehyde has a CREL of 9  $\mu\text{g}/\text{m}^3$  (December 2008); guidance value established by this Standard Method at 16.5  $\mu\text{g}/\text{m}^3$  before Dec 31<sup>st</sup>, 2011 and at 9  $\mu\text{g}/\text{m}^3$  starting from Jan 1<sup>st</sup>, 2012.

<sup>31</sup> <https://archive.cdph.ca.gov/programs/IAQ/Pages/VolatileOrganicCompounds.aspx>