

# Healthy Flooring criteria

Environmental attributes for healthy flooring in health care

November 2018



This document provides guidance for manufacturers wishing to meet Health Care Without Harm’s Healthy Flooring criteria. The criteria apply to all flooring except carpet, fluid applied floors, and concrete. The criteria do not apply to floor leveling compounds or underlayment.

## Guidance for manufacturers

This chart summarizes the Healthy Flooring Criteria. Manufacturers can achieve either a Silver or Gold Healthy Flooring rating. Criteria details and a rationale for their inclusion are included below the chart.

“Product” means every part of the flooring, including the flooring material, coatings, and adhesives.

SILVER LEVEL CRITERIA			
CHEMICAL AND MATERIAL CRITERIA	DETAILS	SILVER	GOLD
Alkylphenols	The product does not contain alkylphenols, alkylphenol ethoxylates, or related compounds above 100 ppm.	x	x
Antimicrobial agents	The product does not contain any added antimicrobials.	x	x
Bisphenol A and its analogs	The product does not contain bisphenol A or its structural analogs above 1000 ppm.	x	x
Epichlorohydrin	The product does not contain epichlorohydrin-based formulations.	x	x
Flame retardants	The product does not contain flame retardants above 100 ppm.	x	x
Formaldehyde	The product does not contain formaldehyde-based formulations.	x	x
Isocyanates	The product does not contain unreacted (‘free’) isocyanates.	x	x

CHEMICAL AND MATERIAL CRITERIA	DETAILS	SILVER	GOLD
Metals	The product does not contain lead, mercury, cadmium, hexavalent chromium (chromium VI), or organotins above 10 ppm.	x	x
Nanomaterials	The product does not contain deliberately engineered nanomaterials.	x	x
Ortho-phthalates	The product does not contain total ortho-phthalates above 50 ppm.	x	x
PFAS chemicals	The product does not contain per- or poly-fluorinated alkyl substances above 100 ppm.	x	x
PBT chemicals	The product does not contain persistent, bioaccumulative, and toxic chemicals (PBTs) above 1000 ppm.	x	x
Proposition 65 chemicals	The product does not contain intentionally added chemicals listed on Proposition 65 at levels that would require a warning in the State of California.	x	x
PVC and other chlorinated polymers	The product does not contain polyvinyl chloride (PVC) or other chlorinated polymers.	x	x
Recycled tires	The product does not contain recycled tires.	x	x
Siloxanes	The product does not contain volatile methylcyclsiloxanes D4 and D5 above 100 ppm.	x	x
<b>Other criteria</b>	<b>Details</b>	<b>Silver</b>	<b>Gold</b>
Maintenance	The product must not require the periodic use of strippers, sealants, or floor finishes to maintain the product.	x	x
Product content transparency	The product must have a complete Health Product Declaration with all substances characterized and screened at or above 1000 ppm.	x	x
VOC certification	The product must be certified as meeting California 01350 (California Department of Public Health (CDPH) Standard Method v1.2-2017), GREENGUARD Gold, SCS Indoor Advantage Gold, FloorScore, Blue Angel, or Cradle to Cradle Gold or Platinum.	x	x
VOC certification for SBR products	The product must be certified as meeting GREENGUARD Gold or SCS Indoor Advantage Gold.	x	x
Wood certification	Wood used in the product must be Forest Stewardship Council (FSC) certified.	x	x
Wood finishing	Wood floors must be prefinished.	x	x

<b>GOLD LEVEL CRITERIA</b> <i>(ALL SILVER LEVEL REQUIREMENTS APPLY IN ADDITION TO THE FOLLOWING)</i>			
CRITERIA	DETAILS	SILVER	GOLD
Isocyanates	The product does not contain isocyanate-based formulations.		X
Product content transparency	The product must have a complete Health Product Declaration with all substances characterized, screened, and identified to 100 ppm.		X
SBR	The product does not contain styrene-butadiene rubber (SBR).		X
VOC certification	The product must be certified as meeting GREENGUARD Gold.		X

**NOTE: The Healthy Flooring criteria are part of a broader initiative in health care.** Institutions incorporating the criteria into their specifications must commit to install the flooring using adhesives that are certified by a third party as noted below.

<b>ADHESIVE INSTALLATION REQUIREMENT</b>	
CRITERIA	DETAILS
Installation adhesive	The adhesive used to install the flooring must be certified as meeting California 01350 (California Department of Public Health (CDPH) Standard Method v1.2-2017), GREENGUARD Gold, SCS Indoor Advantage Gold, FloorScore, Blue Angel for Low-Emission Floor Covering Adhesives, or Cradle to Cradle Gold or Platinum; or the flooring must be attached mechanically without a chemical adhesive.

## SILVER LEVEL CRITERIA

### Chemical and material criteria

#### Alkylphenols

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The product does not contain alkylphenols, alkylphenol ethoxylates, or related compounds above 100 ppm.

**Definition:** An alkylphenol is a phenol derivative wherein one or more of the ring hydrogens have been replaced by one or more alkyl groups. An alkyl group is a functional group or side-chain that consists solely of single-bonded carbon and hydrogen atoms.

**Scope:** The alkylphenol restriction applies to alkylphenols or AP ethoxylates with carbon chain lengths of eight or greater; 2,4,6-tri-*tert*-butylphenol, which is included in the OSPAR list of priority substances; and 4-*tert*-butylphenol.

**Rationale:** The breakdown products of alkylphenol ethoxylates include a variety of alkylphenols, some of which are estrogenic, and some are restricted due to persistence and bioaccumulation. When released into the environment, alkylphenol ethoxylates are particularly toxic to aquatic organisms.

#### Antimicrobial agents

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The product does not contain any added antimicrobials, including antimicrobials or preservatives used to preserve or protect the product.

**Definition:** [Antimicrobials](#) are substances or mixtures of substances designed to destroy or suppress the growth of harmful microorganisms whether bacteria, viruses, or fungi on inanimate objects or surfaces. These products are typically used for two purposes: 1) Disinfect, sanitize, reduce, or mitigate growth of microbiological organisms; 2) Protect inanimate objects (floors, walls, and/or furniture), industrial processes or systems, surfaces, water, or other chemical substances from contamination, fouling, or deterioration caused by bacteria, viruses, fungi, protozoa, algae, or slime.

**Rationale:** Human toxicity and ecotoxicity profiles differ among antimicrobial agents, but none are entirely benign. The addition of antimicrobials where there is not a clear benefit can also contribute to more widespread antibiotic resistance. Although floors can be a reservoir for a variety of pathogens, there is no evidence that antimicrobials added to flooring materials confers any health benefit, including reduction in healthcare associated infections.

## Bisphenol A and its analogs

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The product does not contain bisphenol A or its structural analogs above 1000 ppm.

**Scope:** Structural analogs to be avoided are bisphenol AP, bisphenol AF, bisphenol B, bisphenol C, bisphenol C2, bisphenol E, bisphenol F, bisphenol G, bisphenol M, bisphenol S, bisphenol P, bisphenol PH, bisphenol TMC, bisphenol Z, and 4-cumylphenol (HPP).

**Rationale:** Bisphenol A (BPA) is a reproductive and developmental toxicant and endocrine disruptor. Emerging evidence finds an association between prenatal or postnatal exposure to BPA and an increased risk of wheezing or asthma in children. Listed BPA structural analogs are also prohibited because they share similar toxic profiles to BPA.

## Epichlorohydrin

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The product does not contain epichlorohydrin-based formulations.

**Rationale:** Epichlorohydrin is listed as a carcinogen and reproductive toxicant, according to the State of California (Proposition 65).

## Flame retardants

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The product does not contain flame retardants above 100 ppm.

**Exception/exemption:** Where flammability standards require the use of flame retardants, inorganic flame retardants approved under the [Blue Angel Resilient Flooring Coverings criteria](#) are allowed. In particular, the following compounds may be used: inorganic ammonium phosphates (for example, diammonium phosphate or ammonium polyphosphate) and other dehydrating minerals (for example, [aluminium hydroxide](#) or expandable graphite).

**Definition:** Flame retardants are designed to inhibit, suppress, or delay the production of flames to prevent the spread of fire. For example, see the list of [Flame Retardants in the Chemical Hazard Data Commons](#).

**Rationale:** Flame retardants can be persistent and have a variety of toxic properties depending on the specific flame retardant. Non-polymeric flame retardants can migrate out of products into the environment resulting in human exposure.

## Formaldehyde

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The product does not contain formaldehyde-based formulations.

**Scope:** Some formaldehyde-based formulations are listed in [Chemical Hazard Data Commons Formaldehyde-Based Binders](#) and [Urea formaldehyde based compounds](#).

**Rationale:** Formaldehyde is classified as a known human carcinogen by the National Toxicology Program. It is also a sensitizing agent and can cause asthma.

## Isocyanates

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The product does not contain unreacted ('free') isocyanates.

**Definition:** Isocyanate is the functional group with the formula R–N=C=O. Organic compounds that contain an isocyanate group are referred to as isocyanates. Isocyanates are a family of highly reactive, low molecular weight chemicals.

**Scope:** For a list of some isocyanates, see [Isocyanates in the Chemical Hazard Data Commons](#).

Acceptable test methods to test for isocyanates include:

- [Colormetric Surface SWYPEs](#)
- [ASTM D2572](#), Standard Test Method for Isocyanate Groups in Urethane Materials or Prepolymers.

**Rationale:** Isocyanates are a very large group of chemicals. Isocyanates are powerful irritants to the mucous membranes of the eyes and gastrointestinal and respiratory tracts. Some isocyanates are potent sensitizers and asthmagens, posing serious risks to workers. Research suggests that exposure to very small quantities through inhalation or dermal contact can cause the onset of asthma. Commonly used isocyanates are some of the most prevalent asthmagens in building materials. At least one isocyanate is reasonably anticipated to be a carcinogen according to the National Toxicology Program, while others are not classifiable as to human carcinogenicity.

## Metals

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The product does not contain lead, mercury, cadmium, hexavalent chromium (chromium VI), or organotins above 10 ppm.

**Scope:** Metals include lead, mercury, cadmium, hexavalent chromium (chromium VI), organotins, and compounds that contain those metals. For example, see the list of [Toxic Heavy Metals in the Chemical Hazard Data Commons](#) and list of [Organotin Compounds in the Chemical Hazard Data Commons](#).

**Rationale:** A wide variety of health and ecosystem concerns are associated with the toxic metals prioritized in this criterion, including neurotoxicity, cancer, reproductive and developmental effects, and aquatic toxicity.

## Nanomaterials

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The product does not contain deliberately engineered nanomaterials.

**Definition:** Materials engineered to a very small scale are often referred to as engineered nanomaterials (ENMs), which can take on unique optical, magnetic, electrical, and other properties. For a more complete definition, see the European Commission [definition of a nanomaterial](#).

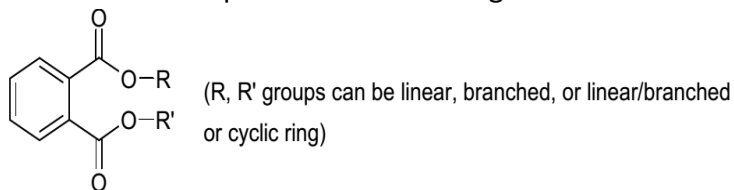
**Rationale:** There are growing concerns about the lack of testing of nanomaterials and emerging toxicity concerns for common nanomaterials. Most nanomaterials have not been extensively studied for health and environmental impacts. Far more information is needed, especially on physicochemical properties of nanomaterials, their behavior in different environments, and interactions with biological systems.

## Ortho-phthalates

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The product does not contain total ortho-phthalates above 50 ppm.

**Definition:** Ortho-phthalates have the general chemical structure shown below:



**Scope:** For more details on the compounds considered ortho-phthalates, please see the list of [Ortho-Phthalates in the Chemical Hazard Data Commons](#).

**Rationale:** The hazard profile of ortho-phthalates varies with side-chain lengths. Adverse effects include hormone disruption, reproductive and developmental impacts, and kidney toxicity. Exposure to some ortho-phthalates is associated with an increased risk of asthma. The [National Research Council](#) reports the importance of looking at cumulative exposure from multiple phthalates; exposure routes include ingestion, inhalation, intravenous injection, and skin absorption.

## Per- and poly-fluorinated alkyl substances (PFAS)

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The product does not contain per- or poly-fluorinated alkyl substances above 100 ppm.

**Definition:** PFAS compounds are a large group of compounds that contain a carbon-fluorine bond. PFAS includes long and short chain per- and poly-fluorinated alkyl substances and fluorinated polymers. This includes any substance that meets any one of the definitions:

- Perfluoroalkyl substances: Substances for which all hydrogen atoms on all carbon atoms (except for carbons associated with functional groups) have been replaced by fluorine atoms.
- Polyfluoroalkyl substances: Substances for which all hydrogen atoms on at least one (but not all) carbon atom have been replaced by fluorine atoms.
- Fluoropolymers: Carbon-only polymer backbone with fluorine atoms directly bound.
- Perfluoropolyethers: Carbon and oxygen polymer backbone with fluorine atoms directly bound to carbon atoms.
- Side-chain fluorinated polymers: Variable composition non-fluorinated polymer backbone with fluorinated side chains.

For a list of some of the specific chemicals included in these categories, see [Per- and Polyfluorinated Alkyl Substances \(PFAS\) / Perfluorinated Compounds \(PFCs\) in the Chemical Hazard Data Commons](#).

**Rationale:** PFAS compounds are generally highly persistent chemicals or break down into highly persistent chemicals. Some but not all bioaccumulate. They are regularly found in people and animals in all areas of the planet. Because of their persistence, continued use will inevitably lead to increasing environmental concentrations of PFAS compounds. The health effects of the most well studied include high cholesterol, thyroid disorders, pregnancy-induced hypertension and preeclampsia, cancer (testicular and kidney), and altered metabolism, among others. Many of these compounds have not been adequately evaluated.

### **Persistent, bioaccumulative, and toxic (PBT) chemicals**

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The product does not contain persistent, bioaccumulative, and toxic chemicals (PBTs) above 1000 ppm.

**Definition:** PBTs are a class of compounds that have high resistance to degradation from abiotic and biotic factors, high mobility in the environment, and high toxicity. Because of these factors, PBTs have been observed to have a high order of bioaccumulation and biomagnification, very long retention times in various media, and widespread distribution across the globe.

PBTs include chemicals on any of the following lists:

- [US EPA – Priority PBTs and US EPA – Priority PBTs \(NWMP\)](#)
- [OSPAR – Priority PBTs & EDs & equivalent concern](#)
- [UNEP Stockholm Conv – Persistent Organic Pollutants](#)
- [US EPA – Toxics Release Inventory PBTs](#)

**Rationale:** These four lists represent authoritative government lists of chemicals known to be persistent, bioaccumulative, and toxic. This combination of properties makes PBTs particularly hazardous. PBTs are long-lasting substances that can build up in the food chain to levels that are harmful to human and ecosystem health. Because of their persistence and bioaccumulative properties, they do not break down easily and are particularly difficult to clean up.

### **Proposition 65 chemicals**

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The product does not contain intentionally added chemicals listed on Proposition 65 at levels that would require a warning in the State of California.

**Definition:** Proposition 65 requires California to publish a [list of chemicals](#) known to cause cancer, birth defects, or other reproductive harm. It requires businesses to provide warnings to Californians about significant exposures to these chemicals. The Proposition 65 list, which must be updated at least once a year, has grown to include approximately 900 chemicals since it was first published in 1987.

**Rationale:** Proposition 65 chemicals are chemicals known to the State of California to cause cancer or adverse impacts on reproduction or development.

### **Polyvinyl chloride (PVC) and other chlorinated polymers**

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The product does not contain polyvinyl chloride (PVC) or other chlorinated polymers.

**Definition:** PVC, or vinyl, is a synthetic thermoplastic material made by polymerizing vinyl chloride. The properties of the material depend on the additives, including plasticizers.

**Rationale:** PVC is a particularly problematic plastic because of the toxicity of the monomers required to make the polymer and the generation and release of hazardous compounds during manufacture and disposal. PVC also generally requires more additives, many with their own toxic properties, when compared to other polymers. PVC is also difficult to recycle. As a flooring material, PVC typically requires more maintenance once installed.



## Recycled tires

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The product does not contain recycled tires.

**Rationale:** Recycled tires can contain contaminants of concern, including metals, polycyclic aromatic hydrocarbons, and other hazards.

## Siloxanes

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The product does not contain volatile methylcyclosiloxanes D4 and D5 above 100 ppm.

**Scope:** Methylcyclosiloxanes D4 and D5 include Octamethylcyclotetrasiloxane (D4) (CAS #'s 556-67-2, 104986-37-0, 117563-66-3, 1257661-59-8, and 83874-62-8) and Decamethylcyclopentasiloxane (D5) (CAS # 541-02-6).

**Rationale:** Siloxanes are a large family of chemicals with different toxicities. A limited number have been found to have aquatic and/or mammalian toxicity and are restricted. The restricted siloxanes D4 and D5 are persistent in the environment, bioaccumulate in the food chain, and are toxic.

## Other criteria

### Maintenance

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The product must not require the periodic use of strippers, sealants, or floor finishes to maintain the product.

**Rationale:** Significant costs and occupational and environmental concerns are associated with stripping and finishing. Products used in floor maintenance can include mixtures of many chemicals, including respiratory and dermal irritants and sensitizers.

### Product content transparency

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The product must have a complete Health Product Declaration with all substances characterized and screened at or above 1000 ppm.

**Definition:** A Health Product Declaration (HPD) can provide a full disclosure of the potential chemicals of concern in products. It provides a framework for manufacturers to inventory and disclose the contents of their products and any associated human and environmental hazards. Through the standardized HPD form, manufacturers provide information on both intentional content and impurities within their products. The framework is maintained and updated by the Health Product Declaration Collaborative.

**Rationale:** Product ingredient transparency is critical to understanding potential occupational and environmental risks of products and their life cycle, and to assessing potential exposures during use.

### VOC certification

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The product must be certified as meeting California 01350 (California Department of Public Health (CDPH) Standard Method v1.2-2017), GREENGUARD Gold, SCS Indoor Advantage Gold, FloorScore, Blue Angel, or Cradle to Cradle Gold or Platinum.

**Definition:** Volatile organic compounds (VOCs) are carbon containing compounds released as gases into the air from products at ambient temperatures. Some VOCs are released quickly and others more slowly over time from solid products. VOCs are numerous, varied, and ubiquitous.

**Rationale:** Most VOCs have hazardous properties and adversely impact the quality of indoor air for building occupants. Each of these certification programs requires testing products for VOC emissions under specified conditions and for specific compounds. Blue Angel and Cradle to Cradle Gold and Platinum are multi-attribute standards, one portion of which includes a VOC emissions requirement.

### VOC certification required if the product contains SBR

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The product must be certified as meeting GREENGUARD Gold or SCS Indoor Advantage Gold.

**Rationale:** Styrene-butadiene rubber (SBR) is manufactured from and can contain chemicals of concern, including a chemical listed on Proposition 65 and 4-Phenylcyclohexene (4-PCH), a volatile organic compound. Greenguard Gold and SCS Indoor Advantage Gold certifications cover 4-PCH.

### Wood certification

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Wood used in the product must be Forest Stewardship Council (FSC) certified.

**Rationale:** FSC certification ensures that products come from responsibly managed forests that provide environmental, social, and economic benefits.

### Wood finishing

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Wood floors must be prefinished.

**Rationale:** Products used in finishing can include mixtures of many chemicals, including respiratory and dermal irritants and sensitizers. Occupational and environmental exposure concerns are associated with the process of wood finishing. These can be minimized in a controlled setting.

## GOLD LEVEL CRITERIA

### Isocyanates

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The product does not contain isocyanate-based formulations.

**Definition:** Isocyanate is the functional group with the formula R–N=C=O. Organic compounds that contain an isocyanate group are referred to as isocyanates. Isocyanates are a family of highly reactive, low molecular weight chemicals.

**Scope:** For a list of some isocyanates, see [Isocyanates in the Chemical Hazard Data Commons](#).

Acceptable test methods to test for isocyanates include:

- [Colormetric Surface SWYPEs](#)
- [ASTM D2572](#), Standard Test Method for Isocyanate Groups in Urethane Materials or Prepolymers.

**Rationale:** Isocyanates are a very large group of chemicals. Isocyanates are powerful irritants to the mucous membranes of the eyes and gastrointestinal and respiratory tracts. Some isocyanates are potent sensitizers and asthmagens, posing serious risks to workers. Research suggests that exposure to very small quantities through inhalation or dermal contact can cause the onset of asthma. Commonly used isocyanates are some of the most prevalent asthmagens in building materials. At least one isocyanate is reasonably anticipated to be a carcinogen according to the National Toxicology Program, while others are not classifiable as to human carcinogenicity.

### Product content transparency

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The product must have a complete Health Product Declaration with all substances characterized, screened, and identified at or above 100 ppm.

**Definition:** A Health Product Declaration (HPD) can provide a full disclosure of the potential chemicals of concern in products. It provides a framework for manufacturers to inventory and disclose the contents of their products and any associated human and environmental hazards. Through the standardized HPD form, manufacturers provide information on both intentional content and impurities within their products. The framework is maintained and updated by the Health Product Declaration Collaborative.

**Rationale:** Product ingredient transparency is critical to understanding potential occupational and environmental risks of products and their life cycle, and to assessing potential exposures during use.

### Styrene-butadiene rubber (SBR)

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The product does not contain styrene-butadiene rubber (SBR).

**Definition:** Styrene-butadiene rubber (SBR) is a synthetic rubber, produced from a copolymer of styrene and butadiene.

**Rationale:** SBR is manufactured from and can contain chemicals of concern. 1,3-butadiene is a known carcinogen and reproductive and developmental toxicant. Many but not all studies find an increased risk of leukemia in workers engaged in rubber manufacture. 1,3 butadiene is often released into the environment from rubber manufacturing facilities. Styrene is listed as reasonably anticipated to be a carcinogen by the National Toxicology Program and as a known carcinogen by the International Agency for Research on Cancer. Styrene is also a neurotoxicant. SBR contains varying amounts of styrene in the finished product.

### VOC certification

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The product must be certified as meeting GREENGUARD Gold, Blue Angel, or Cradle to Cradle Gold or Platinum.

**Definition:** Volatile organic compounds (VOCs) are carbon containing compounds released as gases into the air from products at ambient temperatures. Some VOCs are released quickly and others more slowly over time from solid products. VOCs are numerous, varied, and ubiquitous.

**Rationale:** Most VOCs have hazardous properties and can adversely impact the quality of indoor air for building occupants. The certification programs above test products for VOC emissions under specified conditions and set emission limits for total VOCs as well as for specific compounds.

## ADHESIVE INSTALLATION REQUIREMENT

**NOTE: The Healthy Flooring criteria are part of a broader initiative in health care.** Institutions incorporating the criteria into their specifications must commit to install the flooring using adhesives that are certified by a third party as noted below.

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The adhesive used to install the flooring must be certified as meeting California 01350 (California Department of Public Health (CDPH) Standard Method v1.2-2017), GREENGUARD Gold, SCS Indoor Advantage Gold, FloorScore, [Blue Angel for Low-Emission Floor Covering Adhesives](#), or Cradle to Cradle Gold or Platinum; or the flooring must be attached mechanically without a chemical adhesive.

**Rationale:** Adhesives can be an important source of VOCs in the indoor environment. Most VOCs have hazardous properties and can adversely impact the quality of indoor air for building occupants. Each of these certification programs requires testing products for VOC emissions under specified conditions and for specific compounds. Blue Angel and Cradle to Cradle Gold and Platinum are multi-attribute standards, one portion of which includes a VOC emissions requirement.

## VERIFICATION

Health Care Without Harm does not verify that products meet the criteria outlined in this document. We encourage purchasers to seek verification.

In some cases, third party certification provides verification. Additional methods of verification for other criteria can include:

- A formal declaration stating that the product supplied does not contain the chemical or material above the stated threshold. The declaration should be written, signed, and dated by the manufacturer on the manufacturer's letterhead.
- Laboratory testing data from an accredited lab, verifying compliance for those criteria that do not reference third party certifications.
- When a Health Product Declaration does not identify the chemical name of every ingredient, purchasers can often enter into a non-disclosure agreement (NDA) with a manufacturer in order to get identifying information about chemical content.

Recycled material is sometimes used in flooring. That material can inadvertently contain chemicals of concern. Purchasers may want to find out from suppliers if there is recycled content in the flooring, and if so, request additional testing or documentation to ensure the prioritized chemicals have been evaluated and that the final product meets the criteria.