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# **CRADLE TO CRADLE CERTIFIED® VERSION 4.1**

## **VOLATILE ORGANIC COMPOUND (VOC) EMISSIONS TESTING**

Last updated: 14 October 2024

# CHANGE LOG

SECTION(S)	CHANGE SUMMARY	DATE
Initial Release		March 2021
All	Updated the referenced testing schemes, requirements, and specifications to align with their current versions. Added a transition policy.	14 October 2024

## Demonstrating Low VOC Emissions

The VOC emission related provisions (including both limits and testing requirements) of one of the standards listed below, including more recent versions, or an equivalent, must be used to demonstrate low VOC emissions, as applicable, to meet the Silver level requirement in Material Health.

Previous versions of the standards and schemes listed in this document may be accepted provided that the following criteria are met:

1. The test was completed no more than two years prior to the date of application (per the Version 4.0/4.1 standard).
2. The test was completed prior to the date this reference document was updated OR the test is completed within a transition period set by the developer of the standard or scheme.

## Acceptable Standards

- Schemes that are recognized as meeting the “general level criteria” in Table 2 of the latest version of the BREEAM Guidance Note GN22 for the VOC Emissions from Building Products credit. Formaldehyde emissions must be  $\leq 10 \mu\text{g}/\text{m}^3$  at 28 days or sooner following storage in a ventilated test chamber. [Reference: GN22: BREEAM Recognized Schemes for Emissions from Building Products, Table 2, version 2.8 of October 2024]
- The “general level” emission limits and testing requirements in the BREEAM International New Construction Version 6 Technical Standard. Formaldehyde emissions must be  $\leq 10 \mu\text{g}/\text{m}^3$  at 28 days or sooner following storage in a ventilated test chamber. [Reference: BREEAM International New Construction Version 6 Technical Standard, Hea 02 Indoor Air Quality, Table “Emission criteria by product type”.]
- Certifications and labels recognized for LEED v4 EQ Credit Low-Emitting Materials. [Reference: LEED v4 EQ Credit Low-Emitting Materials Third Party Certifications and Labels - June 2022] Any mentioned additional requirements, supplemental to the respective program, must also be fulfilled.
- Per LEED v4 or LEED v4.1 General emissions evaluation, compliance with CDPH Standard Method v1.2 , including a statement of the exposure scenarios and disclosure of the TVOC range.
- Per LEED v4 or LEED v4.1 General emissions evaluation, option 2 (LEED v4) or alternative compliance path ACP for LEM VOC Emissions Evaluation (LEED v4.1), compliance with AgBB (2018), including formaldehyde emissions  $\leq 10 \mu\text{g}/\text{m}^3$ . The TVOC range must be disclosed if complying with LEED v4.1.
- Schemes and labels listed in DGNB System 2020, ENV 1.2 Local and Environmental Impact, Appendix 1 Criteria Matrix as follows (Note: This also fulfills the Gold level requirement below):
- For textile floor coverings (line 6), compliance with any quality level and demonstration that formaldehyde is  $\leq 10 \mu\text{g}/\text{m}^3$  at 28 days or sooner following storage in a ventilated test chamber.
- For primers, precoats, fillers, and adhesives under wall and floor coverings (line 8), compliance with quality levels 2, 3, or 4.
- For polyurethane and silane modified polymers used as sealing compounds (line 11), compliance with quality levels 3 or 4.

- For barrier coatings, resin screeds, and seals under tiles (line 9), compliance with quality levels 3 or 4.
- For resilient/elastic floor coverings: Compliance with RAL UZ 120 and formaldehyde  $\leq 10 \mu\text{g}/\text{m}^3$  at 28 days or sooner following storage in a ventilated test chamber (Note: This also fulfills the Gold level requirement below).
- For composite wood (not in finished products such as furniture or flooring): Compliance with CARB ULEF or NAF requirements, or 100% of the European E1 formaldehyde class as tested per EN 717 or EN 16516.
- For furniture: Compliance with ANSI/BIFMA e3-2019 Furniture Sustainability Standard, Section 7.6.2 or 7.6.3 (Note: This also fulfills the Gold level requirement below).

## Demonstrating Very Low to No VOC Emissions

The VOC emission related provisions (including both limits and testing requirements) of one of the standards listed below, including more recent versions, or an equivalent must be used to demonstrate very low to no VOC emissions, as applicable, to meet the Gold and Platinum requirements in Material Health.

Previous versions of the standards and schemes listed in this document may be accepted provided that the following criteria are met:

1. The test was completed no more than two years prior to the date of application (per the Version 4.0/4.1 standard).
2. The test was completed prior to the date this reference document was updated OR the test is completed within a transition period set by the developer of the standard or scheme.

## Acceptable Standards

- Schemes that are recognized as meeting the “exemplary level criteria” in Table 2 of the latest version of the BREEAM Guidance Note GN22 for VOC Emissions from Building Products credit. [Reference: GN22: BREEAM Recognized Schemes for Emissions from Building Products, Table 2, version 2.8 of February 2024]
- The “exemplary level” emission limits and testing requirements in the BREEAM International New Construction Version 6 Technical Standard. [Reference: BREEAM International New Construction Version 6 Technical Standard, Hea 02 Indoor Air Quality, Table “Exemplary level emission criteria by product type”]
- Per LEED v4 or LEED v4.1 General emissions evaluation, compliance with CDPH Standard Method v1.2 and TVOC emissions no higher than 0.5 mg/m<sup>3</sup> (500 µg/m<sup>3</sup>) after no more than 14 days of storage in a ventilated test chamber, or no more than 10 days conditioning and 4 days of storage in a ventilated test chamber.
- Per LEED v4 or LEED v4.1 General emissions evaluation, alternative compliance path ACP for LEM VOC Emissions Evaluation, compliance with AgBB (2018), including formaldehyde emissions ≤10 µg/m<sup>3</sup> and TVOC emissions ≤ 0.3 mg/m<sup>3</sup> (300 µg/m<sup>3</sup>) after no more than 28 days of storage in a ventilated test chamber.
- Schemes and labels listed in DGNB System 2020, ENV 1.2 Local and Environmental Impact, Appendix 1 Criteria Matrix as follows:
  - For textile floor coverings (line 6), compliance with any quality level and demonstration that formaldehyde is ≤10 µg/m<sup>3</sup> at 28 days or sooner following storage in a ventilated test chamber.
  - For primers, precoats, fillers, and adhesives under wall and floor coverings (line 8), compliance with quality levels 2, 3, or 4.
  - For barrier coatings, resin screeds, and seals under tiles (line 9), compliance with quality levels 3 or 4.
  - For polyurethane and silane modified polymers used as sealing compounds (line 11), compliance with quality levels 3 or 4.

- For resilient floor coverings: Compliance with RAL UZ 120 and formaldehyde  $\leq 10 \mu\text{g}/\text{m}^3$  at 28 days or sooner following storage in a ventilated test chamber.
- For composite wood (not in finished products such as furniture or flooring): Compliance with CARB ULEF or NAF requirements, or 50% of the European E1 formaldehyde class as tested per EN 717 or EN 16516.
- For furniture: Compliance with ANSI/BIFMA e3-2019 version Furniture Sustainability Standard, Sections 7.6.2 or 7.6.3.