



Paint and LEED V4

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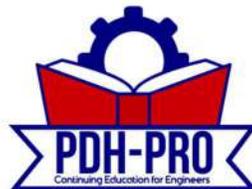
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LEED v4: Paint and Coatings



LEED v4 and Paint

LEED® v4

The goal of the LEED rating systems is to amplify the positive impacts and mitigate the negative impacts of buildings on both the natural environment and the buildings' inhabitants. The rating systems act as a framework for decision-making in multiple areas of building construction such as energy use, water use, indoor environmental quality, materials, and the building's effects on its site. Meeting requirements set by LEED and achieving credits and points in each one of the those areas leads to an overall certification level for the building, ranging from Certified (40-49 points) to Platinum (80+ points).

In November 2013, the USGBC released the latest version of their green building rating system: LEED v4. This is the third iteration of their voluntary certification system which has been used in the building industry since 1993.

The v4 version will overlap with the previous version, LEED 2009, until October 2016. At that point, all new projects seeking LEED certification will have to use LEED v4. Projects registered under LEED 2009 are given a six-year grace period from the registration date, during which they can continue to use LEED 2009 requirements.

LEED Goals

The changes to LEED v4 are meant to improve the connection between green building strategies and a defined set of goals, or the things that LEED building projects should accomplish.

LEED identified seven areas of impact that guided the technical development of LEED version 4.

USGBC wants LEED projects to do the following:

- Reverse contribution to global climate change
- Enhance individual human health and well-being
- Protect and restore water resources
- Protect, enhance, and restore biodiversity and ecosystem services
- Promote sustainable and regenerative material resources cycles
- Build a greener economy
- Enhance social equity, environmental justice, and community quality of life

Paint and LEED v4

Paints and coatings were able to contribute mainly to two LEED credits in LEED 2009: Low Emitting Materials and Heat Island Effect. In LEED v4, paints may contribute to five credits.

The primary credit for paints and coatings in LEED 2009 was the Low Emitting Materials credit within the Indoor Environmental Quality category. In this category, paints and coatings were required to show low VOC content (in grams/litre (g/L)). Paints and coatings were also able to contribute to a credit concerned with mitigation of heat island effect within the Sustainable Sites category by using paints with a higher solar reflectance index (SRI). In LEED v4 , these two credits remain with minor tweaks.

The first change in LEED v4 is the additional requirements for VOC emissions testing in the Low Emitting Materials credit. Another change that will affect paints and coatings in LEED v4 is the introduction of a new set of credits within the Materials and Resources category which applies life cycle thinking to material transparency and material optimization. While LEED 2009 credits were based on single attributes of materials, such as recycled content, LEED v4 asks manufacturers to divulge a more complete picture of their products. Ultimately, this should enable project teams to make more informed decisions.

LEED v4 Checklist for Paints and Coatings

Category and Credit

Max Possible Points

Sustainable Sites

Heat Island Reduction

2

Materials and Resources

Building Product Disclosure and Optimization -
Environmental Product Declarations

2

Building Product Disclosure and Optimization -
Sourcing of Raw Materials

2

Building Product Disclosure and Optimization -
Material Ingredients

2

Indoor Environmental Quality

Low Emitting Materials

3

Paint and LEED

For the remainder of this course, we'll look more closely at these changes as they apply to paints and coatings within the BD+C New Construction rating system, the type of information required for the credit, and how a design professional might meet these requirements.

We'll begin by looking at the Low Emitting Materials Credit.





Indoor Environmental Quality Low Emitting Materials

Low Emitting Materials

The new LEED v4 Low Emitting Materials credit is a combination of LEED 2009's four Low Emitting Materials credits. The goal or intent is to reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

| Indoor Environmental Quality | | | | | |
|------------------------------|---|---|---------|---|---|
| LEED 2009 | | | LEED v4 | | |
| Prereq 1 | Minimum Indoor Air Quality Performance | | Prereq | Minimum Indoor Air Quality Performance | |
| Prereq 2 | Environmental Tobacco Smoke Control | | Prereq | Environmental Tobacco Smoke Control | |
| Credit 1 | Outdoor Air Delivery Monitoring | 1 | Credit | Enhanced Indoor Air Quality Strategies | 2 |
| Credit 2 | Increased Ventilation | 1 | Credit | Low Emitting Materials | 3 |
| Credit 3.1 | Construction Indoor Air Quality Management Plan | 1 | Credit | Construction Indoor Air Quality Management Plan | 1 |
| Credit 3.2 | Construction Indoor Air Quality Management Plan | 1 | Credit | Indoor Air Quality Assessment | 2 |
| Credit 4.1 | Low Emitting Materials – Adhesives and Sealants | 1 | Credit | Thermal Comfort | 1 |
| Credit 4.2 | Low Emitting Materials – Paints and Coatings | 1 | Credit | Interior Lighting | 2 |
| Credit 4.3 | Low Emitting Materials – Flooring Systems | 1 | Credit | Daylight | 3 |
| Credit 4.4 | Low Emitting Materials – Composite Wood and Agrifiber | 1 | Credit | Quality Views | 1 |
| Credit 5 | Indoor Chemical and Pollutant Source Control | 1 | Credit | Acoustic Performance | 1 |
| Credit 6.1 | Controllability of Systems | 1 | | | |
| Credit 6.2 | Controllability of Systems | 1 | | | |
| Credit 7.1 | Thermal Comfort - Design | 1 | | | |
| Credit 7.2 | Thermal Comfort - Verification | 1 | | | |
| Credit 8.1 | Daylight and Views - Daylight | 1 | | | |
| Credit 8.2 | Daylight and Views - Views | 1 | | | |

Low Emitting Materials

Now worth a maximum of three points, this new credit has two new requirements that will affect paints and coatings applied on site. The first is a change from meeting VOC content requirements only, to VOC content and emissions levels. VOC content limits are meant to protect the health of the contractors applying the paints. Emissions levels give a better indication of the products VOC emissions over time.

The second change is a requirement for total volatile organic compound (TVOC) testing results. This was included to give a better indication of overall air quality.

Low Emitting Material Terms

VOC: Volatile organic compounds (VOCs) are chemicals that easily vaporize at room temperature. They are called organic because they contain the element carbon. They include a wide range of substances including hydrocarbons, halocarbons, and oxygenates.

VOCs may have short- and long-term adverse health effects and are emitted by a wide array of products. They are linked to a number of chronic health problems such as asthma, chronic obstructive pulmonary disease, and cancer. They also are fingered in short-term, acute reactions, such as eye, nose, and throat irritation. Specifying low emitting or no VOC products reduces the quantity of VOCs indoors. Tests for VOCs in products typically look for specific VOCs that are deemed to be chemicals of concern.

TVOC: Total volatile organic compounds (TVOC) is the sum of the concentrations of all identified and unidentified VOCs released from a product. Looking at TVOC provides another way of analyzing air quality. A low TVOC may indicate no VOC issues, and a high TVOC may indicate a high level of one individual VOC or lower levels of a large number of VOCs.

VOC Content and Emissions Requirements

To meet the LEED v4 credit requirements for interior paints and coatings, either products that are inherently non-emitting, like stone or ceramic, or products that meet both the general VOC emissions evaluation and the VOC content requirements can be used.

Products that meet the general emissions evaluation comply with California Department of Public Health (CDPH) Standard Method v1.1–2010. The testing can be done by the manufacturer or a third party. At least 90%, by volume, of paints and coatings used on site must meet these emissions requirements. Testing results must also state the range of TVOCs.

To meet the VOC content requirements, on site wet applied paints and coatings must meet the applicable VOC content limits of the California Air Resources Board (CARB) 2007 Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113. 100% of wet applied products must meet VOC content criteria.

Healthcare and Schools Exterior Products

Healthcare and school buildings have an additional VOC requirement for exterior applied products. These exterior products must meet the VOC limits of California Air Resources Board (CARB) 2007 Suggested Control Measure (SCM) for Architectural Coatings, and the South Coast Air Quality Management District (SCAQMD) Rule 1168. At least 90% of the paints and coatings, by volume, must meet these requirements.

Option 1: Product Category Calculations

There are two options for achieving points in this credit. In Option 1, building products and compliance requirements are divided into seven categories (shown below), of which “interior paints and coatings” is one. Compliance with the requirements of more than one category must be met in order to achieve points.

TABLE 1. Thresholds of compliance with emissions and content standards for 7 categories of materials

| Category | Threshold | Emissions and content requirements |
|---|--|--|
| Interior paints and coatings applied on site | At least 90%, by volume, for emissions; 100% for VOC content | <ul style="list-style-type: none"> • General Emissions Evaluation for paints and coatings applied to walls, floors, and ceilings • VOC content requirements for wet applied products |
| Interior adhesives and sealants applied on site (including flooring adhesive) | At least 90%, by volume, for emissions; 100% for VOC content | <ul style="list-style-type: none"> • General Emissions Evaluation • VOC content requirements for wet applied products |
| Flooring | 100% | General Emissions Evaluation |
| Composite wood | 100% not covered by other categories | Composite Wood Evaluation |
| Ceilings, walls, thermal, and acoustic insulation | 100% | <ul style="list-style-type: none"> • General Emissions Evaluation • Healthcare, Schools only Additional insulation requirements |
| Furniture (include in calculations if part of scope of work) | At least 90%, by cost | Furniture Evaluation |
| Healthcare and Schools Projects only: Exterior applied products | At least 90%, by volume | Exterior Applied Products |

The requirements of the other non-paint categories can be found at the LEED Credit Library: <http://www.usgbc.org/credits>

Option 1: Product Category Calculations

One to three points are awarded depending on how many compliant categories are achieved. In order to achieve only one point, the requirements of at least two of these categories must be met.

| Compliant categories | Points |
|--|--------|
| New Construction, Core and Shell, Retail, Data Centers, Warehouses and Distribution Centers, Hospitality projects without furniture | |
| 2 | 1 |
| 4 | 2 |
| 5 | 3 |
| New Construction, Core and Shell, Retail, Data Centers, Warehouses and Distribution Centers, Hospitality projects with furniture | |
| 3 | 1 |
| 5 | 2 |
| 6 | 3 |
| Schools, Healthcare without furniture | |
| 3 | 1 |
| 5 | 2 |
| 6 | 3 |
| Schools, Healthcare with furniture | |
| 4 | 1 |
| 6 | 2 |
| 7 | 3 |

Option 2: Budget Calculation Method

Option 2 of this credit still requires that products meet the VOC emissions and VOC content criteria set out in Option 1. However, it provides another option for calculating compliance. A budget calculation method is given in which the building is organized into six assemblies: flooring, ceilings, walls, thermal and acoustic insulation, furniture, and exterior applied products (Healthcare and Schools only). The VOC content levels and emissions testing are documented for each material within the assembly. Then, total percentage compliance is calculated to achieve points.

This credit accommodates materials that may not meet the required VOC thresholds by assessing not material types, but materials within assemblies. In Option 1, if one wall in the building requires a paint that does not meet VOC content requirements, the entire building's paints and coatings would not contribute. In Option 2, paints and coatings are considered a layer within the wall, ceiling, or floor assembly and are evaluated for compliance as part of that assembly.

Option 2: Budget Calculation Method

Each assembly is assessed for percent compliance and inserted into the equation at right.

Required documentation for this option includes VOC content and VOC emissions information for the paint or coating, the assembly to which the paint or coating belongs, and surface area of the paint or coating.

Points are awarded for different levels of percentage compliance.

EQUATION 1. Total percentage compliance

$$\text{Total \% compliant for projects without furniture} = \left\{ \frac{(\% \text{ compliant walls} + \% \text{ compliant ceilings} + \% \text{ compliant flooring} + \% \text{ compliant insulation})}{4} \right\}$$

$$\text{Total \% compliant for projects with furniture} = \left\{ \frac{(\% \text{ compliant walls} + \% \text{ compliant ceilings} + \% \text{ compliant flooring} + \% \text{ compliant insulation}) + (\% \text{ compliant furniture})}{5} \right\}$$

Equations for indoor assemblies

TABLE 3. Points for percentage compliance, under budget calculation method

| Percentage of total | Points |
|---------------------|--------|
| ≥ 50% and < 70% | 1 |
| ≥ 70% and < 90% | 2 |
| ≥ 90% | 3 |

How Can Paints Contribute?

Many paint and coating manufacturers have products that meet or exceed VOC content limits. Some will also have undergone testing that meets the CDPH standard. You can check with your preferred paint companies or look for lists of accredited products on testing agency or certifiers websites (i.e. some UL GREENGUARD Sustainable Product Guide, <http://productguide.ulenvironment.com/QuickSearch.aspx> and SCS Global programs, <http://www.scsglobalservices.com/certified-green-products-guide>).



Indoor Environmental Quality

Low Emitting Materials Credit – max. 3 points

| Product Category Calculations | | Budget Calculation Method |
|---|--|--|
| Meet threshold requirements for material categories 2 categories=1 point 4 categories=2 points 5 categories=3 points | | Calculate total percentage compliance ≥ 50% and < 70% = 1 point ≥ 70% and < 90% = 2 points ≥ 90% = 3 points |
| Threshold requirements for paints and coatings | | |
| VOC Content 100% of wet applied products | VOC Emissions 90% of wet applied products | Meet the same content and emissions standards as Option 1 |
| Meet CARB 2007 SCM for Architectural Coatings or SCAQMD Rule 1113, 2011 | Meet CDPH Standard Method v1.1–2010 | |
| Allowable VOC content Flat 50 g/l Non-flat 50 g/l Primers Sealers 100 g/l | State range of TVOC | |

CARB: California Air Resources Board, SCM: Suggested Control Measure, SCAQMD: South Coast Air Quality Management District, CDPH: California Department of Public Health, VOC: Volatile Organic Compound, TVOC: Total Volatile Organic Compound



White roof and skylights on Romeoville, IL Walmart

Sustainable Sites: Heat Island Reduction/Cool Roofing

Heat Island Effect

The heat island effect is the increase in urban temperatures in relation to rural as a result of buildings, roads, and other infrastructure replacing open land and vegetation. These urban surfaces are typically non-permeable and often highly heat absorbing.

This credit is concerned with reducing the impact of heat islands by using measures to increase reflectivity and lower solar heat absorption at the building and site. Highly reflective paints and coatings may contribute to this credit when being used on a low or steep sloped roof surface, either new or an upgrade of an older roof. Cool coatings (highly reflective) can also be used on pavement materials to produce cool pavements.

Reflectivity in paints and coatings is measured for solar reflectance (SR), thermal emittance (TE), and solar reflectance index (SRI). Using paints and coatings to contribute to this credit means finding materials that are able to meet the SR and SRI requirements set out in the credit.

Heat Island Terms

Solar Reflectance is the fraction of sunlight that a surface reflects. Sunlight that is not reflected is absorbed as heat. Solar reflectance is measured on a scale of 0 to 1. For example, a surface that reflects 55% of sunlight has a solar reflectance of 0.55. SR may be measured using a variety of standard test procedures, including ASTM C1549, E903, and E1918.

Emittance is a material's ability to release absorbed energy. A material with a high solar reflectance will reflect solar energy rather than absorb it. High-emittance roof surfaces give off absorbed heat relatively quickly. Emittance is measured according to ASTM E408 or ASTM C1371.

Solar Reflectance Index is a method used to measure a material's ability to reject solar heat. It is calculated according to ASTM E1980 using values for both solar reflectance and emittance. Solar reflectance index is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. However, the way SRI is calculated means that very cool materials may have a value exceeding 100.

Heat Island Terms

Aged Solar Reflectance and Solar Reflectance Index: LEED v4 also now requires a three-year aged SRI and aged SR results in order to gauge the measure material performance over time.

Cool Coatings: Paint pigments provide color by selectively reflecting different wavelengths of visible light. Although nearly 40% of the sun's energy occurs in the visible light range (400–700 nm), 50% occurs in the infrared range (700–2500nm), and this is the type of light primarily responsible for heat build-up. The most straightforward coating for cool roofs is white pigments like titanium dioxide (TiO_2). TiO_2 reflects light in the visible and in the infrared spectrums.

Cool coatings are available in color pigments also. These are pigments that are able to reflect infrared light while still absorbing the same amount of visible light. Infrared reflective pigments have been developed that reflect the sun's infrared energy and make possible the formulation of paints and coatings that offer many colors while still providing energy saving, “cool” properties.

Heat Island Reduction Credit

The intent of this credit is to minimize effects on microclimates and human and wildlife habitats by reducing heat islands. Paints and coatings with higher reflectance levels are able to contribute to this goal.

Similar to LEED 2009, this credit requires 75% of the roof to be high reflectance material or green roof and 50% of non-roof area to be shaded area or high reflectance paving materials.

In LEED v4, there is a requirement for:

- higher roof solar reflectance index (SRI) requirements,
- a new optional three-year aged SRI requirement, and
- new solar reflectance (SR) values for non-roof measures.

This credit is worth a maximum of two points towards certification.

Option 1: Roof and Non-Roof

The Heat Island Reduction credit contains two options. Option 1 is concerned with roof and non-roof measures for a possible two points. SRI requirements for roof surfaces must meet the three-year aged SRI value of at least 32 for steep sloped roofs and at least 64 for low sloped roofs. If three-year aged value information is not available, materials that meet the initial SRI values of at least 39 for steep sloped roofs and at least 82 for low sloped roofs are acceptable.

For non-roof measures, pavement coatings may play a role. Pavement materials must have a three-year aged SR value of at least 0.28. If three-year aged value information is not available, you may use materials with an initial SR of at least 0.33 at installation. A 2013 Lawrence Berkeley National Laboratory (LBNL) study on cool pavements found that highly reflective coatings achieved the best SR values among alternatives tested; these included grey and white cement.

| Heat Island Reduction | | |
|---|--|---|
| Option 1: Roof and Non-roof Measures – 2 points | | |
| Roof- 75% | Low sloped roof: 3-yr aged SRI at least 64 Initial SRI at least 82 | Steep sloped roof: Aged SRI at least 32 Initial SRI at least 39 |
| Non-roof – 50% | Paving materials : 3-yr aged SR at least 0.28 Initial SR at least 0.33 | |

Option 2: Parking Under Cover

Option 2 includes parking under cover for one point. Paints and coatings may contribute to this option when being used to coat the roof of a parking structure with highly reflective paint. Paint requirements for this option must have three-year aged SRI of at least 32, and if three-year aged value information is not available, the coating must have an initial SRI of at least 39 at installation.

Heat Island Reduction

Option 2: Parking Under Cover – 1 point

Roof used to shade or cover parking must have 3-yr aged SRI of at least 32 or initial SRI of at least 39

How Can Paints Contribute?

Many manufacturers carry reflective paints. A good place to start a search is at the ENERGY STAR® Certified Roof Products web page. Here, ENERGY STAR has listed ENERGY STAR certified products. Under each listing are initial SR, aged SR, and emittance.

The Cool Roof Rating Council also tests reflective paints and provides labels outlining key information, like the one below.

| | | | |
|--|---------------------------|-----------------------|-------------------------|
|  | | <u>Initial</u> | <u>Weathered</u> |
| | Solar Reflectance | 0.00 | Pending |
| | Thermal Emittance | 0.00 | Pending |
| | <hr/> | | |
| | Rated Product ID Number | ----- | |
| | Licensed Seller ID Number | ----- | |
| | Classification | Production Line | |
| <p>Cool Roof Rating Council ratings are determined for a fixed set of conditions, and may not be appropriate for determining seasonal energy performance. The actual effect of solar reflectance and thermal emittance on building performance may vary.</p> <p>Manufacturer of product stipulates that these ratings were determined in accordance with the applicable Cool Roof Rating Council procedures.</p> | | | |

Sustainable Sites

Heat Island Reduction Credit – max. 2 points

| Option 1 – 2 points Non-roof and Roof | | Option 2 – 1 point Parking under Cover |
|--|---|---|
| Non-Roof – 50% of surface to meet requirements below | Roof – 75% of surface to meet requirements below | |
| Paving materials 3-yr aged SR of at least 0.28 Initial SR of at least 0.33 | Low sloped roof 3-yr aged SRI of at least 64 Initial SRI of at least 82 | Steep sloped roof 3-yr aged SRI of at least 32 Initial SRI of at least 39 |
| | | Parking structure roof - surface must meet requirements below 3-yr aged SRI of at least 32 Initial SRI of at least 39 |

SRI: Solar Reflectance Index, SR: Solar Reflectance, Aged SRI: Solar Reflectance Index calculated at three years



Materials and Resources: Building Product Disclosure and Optimization, Environmental Product Declarations

Building Product Disclosure

The Materials and Resources section of LEED v4 contains three new Building Product Disclosure and Optimization credits.

- Environmental Product Declaration (EPD)
- Sourcing of Raw Materials
- Material Ingredients

These credits are concerned with greater transparency of the environmental impacts of products. Previous single attribute information, like recycled content and rapidly renewable resources, is now either coupled with requirements for life cycle type analysis or bundled into the life cycle analysis itself.

Environmental Product Declaration Credit

Any product within a building project, including paints and coatings, could feasibly contribute to the Environmental Product Declaration (EPD) credit as long as the manufacturer or a group of manufacturers has prepared life cycle information. There are two options for achieving points in the EPD credit for a maximum of two points.

| Environmental Product Declaration | |
|-----------------------------------|---|
| Option 1 | Environmental Product Declaration |
| | 20 products must comply using one of three alternative criteria |
| | LCA – Product specific |
| | EPD – Generic |
| | EPD – Product specific |
| Option 2 | Multi-attribute option |
| | 50% by cost of total value of permanently installed products must comply with the disclosure criteria |

In Option 1 of this credit, 20 products must comply with certain disclosure criteria, and in Option 2, 50% by cost the total value of permanently installed products in the project must comply with a different set of disclosure criteria.

Building Product Disclosure and Optimization Terms

Life Cycle Analysis: Before we define environmental product declarations (EPDs), it's best to understand what a life cycle assessment (LCA) is, as the information generated from an LCA forms the basis of an EPD. A life cycle assessment examines and evaluates potential environmental impacts of both energy and material inputs and environmental outputs of a product.

The LCA typically looks at all stages of a product's life, including raw material acquisition, materials manufacture, production, use/reuse/maintenance, and waste management. Examining the energy and material inputs and outputs for these stages of a product's life is called "cradle-to-grave" scope. In LEED, a smaller scope is required. Option 1 of this credit is looking for LCA information with a cradle-to-gate scope, leaving off use/reuse/maintenance.

To ensure LCA data used for LEED credits is consistent, all LCA information must meet the International Organization for Standardization (ISO) uniform methods for conducting LCAs—their 14000 series standards. LEED v4 asks for LCA data conforming to ISO 14044. LCAs are typically prepared by third-party program operators, such as these North American providers: UL Environmental, Quantis, and PE International.

Building Product Disclosure and Optimization Terms

Life Cycle Analysis and Product Category Rules: The LCA is not an ideal tool for comparing products. That is because there are a range of options for organizing and analyzing the data that would affect the results, for example, project scope (cradle to gate, cradle to grave, gate to grave), system boundaries (how much of the supply chain of product inputs will be included in the study), and size of functional unit being studied. They are valuable, however, for other uses including the ability for manufacturers to identify and affect improvements to their product's environmental impact or monitor changes over time.

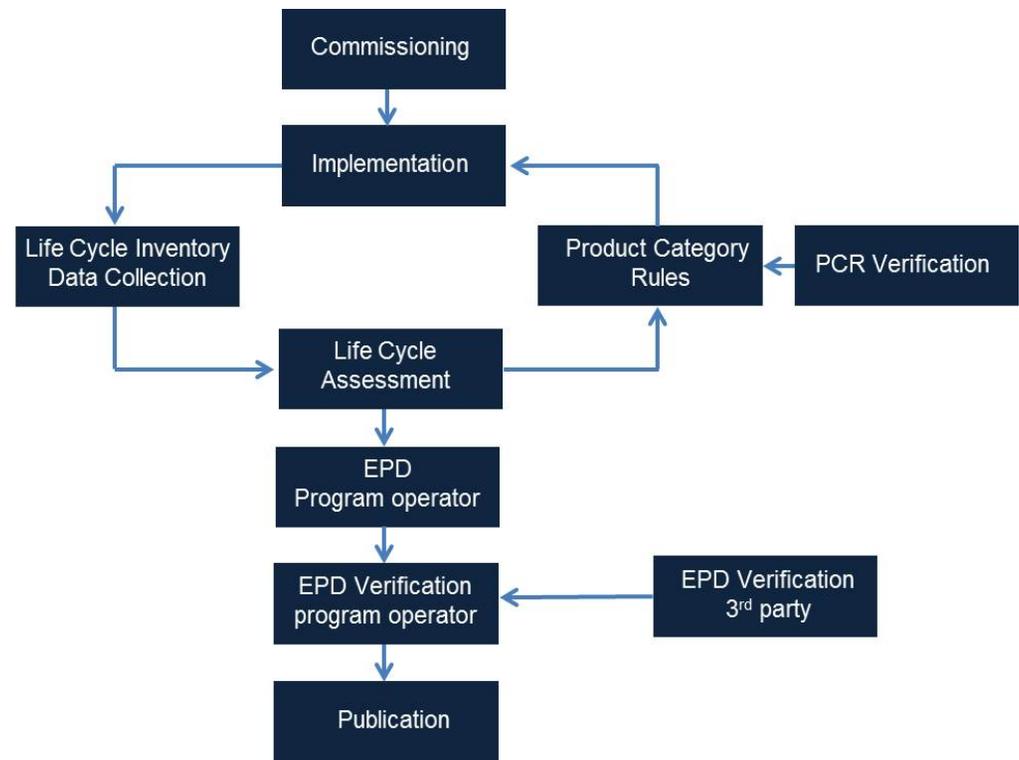
In order to be able to compare data, an Environmental Product Declaration (EPD) is created using LCA information gathered using a consistent set of rules. These rules are called product category rules (PCRs) and govern the LCA used to create the EPD.

Building Product Disclosure and Optimization Terms

Product Category Rules (PCR):

PCRs describe both scope and methodology for performing an LCA when used to produce an EPD. An LCA that is based on an objective, identifiable product category rule provides the transparency necessary for comparing one product with another. They are created for particular product types.

The first step in creating an EPD is to find the appropriate PCR. If the PCR does not exist, a new PCR must be developed and approved for use through a credible EPD program operator.



The EPD Process

Building Product Disclosure and Optimization Terms

Environmental Product Declaration: The environmental product declaration (EPD) is a product comparison tool that reports a product's life cycle environmental impacts using results from an LCA. It reports a product's life cycle environmental impacts using results from an LCA that has been created using a PCR. To ensure LCA data used for LEED is consistent, all LCA information must also meet the International Organization for Standardization (ISO) uniform methods for conducting LCAs—their 14000 series standards. LEED v4 asks for LCA data conforming to ISO 14044.

EPDs are typically created by a credible third-party program operator using the standardized rules set out in ISO 14025:2006. This produces what is called a Type III EPD. ISO defines Type III eco labels as those with independent evaluation of the product. EPDs may be created by one manufacturer (product specific) or a number of manufacturers (generic) to study a particular product type and are used to provide comparable information regarding environmental performance of products.

Option 1: EPD

In Option 1, there are three alternatives for achieving one point, and they all revolve around the use of life cycle analysis information for a product. In order to achieve a point, this information is required for 20 different permanently installed products sourced from at least five different manufacturers.

The value of the product is weighted depending on the type of analysis done, with third-party certified information and more product specific information receiving full value.

| Environmental Product Declaration | |
|---|-----------------------------------|
| Option 1 | Environmental Product Declaration |
| 20 products must comply using one of three alternative criteria | |
| Alt. 1 | Product specific LCA |
| Alt. 2 | Generic EPD |
| Alt. 3 | Product specific EPD |

Option 1: EPD Alternative 1 Product Specific LCA

Product Specific LCA

The first alternative is providing a publically available non-third-party certified LCA . Each product will be valued at one-quarter of a product. This information still has to conform to ISO 14044 and have at least a cradle-to-gate scope.

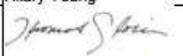
Cradle-to-gate scope means that the life cycle analysis examines the environmental impacts for only part of the life of the product, from resource extraction through to manufacturing, excluding the use and disposal phase of the product.

Option 1: EPD Alternative 2 Generic EPD

Generic EPD

The second alternative is to provide an industry wide (generic) EPD for a product which conforms to ISO standards and has at least a cradle-to-gate scope. This type of EPD may be produced by an industry organization or a group of manufacturers from a single industry. However, the manufacturer whose product is being used must be one of the participants of the study. This type of information for a product is valued as one-half of a product for purposes of credit achievement calculation.

At right is a sample of a generic EPD sponsored by a number of insulated metal panel manufacturers. Note that the declared product is a generic product type - "insulated metal panels".

| | |
|---|--|
| PROGRAM OPERATOR | UL Environment |
| DECLARATION HOLDER | Metal Construction Association (MCA) |
| DECLARATION NUMBER | 13CA27321.101.1 |
| DECLARED PRODUCT | Insulated Metal Panels |
| REFERENCE PCR | Insulated Metal Panels & Metal Composite Panels, and Metal Cladding: Roof and Wall Panels (UL, October 2012) |
| DATE OF ISSUE | 27 August 2013 |
| PERIOD OF VALIDITY | 5 Years |
| CONTENTS OF THE DECLARATION | <ul style="list-style-type: none"> Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications |
| The PCR review was conducted by: | <ul style="list-style-type: none"> UL Environment Review Panel Thomas Gloria (Chairperson) 35 Bracebridge Road Newton, MA 02459-1728 t.gloria@industrial-ecology.com |
| This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL |  Hilary Young |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by: |  Thomas Gloria, Life-Cycle Services, LLC |

Option 1: EPD Alternative 3 Product Specific EPD

Product Specific EPD

The third alternative for Option 1 of this credit is to have a product-specific Type III EPD which recognizes the manufacturer whose product you are using as the sole participant of the study. This type of EPD is valued as one whole product for purposes of credit achievement calculation.

At right is an example of a product specific EPD. Note that the declared product is a specific Certainteed product – “Symphony m Mineral Fiber Ceiling Panels”.

| | |
|---|---|
| PROGRAM OPERATOR | UL Environment |
| DECLARATION HOLDER | Certainteed Ceilings |
| DECLARATION NUMBER | 12CA16994.104.1 |
| DECLARED PRODUCT | Symphony m Mineral Fiber Ceiling Panels |
| REFERENCE PCR | Institut Bauen und Umwelt e.V. PCR for Ceiling panels for suspended ceiling systems |
| DATE OF ISSUE | July 10, 2012 |
| PERIOD OF VALIDITY | 5 years |
| CONTENTS OF THE DECLARATION | <p>Product definition and information about building physics</p> <p>Information about basic material and the material's origin</p> <p>Description of the product's manufacture</p> <p>Indication of product processing</p> <p>Information about the in-use conditions</p> <p>Life cycle assessment results</p> <p>Testing results and verifications</p> |
| The PCR review was conducted by: | <p>Institut Bauen und Umwelt e.V.</p> <p>PCR confirmed by SVA</p> <p>Rheinufer 108</p> <p>D-53639 Königswinter</p> <p>Germany</p> <p>Tel.: +49 (0)2223 296679-0</p> <p>Fax: +49 (0)2223 296679-1</p> <p>Email: info@bau-umwelt.com</p> |
| <p>This declaration was independently verified by Underwriters Laboratories in accordance with ISO 14025</p> <p><input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL</p> | <p></p> <p>Loretta Tam</p> |
| <p>This life cycle assessment was independently verified by in accordance with ISO 14044 and the reference PCR</p> | <p></p> <p>Eva Schmincke</p> |

Option 2: EPD Multi Attribute Optimization

Option 2 is asking for products that have been third-party certified as having an environmental impact below industry average for at least three of the following LCA impacts:

- global warming potential (greenhouse gases)
- depletion of the stratospheric ozone layer
- acidification of land and water sources
- eutrophication or,
- formation of tropospheric ozone.

No more than 30% of the compliant materials can be structural and enclosure materials.

The value of the applicable materials will be doubled when sourced (extracted, manufactured, purchased) within 100 miles of the project site.

| Environmental Product Declaration | |
|-----------------------------------|---|
| Option 2 | Multi Attribute Optimization |
| | 50% by cost of total value of permanently installed products must comply with the disclosure criteria |

How Can Paints Contribute?

Construction material EPDs aren't currently readily available, and the USGBC hopes that including this credit will spur manufacturers into action. To find paint and coatings with EPDs, check first with the manufacturer, then with LCA and EPD program operators, like UL Environment and other subscription-based sources like GreenWizard.

Locating EPDs:

- UL Product database
- ICC-ES website
- GreenWizard: subscription-based
- GreenSpec: subscription-based

Verify that EPDs use the ISO standards—those that don't will not meet the requirements of this credit.

Materials and Resources

Building Product Disclosure and Optimization, Environmental Product Declarations Credit – max. 2 points

| Option 1 – 1 point Environmental Product Declarations | | | Option 2 – 1 point Multi Attribute Optimization |
|---|--|---|---|
| Meet one of the following with 20 different permanently installed products ≥ 5 manufacturers | | | For 50% of permanently installed products, meet requirements below |
| Alternative 1 Product Specific LCA: ¼ value | Alternative 2 Generic EPD: ½ value | Alternative 3 Product Specific EPD: Full value | Third-party certified products that demonstrate impact reduction below industry average in at least three of five impact categories. <ul style="list-style-type: none"> • global warming potential • depletion of the stratospheric ozone layer • acidification of land and water sources • eutrophication • formation of tropospheric ozone |
| ISO 14044 | ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 | ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 | |
| Publicly available, critically reviewed | Third-party certified | Third-party certified | |
| Products sourced within 100 miles of project site are valued at 200% of their base contributing cost. | | | |

LCA: Life cycle analysis, EPD: Environmental product declaration



Materials and Resources: Building Product Disclosure
and Optimization, Sourcing of Raw Materials

Sourcing of Raw Materials Credit

The second new credit in the Materials and Resources category is Building Product Disclosure and Optimization, Sourcing of Raw Materials. In this credit, USGBC zeros in on sustainable practices around raw material extraction. There are two options which require responsible sourcing of raw materials and/or reduction of raw material use, for a total of two points.



Raw Materials Paint

Paint is a mixture of ingredients, including pigments, a binder, and a thinner (in latex paint, it is water; in solvent paint, it is petroleum based).

Pigments provide the texture, color, and hiding properties of paint. The pigments, usually in the form of dry powder, can be organic (containing carbon), inorganic (no carbon), synthetic, or natural.

The binder consists of synthetic and natural resins, which start out as liquids but dry to form durable films. The properties of the binder largely determine the properties of the paint film. In waterborne coatings, the binder is usually a latex emulsion composed of vinyl and/or acrylic copolymers. In solvent-based coatings, the binder is usually an alkyd, which is a natural drying oil that is chemically modified to be especially tough and long-lasting.

Water is the most popular thinner in today's latex emulsion paints. Solvent-based paints are thinned with petroleum solvent. Over the years, use of solvent-based paint has diminished because of concerns about VOCs. Solvent-based paints, however, still play an important role today because of their unique durability and adhesion properties.

Option 1: Sourcing Report

Option 1 requires proof of responsible sourcing of raw materials for 20 different products. This must be in the form of either a self-declared report or a third-party verified corporate sustainability report. Again, USGBC rewards third-party verified information by granting those products full value. A product with a self-declared report has one-half the value.

| Sourcing of Raw Materials | |
|--|--------------------|
| Option 1: Sourcing Report 20 different products, at least 5 manufacturers | |
| Self-declared | ½ product value |
| Third-party | Full product value |

Both types of reports must contain the following information:

- Raw material supplier extraction locations
- A commitment to long-term ecologically responsible land use
- A commitment to reducing environmental harms from extraction and/or manufacturing processes
- A commitment to meeting applicable standards or programs

Option 1: Sourcing Report

The corporate sustainability report must also contain environmental impacts of extraction operations and impacts of the activities associated with the manufacturer's product and the product's supply chain.

USGBC lists the following as acceptable formats for the corporate sustainability report:

- Global Reporting Initiative (GRI) Sustainability Report
- Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
- U.N. Global Compact: Communication of Progress
- ISO 26000: 2010 Guidance on Social Responsibility

Building Product Disclosure and Optimization Terms

Corporate Sustainability Reports: Corporate sustainability reports (CSRs) are non-financial reports often using standard formats for their production. These reports assist the corporation in understanding the links between environmental issues and the organization's operations, plans, and strategies. They are often used to improve internal processes, manage change, and exhibit transparency and accountability.

There are very few mandatory requirements for this type of report; however, a number of voluntary guidelines have emerged that provide optional frameworks. The most prominent of these guidelines is the one produced by the Global Reporting Initiative, a non-profit organization that promotes economic sustainability.

However, even within a standard framework, there is a range of the type of information covered and a variation in the types of performance indicators disclosed. To meet this credit's requirements, ensure that the CSR contains the necessary information.

Option 2: Leadership Extraction Practices

Option 2 is concerned with reduction of raw material use. A number of the optional requirements are recognizable as LEED 2009 credits. In this credit, you must use products that meet at least one of the responsible extraction criteria below for at least 25%, by cost, of the total value of permanently installed building products in the project.

Paints and coatings may contribute to the following options for responsible extraction:

- Extended producer responsibility (EPR): This means proof of management of the post-use phase of a product, for instance a “take-back” program. Documentation may include a brochure describing the program.
- Bio-based materials: Manufacturers must show that their bio-based materials meet the 10 requirements of the Sustainable Agriculture Network’s Sustainable Agriculture Standard (SAN). Bio-based materials replacing petroleum-based products is common in many commercially available paints (i.e., soy resin).
- Recycled content: Claim conforms to ISO 14021–1999, Environmental Labels and
- Declarations, Self-Declared Environmental Claims

In this credit, USGBC rewards materials that are locally sourced and responsibly extracted by granting them twice the value (200% of cost).

How Can Paints Contribute?

For Option 1, check with manufacturers for reports of raw materials. This can come in a self-declared report or a corporate sustainability report. Global Reporting Initiative is one option for third-party reports that maintains a list of CSR's in their Sustainability Disclosure Database.

Reports must include the following information:

- Raw material supplier extraction locations
- Commitment to long-term ecologically responsible land use
- Commitment to reducing environmental harms from extraction and manufacturing processes
- Commitment to meeting voluntary standards or programs that address responsible sourcing

For Option 2, again, check with manufacturers' web sites for extended producer responsibility (EPR) programs, statements that their bio-based materials meet the Sustainable Agriculture Network (SAN) requirements or recycled content information.

Materials and Resources

Building Product Disclosure and Optimization, Sourcing of Raw Materials Credit – max. 2 points

| Option 1 Sourcing Reports 1 point | | Option 2 Leadership Extraction Practices 1 point | | |
|--|--|--|---|---|
| Provide one of the following for 20 different products, at least 5 manufacturers | | Use products that meet one of the criteria below for at least 25%, by cost, of the total value of permanently installed building products in the project | | |
| Self-Declared Report ½ Product Value | Third-Party Report Whole Product Value | Extended Producer Responsibility (EPR) | Bio-based Materials | Recycled Content |
| Publically released report from raw material suppliers | Acceptable frameworks: Global Reporting Initiative (GRI), Organization for Economic Co-operation and Development (OECD), U.N. Global Compact: Communication of Progress, ISO 26000: 2010 Guidance on Social Responsibility | Evidence of take-back program | Statement that bio-based ingredients meet SAN practices | Claim conforms to ISO 14021–1999, Environmental Labels and Declarations, Self-Declared Environmental Claims |



Materials and Resources Building Product
Disclosure and Optimization, Material Ingredients

Material Ingredients Credit

This is the third new credit in the Materials and Resources category. The intent of this credit is to encourage building designers to choose products that do not contain potentially harmful chemicals with the ultimate goal of encouraging manufacturers and their suppliers to develop healthier and safer alternatives or new green products that avoid harmful chemicals.

This credit focuses on the human health impact of building materials.

There are three options in this credit leading to a maximum of two points towards building certification. The first option of the material ingredients credit rewards transparency of chemical ingredients. The second requires certifications proving the product does not contain problematic ingredients. Option 3 rewards those products which can show use of safety, health, hazard, and risk programs and publically available supply chain information concerning the product's chemical ingredients.



Option 1: Material Ingredient Reporting

This first option is concerned with spelling out the inventory of chemicals used in a product. It requires a chemical inventory of the product to at least 0.1% (1000 ppm). This must be gathered for at least 20 different installed products from five different manufacturers.

The three alternatives for chemical inventory are:

- Manufacturer Inventory
- Health Product Declaration
- *Cradle to Cradle Certified™*

| Material Ingredient Reporting | |
|--|------------------------------------|
| Option 1: Chemical Inventory – 1 point | |
| to 0.1% and 20 different products at least 5 manufacturers | |
| Alternative 1 | Manufacturer Inventory |
| Alternative 2 | Health Product Declaration |
| Alternative 3 | <i>Cradle to Cradle Certified™</i> |

Option 1: Alternative 1 Manufacturer Inventory

The manufacturer inventory has to be a publically available inventory of all ingredients identified by name and chemical abstract service number (CASN), hazardous or not. These are the same numbers that are used in material safety data sheets (MSDS). USGBC is asking for all ingredients to be reported at a 0.1% threshold. Using the manufacturer inventory for this credit entails listing materials, not screening or certifying them.

Some manufacturers may wish to withhold some of this information for proprietary reasons. If this is the case, the following information must be provided:

- Role or function in the product
- Amount, as a percentage of total product content or ppm
- Any potential health hazards associated with the ingredient as defined in authoritative hazard lists from GreenScreen®. GreenScreen is explained in Option 2.

Option 1: Alternative 2 Health Product Declaration (HPD)

The health product declaration (HPD) provides a format for disclosure of product contents, emissions, and health information. It provides a full disclosure of the potential chemicals of concern in products by comparing product ingredients to “hazard” lists published by government authorities and scientific associations. These lists closely match those used by GreenScreen List Translator.

LEED v4 accepts health product declarations that are self-declared by the manufacturer or completed by a second or third party. For this credit, all ingredients, down to 0.1%, must be reported in the HPD and full disclosure of known health hazards from ingredients and residuals noted. Proprietary ingredients may be left unnamed, but health hazards must still be reported.

Option 1: Alternative 2 Health Product Declaration (HPD)

Includes full disclosure of known hazards and residuals to 1000 ppm. Residuals are known trace substances remaining in the product from manufacturing steps (such as monomers or catalysts) or contaminants that come with raw materials.

Self declared declaration

Name CertainTeed Ceilings Gyptone

Product ID Multiple IDs (see Description below) **Classification**

Website

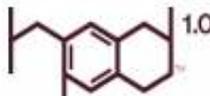
Manufacturer CertainTeed Ceilings Corp. **Contact Name** Dennis Wilson

Address 750 East Swedesford Road **Title** Director, Product Stewardship &

Address Line 2 **Phone** 610-341-7561

City, State, Code Valley Forge, PA 19482 **Email** dennis.wilson@saint-gobain.com

Description HPD covers the following CertainTeed Ceilings Products: All perforation patterns for: Gyptone ceiling panels, Gyptone BIG Board, Gyptone Curve, Gyptone INSTANT



Health Product DECLARATION

Release Date 25-Sep-2013 Self-declared

Expiry Date 24-Sep-2016 Second Party **Certifier** N/A

HPD URL Third Party **Certificate #**

SUMMARY

The content of this product was assessed for health hazard warnings as required using

Residuals Disclosure

Measured 100 ppm (ideal)

Measured 1000 ppm

Predicted by process chemistry

As per MSDS (1,000 & 10,000 ppm)

Not disclosed

Other

Full Disclosure of Intentional Ingredients Yes No

Full Disclosure of Known Hazards Yes No

Disclosure Notes

All ingredients are not listed by name to protect intellectual property.

Contents in Descending Order of Quantity (if the area below is full, refer to the following pages for additional listings)

Gypsum (calcium sulfate), Cellulose Fiber, Polyester Fiber, Starch.

Hazards

PBT (Persistent and Bioaccumulative)

Development

Reproductive

Neurotoxicity

Mammal

Land toxicity

Physical hazard

Multiple

Unknown

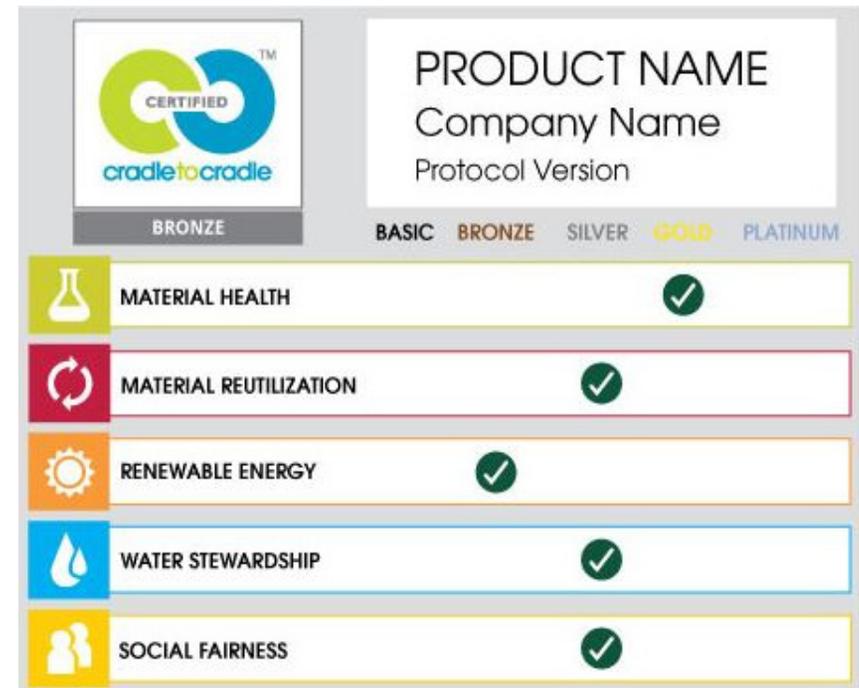
Highest concern GreenScreen score - Unspecified

This is not a disclosure of all intentional ingredients (chemicals that are deliberately used in the product), but only the known hazards. LEED v4 does not require full disclosure of intentional ingredients.

Option 1: Alternative 3 *Cradle to Cradle Certified™*

The *Cradle to Cradle Certified™* Products Program is a multi-attribute certification that examines products for their impact on five different aspects of human and environmental health: material health (similar to GreenScreen review), material reutilization, renewable energy use, water stewardship, and social fairness.

Products are evaluated against the *Cradle to Cradle Certified™* standards and certified at one of five different levels: Basic, Bronze, Silver, Gold, and Platinum. The overall certification level equals the lowest score in any of the five categories. This program does not disclose ingredients, unlike EPDs and HPDs.



Source:

http://www.c2ccertified.org/product_certification/c2ccertified_product_standard

Option 1: Alternative 3 *Cradle to Cradle Certified™*

cont'd

The *Cradle to Cradle Certified™* Products Program examines more environmental impact categories than the HPD or what would be revealed in a manufacturer inventory.

For this option, USGBC is asking for a *Cradle to Cradle Certified™* Basic level certification (if using Version 2) or a *Cradle to Cradle Certified™* Bronze level certification (if using Version 3). Unlike the other methods of achieving this option, the *Cradle to Cradle Certified™* Products Program examines ingredients down to 0.01% of the product.



Option 2: Material Ingredient Optimization

For Option 2, you are required to show that the ingredients used in the product meet similar health benchmarks or standards. However, in this credit, documentation is required for at least 25% of permanently installed products by cost. There are two methods for achieving this credit:

- GreenScreen® List Translator or full GreenScreen assessment using Version 1.2.
- *Cradle to Cradle Certified™* V2 Gold or Platinum or V3 Silver or Gold levels.

When different levels of these certifications are achieved (i.e., *Cradle to Cradle Certified™* Gold vs. Silver) the materials are valued differently.

Material Ingredient Reporting

Option 2: Material Ingredient Optimization – 1 point

at least 25% of permanently installed products by cost

| | | |
|---------------|------------------------------------|--|
| Alternative 1 | GreenScreen V1.2 | List Translator = 100% Full GreenScreen = 150% |
| Alternative 2 | <i>Cradle to Cradle Certified™</i> | V2 Gold = 100% V2 Platinum = 150% V3 Silver = 100% V3 Gold = 150% |

Option 2: Alternative 1 GreenScreen

GreenScreen for Safer Chemicals is a method for comparative chemical hazard assessment that is typically used to identify chemicals of high concern in products, and help manufacturers in their search for safer alternatives. It works also as a standardized chemical assessment tool, which is how it is used in LEED v4. Assessments are done by licensed GreenScreen profilers.

| Full GreenScreen Method | | | List Translator |
|--|-----------------------------|--------------------------------------|-----------------|
| HIGHEST CONCERN ↓ LOWEST CONCERN | Benchmark 1 | Avoid | LT 1 |
| | Possible Benchmark 1 | | LTP1 |
| | Unspecified | Insufficient information | LTU |
| | Benchmark 2 | Use but search for safer substitutes | |
| | Benchmark 3 | Use, but opportunity for improvement | |
| | Benchmark 4 | Preferred | |

GreenScreen scoring

Option 2: Alternative 1 GreenScreen

There are two versions of this chemical assessment tool:

1. GreenScreen List Translator compares chemicals in the product against a databank of hazardous chemicals, and
2. Full GreenScreen method, includes a more rigorous search into health and environmental impacts of the chemicals within the product.

Chemical hazards once assessed are then evaluated to produce an overall chemical score called Benchmark or BM for the full method, and LT for the List Translator.

To meet the requirements of this alternative, the product must have a GreenScreen v.1.2 assessment with fully inventoried chemical ingredients to 100 ppm that have no GreenScreen Benchmark™ 1 hazards. If using the GreenScreen List Translator, these products are valued at 100% of cost. If products have undergone a full GreenScreen assessment, these products are valued at 150% of cost.

Option 3: Product Manufacturer Supply Chain Optimization

This option moves its focus to the supply chain, companies upstream of paint and coating manufacturers, like chemical suppliers. This option rewards projects with one point for using building products sourced from manufacturers who procure raw materials from suppliers following health, safety, and environmental standards, with third-party verification.

Material Ingredient Reporting

Option 3: Supply Chain Optimization – 1 point

at least 25% of permanently installed products by cost

Manufacturers must have validated safety, health, hazard, and risk programs which document at least 99% (by weight) of the ingredients used to make the material. Manufacturers must have independent third-party verification of their supply chain that at a minimum verifies specific chemical ingredient requirements.

Verify with USGBC for acceptable programs

It asks that at least 25%, by cost, of the total value of permanently installed products in the project are sourced from manufacturers who have detailed third-party information about health, safety hazard, and risk management programs for chemical ingredients. USGBC doesn't cite an approved third-party standard to achieve this credit, so for now, you cannot achieve points using this credit. (See <http://www.usgbc.org/node/2616399?view=forum>.) USGBC suggests checking their website for updates on how to achieve compliance.

How Can Paints Contribute?

For most of the optional requirements of this credit, you will have to check with manufacturers for inventory and certifications. Of all the certifications and standards mentioned here, only *Cradle to Cradle Certified™* maintains a database of their certified products.



Materials and Resources

Building Product Disclosure and Optimization, Material Ingredients Credit – max. 2 points

| | | | | | |
|---|--|---|--|--|---|
| Option 1: Material Ingredient Reporting – 1 point | | | Option 2: Material Ingredient Optimization – 1 point | | Option 3: Supply Chain Optimization – 1 point |
| chemical inventory to 1000 ppm 20 different products, at least 5 manufacturers | | | at least 25% of permanently installed products by cost | | at least 25% of permanently installed products by cost |
| Alt. 1: Manufacturer Inventory | Alt. 2: HPD | Alt. 3: C2C | Alt. 1: GreenScreen v1.2 | Alt. 2: <i>Cradle to Cradle Certified™</i> | USGBC has not identified method of compliance yet |
| Ingredient inventory CASN numbers | Disclosure of known hazards to 0.1%; any not named must have health risks listed | <i>Cradle to Cradle Certified™</i> v2 Basic or <i>Cradle to Cradle Certified™</i> v3 Bronze | No Benchmark™ 1 hazards to 100 ppm GreenScreen List Translator: 100% value Full GreenScreen Assessment: 150% value | <i>Cradle to Cradle Certified™</i> v2 Gold: 100% value <i>Cradle to Cradle Certified™</i> v2 Platinum: 150% value <i>Cradle to Cradle Certified™</i> v3 Silver: 100% value <i>Cradle to Cradle Certified™</i> v3 Gold or Platinum: 150% value | Manufacturer and supply chain safety, health, hazard, and risk programs |
| Must be publically available | Must be publically available | | CASN: Chemical Abstract Service Number | | Check with USGBC for more detail |



Summary

Summary

In LEED 2009, paints and coatings had the opportunity to contribute to primarily two credits, for a total of three points. In LEED v4, in addition to Heat Islands and Low Emitting Materials, paint contributes to three new Materials and Resources: Building Product Disclosure and Optimization credits, increasing the potential of contribution to points to 11.

The requirements for the carry over credits, Heat Islands and Low Emitting Materials, are fairly similar to LEED 2009, requiring high reflectivity paint for Heat Islands and paint with low VOC content and emissions for the Low Emitting Materials credit.

The new Building Product Disclosure and Optimization credits: Environmental Product Declarations, Sourcing of Raw Materials, and Material Ingredients all contain some sort of disclosure of materials ingredients, manufacturer, and raw material supplier information. Some of the options require public disclosure of this information, and some require private disclosure to certification providers.

Summary

While finding products that meet low reflectivity and low VOC requirements will be fairly straightforward, currently finding products that meet the Materials and Resources credits will be a little more difficult. Check the testing and certification websites for publically available information and, of course, check with the paint manufacturer.

For more information on these LEED credits see the following:

LEED Credit Library: <http://www.usgbc.org/credits>

LEED User: <http://www.leaduser.com/>

LEED Reference Guides: <http://www.usgbc.org/store/products/publications>

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