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LEED RELATED DOCUMENTS

MONOKOTE® Z-156,

MONOKOTE® Z-156 T

and MONOKOTE® Z-156 PC

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March 10, 2020

RE: Monokote® Fireproofing Materials and sustainability.

GCP Applied Technologies is proud to participate in a number of sustainability programs that can help you design and construct a more sustainable building.

Contribution to LEED
Monokote® Fireproofing materials are shipped in recyclable packaging and contain recycled content. We also have publicly available transparency reports to provide insight into our products. Choosing Monokote® Fireproofing can potentially help projects achieve the following LEED® 2009 and LEED® v4 credits under the Building Design + Construction and Interior Design + Construction rating systems:

LEED® 2009	
Construction Waste Management	Regional Materials
Recycled Content	Acoustic Environment (Healthcare)
Low-Emitting Materials—Paints and Coatings	Enhanced Acoustical Performance (Schools)
LEED® v4	
Building Product Disclosure and Optimization—Material Ingredients	Building Product Disclosure and Optimization—Environmental Product Declarations
Low Emitting Materials	Acoustic Performance
Building Product Disclosure and Optimization—Sourcing of Raw Materials	Construction and Demolition Waste Management

Environmental Product Declaration:
All Monokote® Fireproofing materials have a Type III environmental product declaration prepared in accordance with ISO 14025, ISO 21930, ISO 14040/44, ASTM Product Category Rule (PCR) for Spray-applied Fire-Resistive Materials (SFRM) and ASTM General Program Instructions for Type III EPDs.

Regional Materials: Depending on your project location, you may also be eligible to claim a 100-mile regional sourcing multiplier for LEED® V4. Monokote® Fireproofing materials are produced in the following cities in North America:

Ajax, Ontario, Canada
Santa Ana, California
Irondale, Alabama
Andover, Massachusetts (Firebond Concentrate only)

Contribution to the Living Building Challenge
GCP Applied Technologies has developed Declare **RED LIST FREE** labels for several Monokote® Fireproofing products, all of which are available on the Declare website.

VOC – Content and Emissions ; The majority of Monokote® Fireproofing products have been tested per the CDPH - **CA Section 01350** Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers Version 1.2.

The **VOC** Content of our Monokote® Fireproofing products are as follows:

Monokote® Product	Volatile Organic Compounds (VOC) reported per the Emission Standards
Monokote® Fireproofing	0 g/L
Firebond® Concentrate	0.60 g/L

The **recycled contents of** Monokote® Fireproofing are shown below:

Monokote	% Weight Post-Consumer	% Weight Post- Industrial
MK-6/HY	7.13	0.00
MK-6s	5.13	0.00
MK-6 ES	5.13	0.00
MK-6/GF	7.05	0.00
RG	8.27	0.00
MK-10/HB	6.99	0.00
MK-10/HB ES	5.01	0.00
MK-1000/HB	5.10	0.00
MK-1000/HB ES	5.09	0.00
Z-106s	1.44	0.00
Z-106/HY	5.05	0.00
Z-106G	5.13	0.00
Z-146	1.93	0.00
Z-3306	4.51	0.00
SK-III	0.00	0.00
Z-146PC	1.91	0.00
Z-146T	1.91	0.00
Z-156	1.25	0.00
Z-156PC	1.23	0.00
Z-156T	1.23	0.00
Firebond Concentrate	0.00	0.00
MK Accelerator	0.00	0.00

All of the claims made by GCP Applied Technologies with respect to the claims made above have been verified by independent 3rd parties.

Please feel free to contact me or any member of the Monokote® Fireproofing team should you require a project specific letter, additional information or clarification. Additionally a project specific letter may be obtained here.

We look forward to Monokote® Fireproofing being your product of choice when sustainability is important to you.

Sincerely,

John Dalton
Technical Service Manager
Fire Protection Products
GCP Applied Technologies

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Environmental Product Declaration

An Environmental Product Declaration

According to ISO 14025:2006 and ISO 21930:2017

A Corporate Average Cradle-to-gate EPD for Standard, Medium and High & Ultra High-Density Spray-applied Fire-Resistive Materials (SFRMs)

This EPD has been prepared in conformance with ISO 14025, 14040, 14044 standards and according to the requirements of ISO 21930:2017 and ASTM International's EPD program operator rules. This EPD was commissioned by the GCP Applied Technologies and is verified by ASTM International to conform to the requirements of ISO 14040, 14044, 14025 and 21930.

ASTM International	Date of issue: 04.15.2022
West Conshohocken, PA	Period of validity: 5 years
www.astm.org	Declaration #: EPD 060

Environmental Product Declaration Summary

General Summary	
Owner of the EPD	**GCP Applied Technologies Inc.** (GCPAT) 2325 Lakeview Parkway Suite 450, Alpharetta, GA 30009 U.S.A. Link (URL): https://gcpat.com With roughly 2,000 employees and 50 manufacturing facilities worldwide, GCP Applied Technologies serves customers in more than 100 countries. GCPAT was formed in February 2016 by the spin-off of W. R. Grace & Co.'s construction products segment and its packaging technologies business. The owner of the declaration is liable for the underlying information and evidence.
SFRM Manufacturing Facilities	**Ajax, Canada** 294 Clements Rd. West Ajax, Ontario L1S 3C6 **Irondale, United States** 2601 Commerce Blvd. Irondale, Alabama 35210 **Santa Ana, United States** 2500 & 2502 S. Garnsey Street Santa Ana, California 92707
Product Group and Name	Spray-applied Fire-Resistive Material (SFRM), UN CPC 54650.
Product Description	SFRM is composed primarily of binding agents such as cement or gypsum and often contains other materials such as mineral wool, quartz, perlite, vermiculite, or bauxite along with various other ingredients
Reference Product Category Rules (PCR)	ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.
Certification Period	04.15.2022 - 04.15.2027
Declared Unit	1,000 kg of SFRM
Declaration Number	EPD 060

ASTM International
West Conshohocken, PA
www.astm.org

Date of issue: 04.15.2022
Period of validity: 5 years
Declaration #: EPD 060

EPD and Project Report Information	
Program Operator	ASTM International
Declaration Holder	GCP Applied Technologies Inc.

Declaration Type

A "Cradle-to-gate" EPD (Production stage) of GCPAT's production of standard, medium and high & ultra-high-density spray-applied fire-resistive material. The declaration presents a weighted average profile for all three North American facilities operated by GCP Applied Technologies Inc. that manufacture SFRMs. Product activities covered include the raw material supply, transport, and manufacturing (modules A1 to A3). The declaration is intended for Business-to-Business (B-to-B) communication.

Applicable Countries

United States and Canada

Product Applicability

SFRMs are used as part of a building's passive fire resistance strategy. SFRMs have thermal and acoustical properties and assists in controlling condensation. However, its main use is in insulating steel, metal decking and other assemblies from the high temperatures found during a fire. SFRMs are used to delay (or prevent) the weakening of steel and the spalling of concrete in structures that are exposed to the high temperatures found during a fire. They do this by thermally insulating the structural members to keep them below the temperatures that cause failure.

Content of the Declaration

This declaration follows *Section 9*; *Content of an EPD*, ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.

This EPD was independently verified by ASTM in accordance with ISO 14025 and the core PCR ISO 21930:2017: **Internal** **External** X	Tim Brooke, ASTM International
The Project Report *Note that the Project Report is not part of the public communication (ISO 21930, 10.1).*	A Cradle-to-Gate Life Cycle Assessment of GCP Applied Technologies Standard, Medium and High & Ultra High-Density Spray-applied Fire-Resistive Materials (SFRMs). April 2022.
Prepared by Athena Sustainable Materials Institute	Lindita Bushi, PhD, Mr. Jamie Meil and Mr. Grant Finlayson Athena Sustainable Materials Institute 280 Albert Street, Suite 404 Ottawa, Ontario, Canada K1P 5G8 info@athenasmi.org www.athenasmi.org
This EPD project report was independently verified by in accordance with ISO 14025, ISO 14040/44, and the core PCR ISO 21930:2017:	Thomas P. Gloria, Ph. D. Industrial Ecology Consultants

ASTM International	Date of issue: 04.15.2022
West Conshohocken, PA	Period of validity: 5 years
www.astm.org	Declaration #: EPD 060

1 PRODUCT IDENTIFICATION

1.1 PRODUCT DEFINITION

Spray-applied fire-resistive materials (UN CPC 54650) are composed primarily of binding agents such as cement or gypsum and often contain other materials such as quartz or bauxite along with various other ingredients. The other materials are used to help lighten the solution or to add air as an insulator. Chemical hardeners are sometimes used to either speed up hardening or to make the final fireproofing harder than the original.

Passive fire protection materials (commonly referred to as fireproofing) are used to prevent or delay the failure of steel and concrete structures exposed to fire. These materials are intended to insulate the structural members during the event of a fire, delaying any loss of the integrity of the structural members. There is an array of available fireproofing materials that can be used depending upon the specific application. Applied fireproofing is available as a wet or dry formula. It is typically sprayed but can also be troweled on. The fireproofing is generally delivered as a dry powder in bag, which is then mixed with water in the field. Modern formulas are asbestos-free and don't contain free crystalline silica. This is a company-specific EPD representing an array of available SFRMs produced at three of GCPAT's facilities located in North America and produced to various specifications as noted in Table 1. Table 1 summarizes key technical data for GCPAT SFRMs for the 2019 reference year (12 months). GCPAT SFRMs are classified in three major sub-categories based on the dry density minimum average values in pcf (pound per cubic foot). Full material selection guide and literature and the material safety data sheets are available for each of these fireproofing materials at https://gcpat.com.

Table 1. Technical Data for GCPAT SFRMs

Primary Binding Agent	GCPAT SFRM-Sub-category	Dry density, minimum average- in kg/m^3 (pcf)	GCPAT Brand Names
Gypsum - based	Standard density	240 (15)	MK Patch (GF Pail), MK-10/HB EXT SET WHITE, MK-10/HB EXT SET, MK-10/HB WHITE, MK-1000/HB, MK-1000/HB EXT SET, MK-10/HB, MK-10/HB EXT SET, MK-6 EXT SET, MK-6/GF, MK-6/HY, MK-6/HY EXT SET, MK-6/HY CE, MK-6/HY EXT SET, MK-6S, MK-6S CE, RG, Z-3306/G
Cement- or gypsum-based or a blend	Medium density	352 (22)	SK-3, Z-106/G, Z-106/HY, Z-3306, Z-3306 Gray, Z-3306 White
Cement- based	High & ultra-high density	640 (40)	Z-146, Z-146PC, Z-146T, Z-156, Z-156PC, Z-156T

1.2 PRODUCT STANDARD

The physical characteristics of SFRM are determined according to various ASTM standards such as, but not limited to:

- E736/E736M-19, Standard Test Method for Cohesion/Adhesion of Sprayed Fire- Resistive Materials Applied to Structural Members
- E605/E605M-19, Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members
- E759/E759M-92(2020)e1 Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
- E760/E760M-92(2020)e1 Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
- E761/E761M-92(2020)e1 Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
- E859/E859M-93(2020)e1 Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members
- E937/E937M-93(2020)e1 Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

2 DECLARED UNIT

The declared unit is 1,000 kg, 1 metric ton) of spray-applied fire-resistive materials (SFRM).

3 MATERIAL CONTENT

Table 2 shows the weighted average generic formulations for all three sub-categories of GCPAT fireproofing materials as produced at GCPAT's three manufacturing locations. For reasons of confidentiality a portion of each SFRM is reported as "additives".

Table 2: Weighted Average Generic Formulations for Standard, Medium, High & Ultra High Density SFRMs

Standard Density		Medium Density		High & Ultra High Density	
Material composition	**%**	**Material composition**	**%**	**Material composition**	**%**
Stucco (CaSO4 ½H2O)	87%	Stucco (CaSO4 ½H2O)	54%	Bauxite	49%
Recovered paper	5%	Portland cement	31%	Portland cement	41%
Limestone	3%	Clay	6%	Clay	3%
Rest- additives	5%	Rest- additives	9%	Rest- additives	6%
Total	100%	Total	100%	Total	100%

Table 3 shows the amount of packaging materials per 1,000 kg of GCPAT SFRMs. Paper sacks are used for transporting fireproofing materials. The sacks are typically made of high-quality and weight kraft paper, usually virgin fiber.

Table 3: Packaging Materials for GCPAT SFRMs

Packaging materials	Quantity	Units (per 1,000 kg SFRM)
Paper Sacks	22.00	kg
Cardboard Core	0.30	kg

4 PRODUCTION STAGE

For this EPD, the boundary is “cradle-to-gate” or the *Production stage*, which includes the extraction of raw materials (cradle) through the manufacture of SFRM packaged ready for shipment (gate). Downstream activity stages - Construction, Use, End-of-life, and Optional supplementary information beyond the system boundary - are excluded from the system boundary (Figure 1).

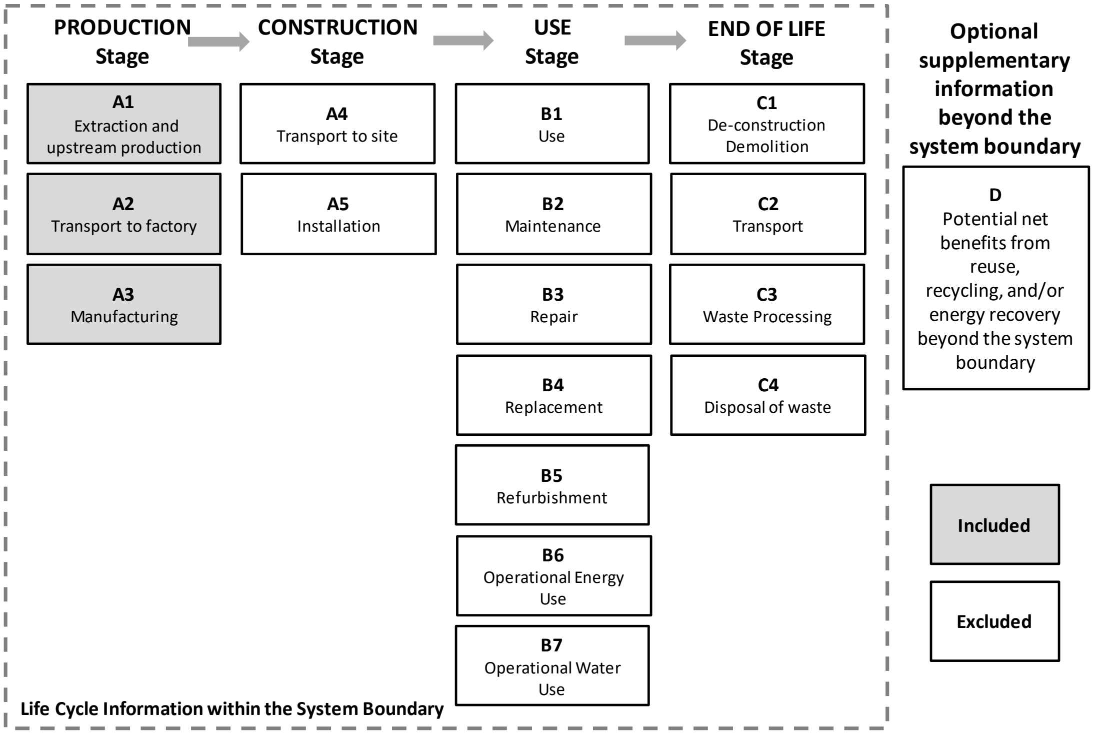

Figure 1 Common four life cycle stages and their information modules for construction products and the optional supplementary module [2]

The **Production stage** (modules A1 to A3) includes the following processes:

A1 Extraction and upstream production: Extraction and processing of input raw materials used in the production of standard, medium, high & ultra-high-density SFRMs, including fuels used in extraction and transport within the process.

A2 Transportation to factory: Transportation of input raw materials (including recovered materials) from extraction site or source to manufacturing facilities, including empty backhauls.

A3 Manufacturing: Manufacturing of the SFRMs, including all on-site energy and ancillary materials required and emissions to air, water and land and wastes produced. This also includes transportation from manufacturing site to landfill for on-site wastes, including empty backhauls and the waste disposal process. The A3 module includes grinding, mixing, blending, pneumatic conveying, high-speed auger packaging, lighting and heating, ventilation and air conditioning, operation of environmental equipment (baghouses and bin vents), on-site transportation (loading and unloading) and storage of SFRMs.

5 LIFE CYCLE INVENTORY

5.1 DATA COLLECTION, SOURCE AND CALCULATIONS

LCI data collection was based on a customized survey of all three GCPAT's SFRM manufacturing sites. All facility specific LCI data were weighted based on facility level total annual production to calculate the weighted average LCI profile for each product type (per 1,000 kg). Data calculation procedures follow ISO 14044. Per ISO 21930, 7.2.2 the net calorific value (lower heating value) of fuels is applied according to scientifically based and accepted values specific to the combustible material.

5.2 DATA QUALITY REQUIREMENTS AND ASSESSMENTS

A detailed description of collected data and the data quality assessment regarding the core PCR requirements and ISO 14044 is provided in the LCA report. Data quality is assessed based on its representativeness (technology coverage, geographic coverage, time coverage), completeness, consistency, reproducibility, transparency, and uncertainty (Table 4).

Table 4 Data Quality Requirements and Assessments

Data Quality Requirements	Description
Technology Coverage	Data represents the prevailing company technology in use in U.S. and Canada. Whenever available, for all upstream and core material and processes, North American typical or average industry LCI datasets were utilized. *Technological representativeness is characterized as "high".*
Geographic Coverage	The geographic region considered is U.S. and Canada. The geographic coverage of all LCI databases and datasets is given in in the LCA background report. *Geographical representativeness is characterized as "high".*
Time Coverage	Activity data are representative as of 2019. - SFRM manufacturing process- primary data collected from 3 facilities: reference year 2019 (12 months); - In-bound/ out-bound transportation data- primary data collected from 3 facilities: reference year 2019 (12 months); - Generic data: the most appropriate LCI datasets were used as found in the US LCI Database, ecoinvent v.3.7.1 database, 2021. *Temporal representativeness is characterized as "high".*
Completeness	All relevant, specific processes, including inputs (raw, secondary, ancillary, and packaging materials, and energy flows) and outputs (emissions and production volume) were considered and modeled to provide a weighted average for the SFRM products of interest. The relevant background materials and processes were taken from the US LCI Database, ecoinvent v 3.7.1 LCI database, and modeled in SimaPro v9.2.0.2, 2021. The completeness of the cradle-to-gate process chain in terms of process steps is rigorously assessed for SFRM products of interest and documented in the LCA background report.

Data Quality Requirements	Description
Consistency	To ensure consistency, the LCI modeling of the production weighted input and output LCI data for the SFRM product of interest used the same LCI modeling structure across the 3 facilities, which consisted of input raw, secondary, ancillary, and packaging materials, energy flows, water resource inputs, product outputs, co-products, by-products, emissions to air, water and soil, and solid and liquid waste disposal. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the facility level and selected process levels to maintain a high level of consistency.
Reproducibility	Internal reproducibility is possible since the data and the models are stored and available in *GCPAT_SFRM_LCI database* developed in SimaPro, 2021. A high level of transparency is provided throughout the report as the weighted average LCI profile is presented for each of the declared products as well as major upstream inputs. Key primary (manufacturer specific) and secondary (generic) LCI data sources are summarized in Annex C. External reproducibility is also possible as a high level of transparency is provided throughout the Project Report and LCI data and sources are also summarized.
Transparency	Activity and LCI datasets are transparently disclosed in the project report, including data sources.
Uncertainty	A *sensitivity check* was conducted to assess the reliability of the EPD results and conclusions by determining how they are affected by uncertainties in the data or assumptions on calculation of LCIA and energy indicator results. The sensitivity check includes the results of the *sensitivity analysis* and *Monte Carlo uncertainty analysis* both of which are summarized in the LCA report.

5.3 ALLOCATION AND CUT-OFF RULES

"Mass" was deemed as the most appropriate physical parameter for allocation used for the SFRMs manufacturing system to calculate the input energy flows (electricity, natural gas, and propane), packaging materials and waste flows per declared unit of 1,000 kg of SFRM. LCI modeling accounts for the plant specific fabrication yields in accordance with ISO 14044, 4.3.4.2.

Secondary materials such as hammermilled newsprint and post-industrial polystyrene are considered recovered materials. However, only the materials, water, energy, emissions, and other elemental flows associated with reprocessing, handling, sorting, and transportation from the generating industrial process to their use in the production process are considered. Any allocated burdens before reprocessing are allocated to the original product. Allocation related to transport are based on the mass of transported product.

The cut-off criteria as per ISO 21930, were followed for this EPD. All input/output data required were collected and included in the LCI modelling. No substances with hazardous and toxic properties that pose a concern for human health and/or the environment were identified in the framework of this EPD. Any data gaps for the reference year 2019 - e.g., packaging materials were filled in with plant generic data from previous years.

The Production Stage *excludes* the following processes:

- Capital goods and infrastructure;
- Human activity and personnel related activity (travel, furniture, office operations and supplies);
- Energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

6 LIFE CYCLE ASSESSMENT

6.1 RESULTS OF THE LIFE CYCLE ASSESSMENT

This section summarizes the product stage life cycle impact assessment (LCIA) results including resource use and waste generated metrics based on the cradle-to-gate life cycle inventory inputs and outputs analysis. Table 5 presents the calculated results for each product density based on 1,000 kg (1 metric ton). *It is noted that LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks* [2], [3].

Table 5 Production Stage (A1-A3), EPD Results for 1,000 kg standard, medium, high & ultra-high density SFRMs

Impact category and inventory indicators	Unit	Standard Density (min 15 pcf)	Medium Density (min 22 pcf)	High & Ultra High Density (min 40 pcf)
Global warming potential, GWP 100[1)], AR5	kg CO_2 eq	**210**	**493**	**621**
Ozone depletion potential, ODP[1)]	kg CFC-11 eq	**1.2E-04**	**1.3E-04**	**1.4E-04**
Smog formation potential, SFP[1)]	kg O_3 eq	**29.1**	**35.3**	**52.5**
Acidification potential, AP[1)]	kg SO_2 eq	**1.4**	**1.9**	**2.6**
Eutrophication potential, EP[1)]	kg N eq	**0.33**	**0.67**	**0.89**
ADP elements, CML[2)]	kg Sb eq	**1.0E-04**	**6.6E-04**	**1.8E-03**
ADP surplus, TRACI[1)]	MJ surplus	**515**	**607**	**683**
Renewable primary resources used as an energy carrier (fuel), RPR_E[3)]	MJ LHV	**166.9**	**405.6**	**450.3**
Renewable primary resources with energy content used as material, RPR_M[3)]	MJ LHV	**0**	**0**	**0**
Non-renewable primary resources used as an energy carrier (fuel), $NRPR_E$[3)]	MJ LHV	**3,849**	**5,051**	**5,833**
Non-renewable primary resources with energy content used as material, $NRPR_M$[3)]	MJ LHV	**0**	**0**	**0**
Secondary materials, SM[3)]	kg	**71**	**90**	**63**
Renewable secondary fuels, RSF[3)]	MJ LHV	**0.080**	**17**	**23**
Non-renewable secondary fuels, NRSF[3)]	MJ LHV	**0.77**	**167**	**218**
Recovered energy, RE[3)]	MJ LHV	**0**	**0**	**0**
Consumption of freshwater, FW[3)]	m^3	**0.31**	**0.62**	**0.64**
Hazardous waste disposed, HWD[3)]	kg	**0.035**	**0.027**	**0.009**
Non-hazardous waste disposed, NHWD[3)]	kg	**19.9**	**116.0**	**143.5**
High-level radioactive waste, conditioned, to final repository, HLRW[3)]	m^3	**9.8E-07**	**9.8E-07**	**1.0E-06**
Intermediate- and low-level radioactive waste, conditioned, to final repository, ILLRW[3)]	m^3	**2.8E-06**	**3.3E-06**	**5.0E-06**
Components for re-use, CRU[3)]	kg	**0**	**0**	**0**
Materials for recycling, MR[3)]	kg	**0**	**0**	**0**
Materials for energy recovery, MER[3)]	kg	**0**	**0**	**0**
Recovered energy exported from the product system, EE[3)]	MJ LHV	**0.0029**	**0.62**	**0.81**
Global warming potential - biogenic, GWP-100 bio[3)4)]		1.1E-03	0.23	0.30
Emissions from calcination[3)4)]		0.71	152.3	200.0

Impact category and inventory indicators	Unit	Standard Density (min 15 pcf)	Medium Density (min 22 pcf)	High & Ultra High Density (min 40 pcf)
Emissions from combustion of waste from renewable sources[3)4)]		3.00E-04	0.064	0.085
Emissions from combustion of waste from non-renewable sources[3)4)]		0.072	15.5	20.3
Removals associated with biogenic carbon content of the bio-based product[3)]		-98.0	-66.2	-41.5
Removals associated with biogenic carbon content of the bio-based packaging[3)]		-40.9	-40.9	-40.9

Table Notes:

[1)] Calculated as per U.S EPA TRACI 2.1, v1.05, SimaPro v 9.2.0.2. GWP_{100}, excludes biogenic CO_2 removals and emissions; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5), TRACI 2.1, with AR5, v1.05.

[2)] Calculated as per CML-IA Baseline V3.05, SimaPro v 9.2.0.2.

[3)] Calculated as per ACLCA ISO 21930 Guidance, respective sections 6.2 to 10.8.

[4)] Applicable for Portland cement only, used in manufacturing of the GCPAT SFRM [11].

6.2 INTERPRETATION

The cradle-to-gate manufacture of **standard density SFRM** embodies about 4 GJ of primary energy (LHV) and emits 210 kg CO2 eq of greenhouse gases per ton of product. Around 96% of the total primary energy input is derived from non-renewable primary energy resources. Across the three standard density production information modules, Module A1 extraction and upstream production contributes the largest share of the LCIA and energy indicator results – accounting for between 60% ($NRPR_E$) and 54% (GWP-100) of the potential environmental burdens. Module A3 Manufacturing is generally the second largest contributor to the overall potential environmental impacts – accounting for 32% and 29% of GWP and non-renewable energy use, respectively. Except for acidification (26%) and smog potential impacts (35%), Module A2 Transportation is generally a minor contributor (<15%) to the overall potential environmental impacts of standard density SFRM production.

The cradle-to-gate manufacture of **medium density SFRM** embodies about 5.5 GJ of primary energy (LHV) and emits 493 kg CO2 eq of greenhouse gases per ton of product. About 93% of the total primary energy input is derived from non-renewable primary energy resources. Across the three medium density production information modules, Module A1 extraction and upstream production contributes the largest share of the LCIA and energy indicator results – accounting for 82% (GWP-100), 72% (NRPRE) and over 50% of both acidification and smog formation burdens. Unlike standard density SFRM, Module A3 Manufacturing is a more minor contributor to the overall potential environmental impacts of medium density SFRM – accounting for 17% of $NRPR_E$ and 9% of GWP-100. Module A2 Transportation is a significant contributor to SFP (37%), AP (27%) and GWP (9%) to the overall potential environmental impacts of medium density SFRM manufacture.

The cradle-to-gate manufacture of **high and ultra-high density SFRM** embodies about 6.3 GJ of primary energy (LHV) and emits 621 kg CO2 eq of greenhouse gases per ton of product. Almost 93% of the total primary energy input is derived from non-renewable primary energy resources. Across the three high and ultra-high density production information modules, Module A1 extraction and upstream production contributes the largest share of the key LCIA and energy indicator results – accounting for 80% (GWP-100), 67% (NRPRE) and 78% of eutrophication potential burden. Similar to medium density SFRM, Module A3 Manufacturing is a more minor contributor to the overall potential environmental impacts of high and ultra-high density SFRM – accounting for 15% of NRPRE and 13% of GWP-100. Module A2 Transportation is a significant contributor to SFP (53%), AP (39%) and GWP (9%) to the overall potential environmental impacts of high and ultra-high density SFRM manufacture.

7 ADDITIONAL ENVIRONMENTAL INFORMATION

Standard, medium and high & ultra-high density SFRMs use between 2% to 7% recovered materials (hammermilled newsprint and post-industrial polystyrene).

8 DECLARATION TYPE

GCPAT SFRM EPD is categorized as follows:
- A corporate specific product EPD, averaged across the manufacturer's plants.

This declaration presents a weighted average EPD for three SFRM North American facilities operated by GCPAT. Product activities covered include the raw material supply, transport and manufacturing (modules A1 to A3). The declaration is intended for Business-to-Business (B-to-B) communication.

9 DECLARATION COMPARABILITY LIMITATION STATEMENT

- Only EPDs prepared from cradle-to-grave life cycle results and based on the same function, RSL, quantified by the same functional unit, and meeting all the conditions for comparability listed in ISO 14025:2006 and ISO 21930:2017 can be used to comparison between products.

10 EPD EXPLANATORY MATERIAL

For any explanatory material, regarding this EPD please contact the program operator.

ASTM International
Environmental Product Declarations
100 Barr Harbor Drive,
West Conshohocken,
PA 19428-2959,
http://www.astm.org

11 REFERENCES

1. ISO 14025:2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.
2. ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.
3. ISO 14040:2006/Amd 1:2020 Environmental management - Life cycle assessment - Principles and framework.
4. ISO 14044:2006/Amd1:2017/Amd2:2020 Environmental management - Life cycle assessment - Requirements and guidelines.
5 ASTM Program Operator Rules. Version: 8.0, Revised 04/29/20.
6 ISO 14021:2016 Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling).
7. PRé 2019.SimaPro LCA Software v9.2.0.2, 2021, https://simapro.com/
8. LEED v4, *Building Design and Construction Guide (BD+C), MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Option 2 Multi-attribute optimization* (1 point). https://www.usgbc.org/node/2616376?return=/credits/new-construction/v4/material-%26amp%3B-resources.
9. LEED v4.1, Building Design and Construction Guide (BD+C), MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Option 2 Multi-attribute optimization (1 point). https://leeduser.buildinggreen.com/credit/NC-v4.1/MRc2#tab-credit-language.
10. ACLCA 2019, Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017. The American Centre for Life Cycle Assessment. May 2019. https://aclca.org/aclca-iso-21930-guidance/
11. PCA 2021, EPD, Portland Cement- Industry-wide. https://www.astm.org/products-services/certification/environmental-product-declarations/epd-pcr.html
12. Athena 2021, A Cradle-to-Gate Life Cycle Assessment of GCP Applied Technologies Standard, Medium and High & Ultra High-Density Spray-applied Fire-Resistive Materials (SFRMs), Final Report.

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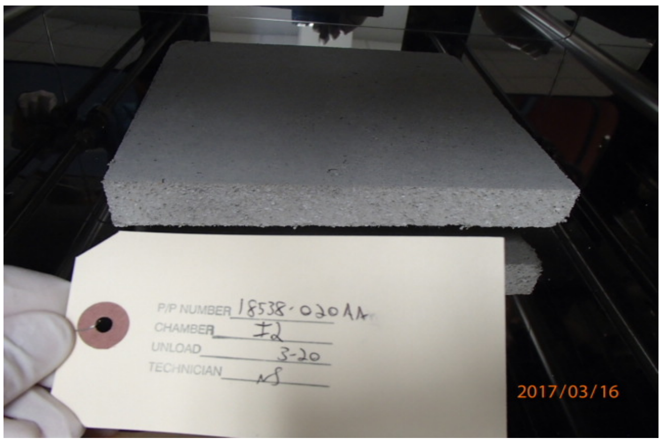
Volatile Organic Compounds (VOCs) Emissions Report

INDOOR AIR QUALITY EVALUATION FOLLOWING THE REQUIREMENTS OF CDPH/EHLB/STANDARD METHOD		
Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC	
Customer Information	GCP APPLIED TECHNOLOGIES JOHN DALTON CONCRETE OPERATING UNIT, 62 WHITTEMORE AVE CAMBRIDGE MA 02140	
Testing Laboratory	2211 Newmarket Parkway, Suite 106, Marietta, GA 30067-9399 USA	
Product Category	Surfacing Materials	
Product Sub-Category	Surfacing (Thin) - Ceiling Usage	
Date Received	February 7, 2017	
Test Description	The product was received by UL Environment as packaged and shipped by the customer. The package was visually inspected and stored in a controlled environment immediately following sample check-in. Just prior to loading, the product was unpackaged, cut, and sealed to expose the top surface only. The sample was placed inside the environmental chamber, and tested according to the specified protocol.	
Test Date	3/6/2017 - 3/20/2017	
Product Area Exposed	one-sided area = 0.0361 m^2	
Chamber Volume	0.0854 m^3	
Product Loading Ratio	0.42 m^2/m^3	
Test Chamber Conditions	Air change rate: 1.00 ± 0.05 1/h Inlet air flow rate: 0.0854 ± 0.004 m^3/h	Temperature: 21.0ºC - 22.5ºC* Relative Humidity: 50% RH ± 5%
Test Method	CDPH - CA Section 01350 *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers* Version 1.2.	
Released by	Allyson M. McFry Chemistry Laboratory Director	

*The temperature range specification is 23°C ± 1°. The actual temperature range listed above may vary slightly. If the range is outside this specification, data was reviewed to ensure a negative impact did not occur.

This test is accredited and meets the requirements of ISO/IEC 17025 as verified by ANSI National Accreditation Board. Refer to certificate and scope of accreditation AT-1297.

PHOTOGRAPH OF SAMPLE



RESULTS SUMMARY

Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC				
Environment	**Product Usage**	**Product Surface Area**	**Room Volume**	**Ventilation Rate (ACH)**	**Product Compliance?**
Classroom	Ceiling	89.2 m²	231 m³	0.82	Yes
Office	Ceiling	11.1 m²	30.6 m³	0.68	Yes

PROJECT DESCRIPTION

The product was monitored for emissions of TVOC, individual VOCs, formaldehyde and other aldehydes over the 96-hour test period. Measurements were made and predicted exposures were calculated according to the CA Section 01350 protocol. As specified in this protocol, the results at 96 hours, after 10 days of conditioning, were compared to ½ (one-half) the current Chronic Reference Exposure Levels (CRELs), as adopted from the California OEHHA list. All identified VOCs were also compared to the California-EPA OEHHA Proposition 65 list and the California-EPA Air Resource Board list of Toxic Air Contaminants (TACs).

Report Outline:

For UL Environment's technical references and resources click here or https://industries.ul.com/wp-content/uploads/sites/2/2018/02/Technical-references-and-resources.pdf
For Product Evaluation Methodologies information click here or https://industries.ul.com/wp-content/uploads/sites/2/2018/03/ProductEvaluationMethodologies-PE.pdf
For Quality Control Program or Environmental Chamber Evaluations information click here or https://industries.ul.com/wp-content/uploads/sites/2/2018/02/Quality-Control-Procedures.pdf
For RSD, Quality Assurance Report or other quality documents, Request here or contact ULE.

TABLE 1

Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC						
COMPARISON OF DATA TO METHOD REQUIREMENTS AT 96 HOURS FOLLOWING 10 DAYS OF CONDITIONING							
Compound	**CAS Number**	**½ CREL (µg/m³)**	**Chamber Concentration (µg/m³)**	**Emission Factor†† (µg/m²•hr)**	**Classroom Predicted Concentration (µg/m³)****	**Office Predicted Concentration (µg/m³)****	**Meets ½ CREL? (Classroom/ Office)**
Acetaldehyde	75-07-0	70	BQL	BQL	BQL	BQL	Yes
Benzene	71-43-2	1.5	BQL	BQL	BQL	BQL	Yes
Carbon disulfide*	75-15-0	400	BQL	BQL	BQL	BQL	Yes
Carbon tetrachloride*	56-23-5	20	BQL	BQL	BQL	BQL	Yes
Chlorobenzene	108-90-7	500	BQL	BQL	BQL	BQL	Yes
Chloroform*	67-66-3	150	BQL	BQL	BQL	BQL	Yes
Dichlorobenzene (1,4-)	106-46-7	400	BQL	BQL	BQL	BQL	Yes
Dichloroethylene (1,1)*	75-35-4	35	BQL	BQL	BQL	BQL	Yes
Dimethylformamide (N,N-)*	68-12-2	40	BQL	BQL	BQL	BQL	Yes
Dioxane (1,4-)	123-91-1	1,500	BQL	BQL	BQL	BQL	Yes
Epichlorohydrin	106-89-8	1.5	BQL	BQL	BQL	BQL	Yes
Ethylbenzene	100-41-4	1,000	BQL	BQL	BQL	BQL	Yes
Ethylene glycol	107-21-1	200	BQL	BQL	BQL	BQL	Yes
Ethylene glycol monoethyl ether acetate*	111-15-9	150	BQL	BQL	BQL	BQL	Yes
Ethylene glycol monoethyl ether*	110-80-5	35	BQL	BQL	BQL	BQL	Yes
Ethylene glycol monomethyl ether acetate*	110-49-6	45	BQL	BQL	BQL	BQL	Yes
Ethylene glycol monomethyl ether*	109-86-4	30	BQL	BQL	BQL	BQL	Yes

Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC						
COMPARISON OF DATA TO METHOD REQUIREMENTS AT 96 HOURS FOLLOWING 10 DAYS OF CONDITIONING							
Compound	**CAS Number**	**½ CREL (µg/m³)**	**Chamber Concentration (µg/m³)**	**Emission Factor†† (µg/m²•hr)**	**Classroom Predicted Concentration (µg/m³)****	**Office Predicted Concentration (µg/m³)****	**Meets ½ CREL? (Classroom/ Office)**
Formaldehyde	50-00-0	9.0***	BQL	BQL	BQL	BQL	Yes
Hexane (n-)	110-54-3	3,500	BQL	BQL	BQL	BQL	Yes
Isophorone*	78-59-1	1,000	BQL	BQL	BQL	BQL	Yes
Isopropanol	67-63-0	3,500	BQL	BQL	BQL	BQL	Yes
Methyl chloroform*	71-55-6	500	BQL	BQL	BQL	BQL	Yes
Methyl t-butyl ether	1634-04-4	4,000	BQL	BQL	BQL	BQL	Yes
Methylene chloride*	75-09-2	200	BQL	BQL	BQL	BQL	Yes
Naphthalene	91-20-3	4.5	BQL	BQL	BQL	BQL	Yes
Phenol	108-95-2	100	BQL	BQL	BQL	BQL	Yes
Propylene glycol monomethyl ether*	107-98-2	3,500	BQL	BQL	BQL	BQL	Yes
Styrene	100-42-5	450	BQL	BQL	BQL	BQL	Yes
Tetrachloroethylene (perchloroethylene)	127-18-4	17.5	BQL	BQL	BQL	BQL	Yes
Toluene	108-88-3	150	BQL	BQL	BQL	BQL	Yes
Trichloroethylene	79-01-6	300	BQL	BQL	BQL	BQL	Yes
Vinyl acetate	108-05-4	100	BQL	BQL	BQL	BQL	Yes
Xylenes (m-, o-, p-)	1330-20-7	350	BQL	BQL	BQL	BQL	Yes

BQL denotes below quantifiable level of 0.04 µg for individual VOCs, with the exceptions benzene and epichlorohydrin which have a QL of 0.02 µg, based on a standard 18 L air collection volume.

††The emission factor (EF) is calculated from the chamber concentration (CC), the chamber air change rate (N_C), the chamber volume (V_C), and the product area exposed in the chamber (A_C) as: $EF = (CC*V_C*N_C)/A_C$.

**The predicted building exposure concentration (BC) is calculated from the emission factor (EF), the building air change rate (N_B), the building room volume (V_B), and the product area exposed in the building room (A_B) as: $BC = (EF*A_B)/(V_B*N_B)$. For more information on Predicted Concentration modeling parameters, click here.

***Guidance value per CA Standard Method

TABLE 2

Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC	
CHAMBER CONCENTRATIONS AND EMISSION FACTORS FOR TVOC AND FORMALDEHYDE AT 24, 48, AND 96 HOURS FOLLOWING 10 DAYS OF CONDITIONING		
Elapsed Exposure Hour After 10 Days Conditioning	**Chamber Concentration ($\mu g/m^3$)**	**Emission Factor†† ($\mu g/m^2 \cdot hr$)**
TVOC†		
24	BQL	BQL
48	BQL	BQL
96	BQL	BQL
Formaldehyde‡		
24	BQL	BQL
48	BQL	BQL
96	BQL	BQL

BQL denotes below quantifiable level of 2 $\mu g/m^3$.
Exposure hours are nominal (± 1 hour).
†Defined as the sum of those VOCs that elute between the retention times of n-hexane (C_6) and n-hexadecane (C_{16}) on a non-polar capillary GC column quantified based on a toluene response factor.
‡ Compound identified and quantified by DNPH derivitization and HPLC/UV analysis.
††The emission factor (EF) is calculated from the chamber concentration (CC), the chamber air change rate (N_C), the chamber volume (V_C), and the product area exposed in the chamber (A_C) as: $EF = (CC*V_C*N_C)/A_C$.

TABLE 3

Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC				
TEN MOST ABUNDANT IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS (VOCs) AND/OR ALDEHYDES AT 96 HOURS FOLLOWING 10 DAYS OF CONDITIONING					
CAS Number	**Compound**	**Chamber Concentration (µg/m³)**	**Emission Factor†† (µg/m²•hr)**	**Calculated Predicted Exposure Concentration** (µg/m³)**	
				Classroom	**Office**
---	**TVOC‡‡**	**BQL**	**BQL**	**---**	**---**
---	none	---	---	---	---

Exposure hours are nominal (± 1 hour).
VOC data obtained by scanning GC/MS; identification of compound made by retention time and mass spectral characteristics.
†Quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.
*Identification based on NIST mass spectral database only.
‡Compound identified and quantified by DNPH derivitization and HPLC/UV analysis.
††The emission factor (EF) is calculated from the chamber concentration (CC), the chamber air change rate (N_C), the chamber volume (V_C), and the product area exposed in the chamber (A_C) as: $EF = (CC*V_C*N_C)/A_C$.
‡‡Defined as the sum of those VOCs that elute between the retention times of n-hexane (C_6) and n-hexadecane (C_{16}) on a non-polar capillary GC column quantified based on a toluene response factor.
**The predicted building exposure concentration (BC) is calculated from the emission factor (EF), the building air change rate (N_B), the building room volume (V_B), and the product area exposed in the building room (A_B) as: $BC = (EF*A_B)/(V_B*N_B)$. For more information on Predicted Concentration modeling parameters, click here.

TABLE 4

Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC							
VOC PREDICTED AIR CONCENTRATIONS AND REGULATORY INFORMATION AT 96 HOURS FOLLOWING 10 DAYS OF CONDITIONING								
CAS Number	**Compound**	**Chamber Concentration (µg/m³)**	**Emission Factor[††] (µg/m²•hr)**	**Predicted Exposure Concentration** (µg/m³)**		**✓ Indicates Presence On List**		
				Classroom	**Office**	**CA PROP 65**	**CA AIR TOXIC**	**CREL**
---	none	---	---	---	---	---	---	---

[†]Quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.
[‡]Compound identified and quantified by DNPH derivitization and HPLC/UV analysis.
[††]The emission factor (EF) is calculated from the chamber concentration (CC), the chamber air change rate (N_C), the chamber volume (V_C), and the product area exposed in the chamber (A_C) as: $EF = (CC*V_C*N_C)/A_C$.
**The predicted building exposure concentration (BC) is calculated from the emission factor (EF), the building air change rate (N_B), the building room volume (V_B), and the product area exposed in the building room (A_B) as: $BC = (EF*A_B)/(V_B*N_B)$. For more information on Predicted Concentration modeling parameters, click here.
CAL Prop. 65: California Health and Welfare Agency, Proposition 65 Chemicals
1 = known to cause cancer
2 = known to cause reproductive toxicity

CAL Toxic Air Contaminant:
I) Substances identified as Toxic Air Contaminants, known to be emitted in California, with a full set of health values reviewed by the Scientific Review Panel.
IIA) Substances identified as Toxic Air Contaminants, known to be emitted in California, with one or more health values under development by the Office of Environmental Health Hazard Assessment for review by the Scientific Review Panel.
IIB) Substances NOT identified as Toxic Air Contaminants, known to be emitted in California, with one or more health values under development by the Office of Environmental Health Hazard Assessment for review by the Scientific Review Panel.
III) Substances known to be emitted in California, and are NOMINATED for development of health values or additional health values.
IVA) Substance identified as Toxic Air Contaminants, known to be emitted in California, and are TO BE EVALUATED for entry into Category III.
IVB) Substance NOT identified as Toxic Air Contaminants, known to be emitted in California, and are TO BE EVALUATED for entry into Category III.
V) Substance identified as Toxic Air Contaminants, and NOT KNOWN TO BE EMITTED from stationary source facilities in California based on information from the AB 2588 Air Toxic "Hot Spots" Program and the California Toxic Release Inventory.
VI) Substances identified as Toxic Air Contaminants, NOT KNOWN TO BE EMITTED from stationary source facilities in California, and are active ingredients in pesticides in California.

Chronic REL: California Office of Environmental Health Hazard Assessment (OEHHA), Chronic Reference Exposure Levels
✓ = Found in Listing

Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC

CHAIN OF CUSTODY

UL Environment Chain of Custody

10062171 7   11558120   1.1

FOR INTERNAL USE ONLY		Test Information	
CURBCH065	Proposal #	___ Specialized Test for Odors	___ Formaldehyde Only ___ 4 Hr ___ 24 Hr
	___ RUSH (Confirm with Account Manager prior to submitting product)	X CA 01350 CDPH/EHLB/Standard Method V1.1	___ Office ___ Classroom ___ Residential
Project - Product # 18538-020A	___ 24 Hr TVOC ___ with Formaldehyde	___ ANSI/BIFMA M7.1 / X7.1 ___ Small Chamber	___ Intermediate Chamber ___ Large Chamber
Category Surfacing Materials	___ 24 Hr TVOC & IVOCs ___ with Formaldehyde	___ Other (Specify test method, non-standard sample preparation, modeling parameters, application rate for wet products, etc.):	
Subcategory Surfacing (Thin) Ceiling Wall	___ GREENGUARD Screening Test (24 Hr TVOC, IVOCs, and Aldehydes w/modeling)		

Manufacturer and Contact Details			
Company Name	GCP - Applied Technologies	Contact Name	John Dalton
Street Address	62 Whittemore Ave	Title	Tech Mgr
City, State/Province, Zip/Postal Code	Cambridge, MA 02140	Phone Number	6174984535
Country	U.S.A.	E-Mail Address	john.a.dalton@gcpat.com

Product Details			
Sample ID (Used in Report)	Monokote Z-146	Product Collection Location	
Product Commercial Name		Product Collection Date/Time (mm/dd/yyyy/hh:mm)	
Manufacturer's Identification Number		Product Collected By	
Manufactured Date (mm/dd/yyyy)		Number of Product Pieces	

Post Testing Instructions			
___ Return Product (Return Shipper and Manufacturer's Shipping Account # must be provided for product return)			___ Discard product after testing
Return Shipper		Manufacturer's Shipping Acct #	
Packed By		Carrier	Fed Ex
Ship Date (mm/dd/yyyy)	2/6/17	Air Bill #	7783 6136 1522

Signature/Tracking Details			
Relinquished By (Manufacturer)		Date & Time (mm/dd/yyyy/hh:mm)	
Signature			

Laboratory Receiving Details - FOR INTERNAL USE ONLY			
Received by (Laboratory)	[signature]	Date & Time (mm/dd/yyyy/hh:mm)	2/7/17 12:08 PM
Signature	[signature]		
Types of Containers	cal 9	Shipping Package Notes	
Condition of Shipping Package	X Undamaged ___ Damaged	Product Condition Notes	
Condition of Product	X Acceptable ___ Unacceptable		

White - Project File
Canary - Sample
Pink - Customer Retains

SHIP TO:
UL Environment
2211 Newmarket Parkway, #106, Marietta, Georgia 30067
T: 888.485.4733 F: 770.980.0072

00-EN-F0852

VOC EMISSION RESULTS COMPARISON TO STANDARD

Standard referenced: *CDPH/EHLB/Standard Method V1.2 (January 2017) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers" (aka CA Section 01350).*

PRODUCT SAMPLE INFORMATION

Manufacturer	GCP Applied Technologies
Product Description	Z-146, Z-146T, Z-146PC, Z-156, Z-156T, Z-156PC
Product Type	Surfacing Materials
Sample Identification	UL Environment's 18538-020AA
Manufactured Date	Not Provided
Test Completed Date	3/20/2017
UL Environment Report #	18538-02R2
Report Date	June 6, 2019

TEST RESULTS COMPARISON TO STANDARD CRITERIA

Environment	**Classroom**		**Office**	
Surface Area	89.2 m²		11.1 m²	
	Criterion	**Meets?**	**Criterion**	**Meets?**
Individual VOC	≤ ½ CREL	Yes	≤ ½ CREL	Yes
Formaldehyde	≤ 9.0 μg/m³	Yes	≤ 9.0 μg/m³	Yes

Environment	**Classroom**	**Office**
Surface Area	89.2 m²	11.1 m²
TVOC	0.5 mg/m³ or less	0.5 mg/m³ or less

TVOC comparison is based on LEED BD+C: New Construction v4 (LEED v4), Indoor environmental quality (EQ) category/Low-emitting materials credit/Emissions and content requirements/General emissions evaluation.
http://www.usgbc.org/node/2614095?return=/credits/new-construction/v4/indoor-environmental-quality

Reviewed By	Allyson McFry Chemistry Laboratory Manager

Complete testing and data results are presented in UL Environment Report

Disclaimer: This Comparison affirms that: 1) the product sample was tested according to the referenced standard; 2) the measured VOC emissions were evaluated for the defined exposure scenario(s); and 3) if so indicated above that the results meet the criteria of the referenced standard(s). UL Environment did not select the samples, determine if the samples were representative of production samples, witness the production of test samples, or were we provided with information relative to the formulation or identification of component materials used in the test samples. The test results apply only to the actual samples tested. The issuance of this Comparison in no way implies Listing, Classification or Recognition by UL and does not authorize the use of UL Listing, Classification or Recognition Marks or any other reference to UL on the product or system. UL Environment authorizes the above named company to reproduce this Comparison provided it is reproduced in its entirety. The name, brand or marks of UL cannot be used in any packaging, advertising, promotion or marketing relating to the data in this Comparison, without UL's prior written permission. UL, its subsidiaries, employees and agents shall not be responsible to anyone for the use or nonuse of the information contained in this Comparison, and shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use of, or inability to use, the information contained in this Comparison.