



## **LEED® v4 Technical Bulletin Building Design + Construction**

### **Background**

This document outlines Carboline's contributions towards available LEED v4 credits. Carboline is committed to developing and manufacturing environmentally compliant coatings and fire protection products. Carboline fireproofing products can contribute towards points under the LEED Green Building Rating System. The LEED Green Building Rating System does not certify construction products and materials. Instead, entire projects are certified on the basis of the environmental impact of the building materials employed and the overall building design.

### **What is LEED?**

Leadership in Energy and Environmental Design (LEED) is the most widely used green building rating system in the world. LEED was developed by the United States Green Building Council (USGBC) to evaluate the environmental performance of buildings and promote sustainable design methods. LEED certification provides independent verification of environmental features which allow for efficient, high performance, cost-effective building design and construction. There are four levels of certification that can be reached for LEED v4 which are awarded based on achieving a minimum number of points (Certified, Silver, Gold and Platinum).

### **Carboline products can contribute toward the following LEED v4 credit categories:**

#### **Energy & Atmosphere**

- ✓ EA Prerequisite – Minimum Energy Performance
- ✓ EA Credit – Optimize Energy Performance

#### **Materials and Resources**

- ✓ MR Prerequisite: Construction and Demolition Waste Management Planning
- ✓ MR Credit: Building Life Cycle Impact Reduction
- ✓ MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials
- ✓ MR Credit: Building Product Disclosure and Optimization – Material Ingredients

#### **Indoor Environmental Quality**

- ✓ EQ Credit: Low-Emitting Materials

## Energy and Atmosphere

### EA Prerequisite: Minimum Energy Performance

**Intent:** To reduce the environmental and economic harm of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.

**Requirements:** Follow the criteria in the LEED New Construction Energy Design Guide as specified in LEED v4 (page 66).

**Carboline Contributions:** Carboline wet mix materials provide thermal resistance and noise reduction coefficient values. This will reduce the amount of energy needed for climate control and any added materials needed for soundproofing. This credit only applies to Carboline materials when used within the building envelope.

**Carboline Products That Contribute:** Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500

### EA Credit: Optimize Energy Performance (1-18 points)

**Note:** This credit requires that an energy analysis be done that includes all energy costs within and associated with the building project. Points for this credit are assigned from 1-18 based on the percentage of energy cost savings the building materials or systems will provide.

**Intent:** Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

**Requirements:** Follow the criteria in EA Prerequisite Minimum Energy Performance to demonstrate a percentage improvement in the proposed building performance rating compared with the baseline. Points are awarded according to Table 1 in LEED v4 (page 75). Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building.

**Carboline Contributions:** Carboline wet mix materials provide thermal resistance and noise reduction coefficient values. This will reduce the amount of energy needed for climate control and reduce any added materials needed for soundproofing. This credit only applies to Carboline materials when used within the building envelope.

**Carboline Products That Contribute:** Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500

## Materials and Resources

### MR Prerequisite: Construction and Demolition Waste Management Planning

**Intent:** To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

**Requirements:**

**Option 1** (page 106) Diversion (1–2 points)

Path1: Divert 50% and Three Material Streams (1 point)

Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams.

OR

Path 2: Divert 75% and Four Material Streams (2 points)

Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams. The minimum percentage debris to be recycled or salvaged for each point threshold is as follows: 50%: 1 point, 75%: 2 points

**Carboline Contributions:** Carboline products are supplied in paper bags, plastic pails or metal pails which can be recycled. The pallets used for shipment are also recyclable.

**Carboline Products That Contribute:** Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, Pyroprime® 775 WB, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

### MR Credit: Building Life-Cycle Impact Reduction (2-5 points)

**Intent:** To encourage adaptive reuse and optimize the environmental performance of products and materials.

**Requirements:** Reuse or salvage building materials from offsite or onsite as a percentage of the surface area as listed in Table 1 (page 91). Include structural elements (e.g., floors, roof decking), enclosure materials (e.g., skin, framing), and permanently installed interior elements (e.g., walls, doors, floor coverings, ceiling systems). Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project.

Materials contributing toward this credit may not contribute toward MR Credit Material Disclosure and Optimization.

Percentage of completed project surface area reused	Points BD&C	Points BD&C (Core and Shell)
25%	2	2
50%	3	3
75%	4	5

**Carboline Contributions:** Carboline wet mix and intumescent materials are utilized for retrofit and rehab construction. These materials provide fire resistance ratings to unprotected structural members which will bring the existing building up to code. This will eliminate the need to replace the structural elements that were not code compliant.

**Carboline Products That Contribute:** Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1 XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK3 Spattercoat, A/D Type TC-55, Pyroprime® 775 WB, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

### **MR Credit: Building Product Disclosure and Optimization-Sourcing of Raw Materials (1-2 points)**

**Intent:** To encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

#### **Requirements:**

##### **Option 1** (page 95) Raw Material Source and Extraction Reporting (1 point)

Use at least 20 different permanently installed products from at least five different manufacturers that have publicly released a report from their raw material suppliers which include 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, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria

**Carboline Contributions:** Carboline has publicly released reports from their raw material suppliers which include raw material supplier extraction locations for our wet mix and intumescent materials fire resistive materials.

**Carboline Products That Contribute:** Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

##### **Option 2** (page 95). Leadership Extraction Practices (1 point)

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.

**Recycled content:** Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost. Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

**Carboline Contributions:** Carboline wet-mix products are manufactured with post-consumer recycled materials.

**Carboline Products That Contribute:** Southwest™ Type 5GP (10% recycled content), Southwest™ Type 5MD (10% recycled content), Southwest™ Type 5EF (10% recycled content).

**MR Credit: Building Product Disclosure and Optimization-Material Ingredients (1-2 points)**

**Intent:** To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances. To reward raw material manufacturers who produce products verified to have improved life-cycle impacts.

**Requirements:**

**Option 1** (Page 97) Material Ingredient Reporting (1 point)

Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product.

**Carboline Contributions:** Carboline wet mix and intumescent products have complete Declare Health Product Declaration: The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open standard.

**Carboline Products That Contribute:** Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 241, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

**MR Credit: Construction and Demolition Waste Management (1-2 points)**

**Intent:** To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

**Requirements:**

**Option 1** (page 106) Diversion (1–2 points)

Path 1: Divert 50% and Three Material Streams (1 point)

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**Carboline Contributions:** Carboline products are supplied in paper bags, plastic pails or metal pails which can be recycled. The pallets used for shipment are also recyclable.

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## Indoor Environmental Quality

### EQ Credit: Low Emitting Materials (1-3 points)

**Intent:** To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

**Requirements:** This credit includes requirements for product manufacturing as well as project teams. It covers volatile organic compound (VOC) emissions in the indoor air and the VOC content of materials as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in seven categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system such as waterproofing membranes and air- and water-resistive barrier materials.

#### Option 1 (Page 118) Product Category Calculations (1-3 points)

Achieve the threshold level of compliance with emissions and content standards for the number of product categories listed in Table 2 (page 118).

Category	Threshold	Emission & Content Requirements
Interior paints and coatings applied onsite	At least 90% by volume for emissions, 100% for VOC content	<ul style="list-style-type: none"> <li>General Emissions Evaluation for paints and coatings applied to walls, floors and ceilings</li> <li>VOC content requirements for wet applied products</li> </ul>
Interior adhesives and sealants applied onsite	At least 90% by volume, for emissions 100% for VOC content	<ul style="list-style-type: none"> <li>General Emissions Evaluation</li> <li>VOC content requirements for wet applied products</li> </ul>
Ceilings, walls, thermal and acoustic insulation	100%	<ul style="list-style-type: none"> <li>General Emissions Evaluation</li> <li>Healthcare, schools only</li> </ul>
Healthcare and schools projects only: Exterior applied products	At least 90% by volume	<ul style="list-style-type: none"> <li>General Emissions Evaluation</li> <li>Exterior applied products</li> </ul>

### Emissions and Content Requirements

To demonstrate compliance, a product or layer must meet all of the following requirements, as applicable.

**Inherently non-emitting sources:** Products that are inherently non-emitting sources of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) are considered fully compliant without any VOC emissions testing if they do not include integral organic-based surface coatings, binders, or sealants.

**General emissions evaluation:** Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010, using the applicable exposure scenario. The default scenario is the private office scenario. The manufacturer’s or third-party certification must state the exposure scenario used to determine compliance. Claims of compliance for wet-applied products must state the amount applied in mass per surface area.

Manufacturers’ claims of compliance with the above requirements must also state the range of total VOCs after 14 days (336 hours), measured as specified in the CDPH Standard Method v1.1:

- 0.5 mg/m<sup>3</sup> or less;
- between 0.5 and 5.0 mg/m<sup>3</sup>; or
- 5.0 mg/m<sup>3</sup> or more.

**Additional VOC content requirements for wet-applied products:** In addition to meeting the general requirements for VOC emissions (above), on-site wet-applied products must not contain excessive levels of VOCs, for the health of the installers and other trade workers who are exposed to these products. To demonstrate compliance, a product or layer must meet the following requirements, as applicable. Disclosure of VOC content must be made by the manufacturer. Any testing must follow the test method specified in the applicable regulation.

- All paints and coatings wet-applied on site must meet the applicable VOC 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, effective June 3, 2011.
- All adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD Rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC regulations.
- For projects outside the U.S., all paints, coatings, adhesives, and sealants wet-applied on site must either meet the technical requirements of the above regulations or comply with applicable national VOC control regulations such as the European Decopaint Directive (2004/42/EC), the Canadian VOC Concentration Limits for Architectural Coatings, or the Hong Kong Air Pollution Control (VOC) Regulation.

As there is no fireproofing category in the LEED v4, the SCAQMD regulations are commonly used to designate specialty coatings classifications for LEED applications. The SCAQMD (Rule #1113) outlines the current VOC limits as of January 1, 2014 for several categories of specialty coatings as follows:

Specialty Coating Type	Current VOC Limit (g/l)
Concrete surface retarders	50
Driveway Sealers	50
Faux finishing coatings	200
<b>Fireproofing coatings</b>	<b>150</b>
Graphic art coatings	150
Mastic coatings	100
Metallic pigmented coatings	150
Anti-graffiti coatings	50

The following Carboline products meet current VOC requirements:

<b>Carboline Compliant Fireproofing Products</b>	<b>VOC Limit (EPA Method 24) (g/l)</b>
A/D Firefilm® III	20 g/l
A/D Firefilm® III C	20 g/l
Firefilm® IV	4 g/l
Thermo-Sorb® VOC	142 g/l
Thermo-Sorb® E	147 g/l
Thermo-Sorb® 263	148 g/l
Thermo-Lag® E100	13 g/l
Thermo-Lag® E100 S	64 g/l
Thermo-Lag® 3000 A	13 g/l
Thermo-Lag® 3000 SA	64 g/l
A/D Type TC-55	0 g/l
Pyroprime® 775 WB	81 g/l
Southwest™ Series	0 g/l
Pyrolite® Series	0 g/l
Pyrocrete® Series	0 g/l

**Carboline**

**Contributions:** Carboline has wet mix and intumescent materials that meet the required VOC limits and VOC emissions requirements for this credit.

**Carboline Products That Contribute:** Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, A/D Type TC-55, Pyroprime® 775 WB, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500, A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

## **Manufacturing Locations**

### **Products manufactured in Louisa, VA:**

Pyrolite® 15, Pyrolite® 22, Southwest™ Type 5GP, Southwest™ Type 5MD, Southwest™ Type 5EF, Southwest™ Type 1XR, Southwest™ Type 7GP, Southwest™ Type 7HD, Southwest™ Type 7TB, Southwest™ Type DK 3 Spattercoat, Pyrocrete® 239, Pyrocrete® 40, Pyrocrete® 240 HY, Pyrocrete® 241, Pyrocrete® 241 HD, Hardcoat 4500

### **Products manufactured in Green Bay, WI:**

Pyroprime® 775, Thermo-Sorb® E, Thermo-Sorb® 263,

### **Products manufactured in Dayton, NV:**

Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

### **Products manufactured in Lake Charles, LA:**

A/D Firefilm® III, A/D Firefilm® III C, Firefilm® IV, A/D Type TC-55, Thermo-Sorb®, Thermo-Sorb® VOC, Thermo-Sorb® E, Thermo-Sorb® 263, Thermo-Lag® 3000, Thermo-Lag® E100, Thermo-Lag® E100 S

## **Raw Material Extraction Locations**

**NOTE:** For raw material extraction locations and distance to manufacturing plants, please contact your local Carboline technical sales representative or Carboline fireproofing technical service.