Environmental Product Declaration

USG Olympia™ Micro™, Olympia Micro™ 0.6 NRC and Olympia™ Micro™ Illusion™ Two/24 Acoustical Panels

Greenville, MS

Features and Benefits

- Economical, all-purpose ceiling pattern available in various panel sizes.
- Optional Firecode® product designed to meet life-safety codes.

TRACI v2.1 (Environmental Impacts) USG Olympia™ Micro™ Acoustical Panels

Functional Unit – 1 square foot (0.0929 square meters)	(A1-A3) Cradle-to-Gate	(A1-C4) Cradle-to Grave
Global Warming Potential (kg CO2 eq.)	4.54E-01	5.11E-01
Ozone Depletion Potential (kg CFC-11 eq.)	1.69E-11	1.82E-11
Acidification Potential (kg SO2 eq.)	5.88E-04	7.00E-04
Eutrophication Potential (kg N eq.)	1.50E-04	1.68E-04
Photochemical Ozone Creation Potential (kg O3 eq.)	1.07E-02	1.29E-02
Abiotic Resource Depletion Potential Fossil Fuels (MJ, LHV)	7.98E-01	8.98E-01

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This declaration is an Environmental Product Declaration (EPD) in accordance with ISO 14025 and ISO 21930; 2017. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

USG Corporation has sole ownership, liability, and responsibility for this EPD.

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building or construction works level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences in results upstream or downstream of the life cycle stages declared.

DECLARATION NUMBER	EPD 723
EPD TYPE	Product specific, facility specific EPD
PROGRAM OPERATOR	ASTM International – 100 Barr Harbor Drive, West Conshohocken, PA USA www.astm.org
DECLARATION HOLDER	USG Corporation - 550 W. Adams St., Chicago, IL USA
EPD Type	Type III Declaration per ISO 14025:2006
DECLARED PRODUCT	USG Olympia™ and Olympia™ Firecode® Acoustical Panels
DATE OF ISSUE PERIOD OF VALIDITY	9/27/24 5 Years
CORE STANDARD	ISO 21930
CORE PCR	UL Environment: Product Category Rules for Building-Related Product and Services - Part A: Calculation Rules for the LCA and Requirements. ULE 10010 V3.2, December 2018.
SUB-CATEGORY PCR	UL Environment: PCR Guidance for Building-Related Products and Services; Part B: Non-Metal Ceiling Panel EPD Requirements; April 13, 2021
SUB-CATEGORY PCR REVIEW	The review process included a public consultation period from 12/16/20 – 1/16/21 and a review panel comprising Dr. Landita Bushi, Dr. Tom Gloria and Olivia Palmer.
ACLCA PCR OPEN STANDARD CONFORMANCE	Transparency
ACLCA PCR OPEN STANDARD VERSION	Version 1.0 | May 25, 2022
This declaration was independently verified in accordance with ISO 14025 and ISO 21930:2017 □ INTERNAL ☒ EXTERNAL	Tim Brooke, ASTM International
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria, Industrial Ecology Consultants

1. Product System Documentation

1.1 Product Description and Product Identification

USG Olympia™ Micro™, Olympia™ Micro™ 0.6 NRC and Olympia™ Micro™ Illusion™ Acoustical Panels are an economical, all-purpose ceiling product available in various panel sizes. This product utilizes a ground wet-felted basemat consisting of perlite, mineral wool, paper fiber and starch with varying levels of clay. Additional information regarding Olympia™ Micro™, Olympia™ Micro™ 0.6 NRC and Olympia™ Micro™ Illusion™ Acoustical Panels can be found at usg.com and cgcinc.com. This EPD includes USG Olympia™ Micro™, Olympia™ Micro™ 0.6 NRC and Olympia™ Micro™ Illusion™ Acoustical Panels from Greenville, MS.

These products generally fall under ASTM E1264-2022 Section 5.2 designation as Type III-Mineral Base with painted finish and ASTM E1264-2023 Section 5.2 designation as Type A1.2-Mineral Base with painted finish. The modifications typically involve modifications to the thickness, density, basemat composition and/or coating package. This EPD covers the following Olympia™ Micro™, Olympia™ Micro™ 0.6 NRC and Olympia™ Micro™ Illusion™ Acoustical Panels: Item nos.: 4210,4913, 4211, 4411, 4221, 4421, 4231, 4431, 4750, 4751, 4752, 4753, 4754, 4755, 4742 and 4744.

1.2 Designated Application

The products covered by this EPD are designed to be installed in a suitable metal grid system typically designed to accommodate a nominal 2'x2' or 2'x4' panel. They are suitable for offices, classrooms, reception/lobby areas, hotels, conference areas, and retail stores.

1.3 Product Technical Data

Table 1: Performance Data

Name	Test Method	Olympia™ Micro™ and Olympia™ Micro™ Illusion™ Two/24 Acoustical Panels	Olympia™ Micro™ 0.6 NRC Acoustical Panels
Noise Reduction Coefficient	C423	0-0.50	0.60
Articulation Class (AC)	E1111 and Classification	N/A	N/A
Ceiling Attenuation Class	E1414 and Classification	33 - 35	33-35
Fire Rating	E84	Class A	Class A
Light Reflectance	E1477	0.86	0.86

1.4 Placing on the Market/Application Rules

Acoustical ceiling panels must be installed and maintained in accordance with current USG written instructions and best industry practice, including the CISCA Handbook and ASTM C636, "Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels."

1.5 Delivery Status

Olympia™ and Olympia™ Firecode® acoustical ceiling panels arrive at the jobsite in a shrink-wrapped wrap-around carton.

1.6 Product Composition

Table 2: Product formula

Material	Olympia™ Micro™ Acoustical Panels	Olympia™ Micro™ 0.6 NRC Acoustical Panels	Olympia™ Micro™ Illusion™ Two/24 Acoustical Panels
Mineral Wool	33%	51%	41%
Perlite	26%	13%	31%
Paper Fiber & Starch	21%	21%	16%
Filler	2%	0%	10%
Dry Coating	18%	15%	2%
Total	**100%**	**100%**	**100%**

1.7 Product Manufacturing

In wet-formed mineral fiber production, the tile ingredients are mixed into a dilute slurry, which is then formed onto a wire as a basemat. The basemats are then pressed and dried. The dried panels are cut or trimmed into the appropriate sizes and painted. Painting may involve two or more coatings with a drying cycle between coatings. After inspection, the ceiling tiles are packaged for shipment. Panel trim and panels that are chipped or broken during manufacturing (referred to as “broke”) are recycled and returned to the process. The finishing unit processes are dominated by the use of water-based paint, which contains ingredients such as calcium carbonate, clay, latex, and titanium dioxide (TiO2). This product is manufactured exclusively at the Greenville, MS manufacturing plant.

1.8 Environment and Health During Manufacturing

USG and CGC lead the building sector in developing and supplying sustainable construction materials. Today, sustainability is integrated into the design and manufacture of every wall, ceiling, and flooring product. In the manufacture of our products, we review and select each material with consideration of environmental protection, health, and safety. Raw materials used in our products are carefully selected and go through a qualification procedure. Raw materials are tested for contaminants by an internal lab and third-party labs.

1.9 Packaging

USG Interiors ceiling panels are packaged using cardboard sleeves and are then wrapped in plastic shrink wrap. Both the production and disposal of these packaging materials were modeled in this LCA study.

1.10 Distribution

The default transport distance from the PCR (product transport from the point of manufacture to building site) of 497 miles (800 km) by truck was used in this analysis for all system components that are shipped from the warehouse.

1.11 Product Installation

The ceiling panels must be installed in accordance with all applicable USG Interiors installation guidelines. Approved installation procedures are provided in the Ceiling Systems Handbook published by the Ceiling and Interior Systems Construction Association and must be followed. Installation of USG's ceiling and grid products is accomplished by manual labor using mostly hand tools. A 7% installation waste factor was used in this study. No material or energy inputs are required on the jobsite. Proper personal protective gear should be worn by the installer for protection.

1.12 Conditions of Use

To ensure the longevity of the product, panels should not be exposed to moisture, high humidity, or high temperature. Criteria can be found in the USG warranty information specific to each product.

1.13 Environment and Health During Use Stage

This product is not expected to produce any unusual hazards during normal use.

1.14 Reference Service Life

The reference service life (RSL) and ESL shall be indicated according to Part A, Section 2.8.2. The RSL shall be assumed to be 30 years for this ceiling system. Non-metal ceiling and wall panels shall be assumed to not need repainting, maintenance, or repairing and to last the entire duration of the building ESL with no replacement or refurbishment.

1.15 Re-Use Phase

Ceiling panels cannot generally be reused at the end of life.

1.16 End-of-Life Disposal

USG is helping to promote a circular economy by taking back approved USG ceiling panels and recycling them into new building products. While USG encourages recycling of its ceiling panels through its Take-Back Recycle Program, all ceiling panel waste generated during installation and at end-of-life is assumed to be disposed of in an appropriate landfill. Final transportation from the building site to waste processing was assumed to be 22 miles (35 km) by truck.

1.17 Extraordinary Effects

Fire

All ceiling products covered by this EPD are rated Class A (flame spread of 25 or less, smoke developed of 50 or less, as defined by ASTM E1264, and as tested according to ASTM E84).

Water

Moisture must not come in contact with the ceiling panel as a result of a leaking roof, a sweating pipe, a leaking radiator, a flood, condensation on windows, condensation on more subtle surfaces where dew points are reached, humidified air from the HVAC system or any other similar causes.

Mechanical Destruction

The product must be installed and maintained in accordance with current USG written instructions and best industry practice, including the CISCA Handbook and ASTM C636, “Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.”

2 LCA Calculation Methodology

2.1 Functional Unit

The functional unit is defined as 0.0929 square meters with optional reporting of one square foot (12”x12”) of installed product.

Tables 3 -5: Functional units

Name	Olympia™ Micro™ Acoustical Panels (metric)	Olympia™ Micro™ Acoustical Panels (Standard)
Functional Unit	0.0929 m^2	1 ft^2
Declared Thickness	1.65 cm	0.650 in
Density	231 kg/m^3	14.4 pcf
Surface weight per declared	3.86 kg/m^2	0.791 $lb./ft^2$

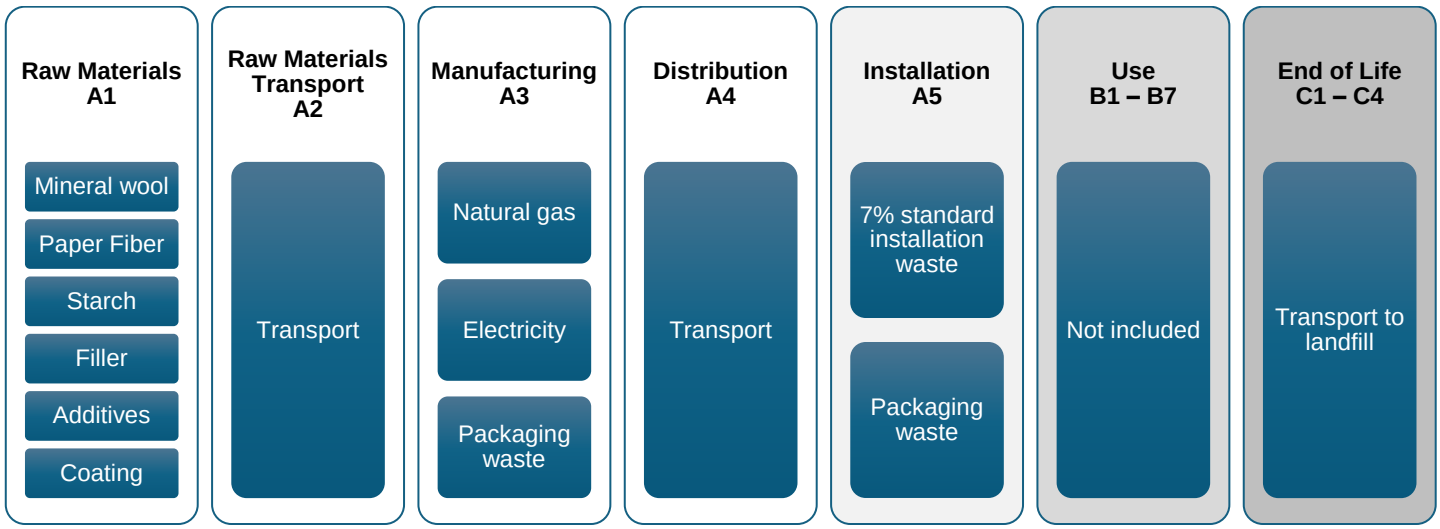
Name	Olympia™ Micro™ 0.6 NRC Acoustical Panels (metric)	Olympia™ Micro™ 0.6 NRC Acoustical Panels (Standard)
Functional Unit	0.0929 m^2	1 ft^2
Declared Thickness	2.03 cm	0.800 in
Density	239 kg/m^3	14.9 pcf
Surface weight per declared	4.85 kg/m^2	0.993 $lb./ft^2$

Name	Olympia™ Micro™ Illusion Two/24 Acoustical Panels (metric)	Olympia™ Micro™ Illusion Two/24 Acoustical Panels (Standard)
Functional Unit	0.0929 m^2	1 ft^2
Declared Thickness	1.75 cm	0.690 in
Density	229 kg/m^3	14.3 pcf
Surface weight per declared	4.00 kg/m^2	0.819 $lb./ft^2$

3 System Boundary

This EPD represents a “cradle-to-grave” LCA analysis for wet-formed mineral fiber ceiling panels. It covers all the production steps from raw material extraction (i.e., the cradle) to end of life disposal (grave).

Figure 1: Specific processes covered by this EPD by life cycle stage



3.1 Estimates and Assumptions

Primary energy and raw material input data was collected from the Greenville, MS plant for the 2023 calendar year. Data collection of energy and raw material inputs was aided by the presence of an extensive computer monitoring system which tracked product formulas by product type. All wet-formed mineral fiber ceiling product raw material and energy inputs are specific to the particular wet-formed mineral fiber product produced at the Greenville, MS plant.

Additional data limitations include the use of proxy processes rather than actual supplier generated primary data. This would include such processes as starch, which is representative of wet-milled corn starch but may not necessarily be representative of USG’s particular starch supplier. In addition, the data is limited in that the primary data was collected during the 2023 year and changes in operations may increase/decrease impacts in the future. Other data limitations include the use of secondary data sets instead of primary data for upstream and downstream processes, local impacts vs. global impacts, possible impacts vs. actual impacts, inherent uncertainty in the data sets, accuracy and precision of impact assessment methodology, etc.

3.2 Cut-off Criteria

The requirements for the exclusion of inputs and outputs (cut-off rules) shall follow the guidance in ISO 21930 Section 7.1.8.

3.3 Background Data

All background data was sourced from critically reviewed LCA for Experts databases from Sphera.

3.4 Data Requirements and Data Sources

The LCA model was created using LCA for Experts software (version 10.7.1.28) from Sphera. Specific comments related to data quality requirements cited in ISO 14025 Section 4.2.3.6.2 include the following.

Temporal: In the case of wet-formed mineral fiber ceiling tile production, the LCI data was collected from the Greenville, MS plant for the 2023 production year.

Geographical: Where possible, all processes were chosen as being representative of US manufacturing processes.

Technical: The data selected for this study is specific to the technology used in the preparation of the various raw materials.

Precision: The raw material usage amounts were derived from plant quality data on finished products, coatings usage plant data and product formulas.

Completeness: Virtually all the significant raw material flows (> 99%) in wet-formed mineral fiber ceiling panel production have been modeled. The exception consists of transportation of the coating raw materials; the effect of which was determined to be less than 1% of the total.

Representative: Where possible all the data sets were selected to be representative of US-based production, are less than 10 years in age and are representative of the technology being employed.

Consistency: All the manufacturing processes were modeled in a consistent manner throughout this study in accordance with the goal and scope definitions.

Reproducibility: The information contained in this study, including raw material, energy and transportation distance inputs, have been fully documented in the LCA report.

Sources of Data: The sources for the processes used in this study have been fully provided in the LCA report and are representative of the material and energy sources used in actual production.

Uncertainty: The relative uncertainty associated with this study has been minimized. No significant assumptions have been made.

4 LCA: Scenarios and Additional Technical Information

Table 6: Transport to the building site (A4)

Name	Olympia™ Micro™ Acoustical Panels	Olympia™ Micro™ 0.6 NRC Acoustical Panels	Olympia™ Micro™ Illusion Two/24 Acoustical Panels	Unit
Fuel type	Diesel	Diesel	Diesel	-
Liters of fuel	7.76E-04	8.19E-04	8.04E-04	l/100km
Vehicle type	US Truck	US Truck	US Truck	-
Transport distance	800	800	800	km
Capacity	0.67	0.67	0.67	
Gross density of products	231	239	229	kg/m^3

Table 7: Installation into the building (A5)

Name	Olympia™ Micro™ Acoustical Panels Value	Olympia™ Micro™ 0.6 NRC Acoustical Panels	Olympia™ Micro™ Illusion Two/24 Acoustical Panels	Unit
Ancillary materials	8.02E-02	8.02E-02	8.02E-02	Kg
Net freshwater consumption	0	0	0	m^3
Other resources	0	0	0	kg
Electricity consumption	0	0	0	kWh
Other energy carriers	0	0	0	MJ
Product loss per functional unit	2.51E-02	3.15E-02	2.60E-02	kg
Waste materials at the construction site before waste processing, generated by product installation	2.51E-02	3.15E-02	2.60E-02	kg
Output materials resulting from on-site waste	2.51E-02	3.15E-02	2.60E-02	kg
Mass of packaging waste, cardboard	4.71E-03	4.71E-03	4.71E-03	kg
Mass of packaging waste, plastic film	1.21E-03	1.21E-03	1.21E-03	kg
Biogenic carbon contained in packaging	7.10-03	7.10-03	7.10-03	kg CO_2
Direct emission to ambient air, soil, and water	~ 0	~ 0	~ 0	kg
VOC emissions	< 9	< 9	< 9	µg/m^3

Table 8. Use or application of the installed product (B1)

Name	Value	Unit
RSL	30	years
VOC	< 90	µg/m^3

Table 9: End of Life (C1-C4)

Name		Olympia™ Micro™ Acoustical Panels	Olympia™ Micro™ 0.6 NRC Acoustical Panels	OLYMPIA™ Micro™ Illusion Two/24 Acoustical Panels	Unit
Collection process (specified by type)	Collected separately	0	0	0	kg
	Collected with mixed construction	3.59E-01	4.51E-01	3.72E-01	kg
Recovery (specified by type)	Reuse	0	0	0	kg
	Recycling	0	0	0	kg
	Landfill	3.59E-01	4.51E-01	3.72E-01	kg
	Incineration	0	0	0	kg
	Incineration with energy recovery	0	0	0	kg
	Energy conversion efficiency rate	N/A	N/A	N/A	N/A
Disposal	Product or material for final	3.59E-01	4.51E-01	3.72E-01	kg

5 Life Cycle Assessment Results

Product Stage				Construction Process stage								End of Life Stage			
Raw Material Supply	Transport	Manufacturing	Transport	Construction-Installation Process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational water Use	De-construction Demolition	Transport	Waste Processing	Disposal
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Figure 2: System Boundary

5.1 LCA Results

Table 10: North American LCA Environmental Impacts - 0.0929 Square Meters (1 Square Foot) of 5/8" Greenville Olympia™ Micro™ Acoustical Panels (A1-C4)

Impact Category	Units	A1-A3	A4	A5	B1-B7	C2	C4	A1-C4
Global Warming Potential, excl. biogenic carbon (GWP)	kg CO2 eq.	4.54E-01	1.35E-02	3.69E-02	0.00E+00	9.96E-04	5.30E-03	5.11E-01
Ozone Depletion Potential (ODP)	kg CFC 11-eq.	1.69E-11	3.64E-17	1.29E-12	0.00E+00	2.59E-18	2.91E-16	1.82E-11
Acidification Potential (AP)	kg SO2 eq.	5.88E-04	1.98E-05	5.69E-05	0.00E+00	2.80E-06	3.29E-05	7.00E-04
Eutrophication Potential (EP)	kg N eq.	1.50E-04	2.87E-06	1.32E-05	0.00E+00	2.93E-07	1.45E-06	1.68E-04
Photochemical Ozone Creation Potential (POCP)	kg O3-Equiv.	1.07E-02	4.44E-04	1.02E-03	0.00E+00	6.39E-05	6.24E-04	1.29E-02
Abiotic Depletion Potential (ADP) fossil fuels	MJ	7.98E-01	2.63E-02	6.28E-02	0.00E+00	1.87E-03	9.09E-03	8.98E-01

Table 11: North American LCA Environmental Impacts – 0.0929 Square Meters (1 Square Foot) of 3/4" Greenville Olympia™ Micro™ 0.6 NRC Acoustical Panels (A1-C4)

Impact Category	Units	A1-A3	A4	A5	B1-B7	C2	C4	A1-C4
Global Warming Potential, excl. biogenic carbon (GWP)	kg CO2 eq.	6.26E-01	1.69E-02	5.03E-02	0.00E+00	1.25E-03	6.65E-03	7.01E-01
Ozone Depletion Potential (ODP)	kg CFC 11-eq.	1.73E-11	4.56E-17	1.32E-12	0.00E+00	3.25E-18	3.66E-16	1.86E-11
Acidification Potential (AP)	kg SO2 eq.	7.96E-04	2.48E-05	7.38E-05	0.00E+00	3.51E-06	4.13E-05	9.39E-04
Eutrophication Potential (EP)	kg N eq.	2.04E-04	3.59E-06	1.73E-05	0.00E+00	3.68E-07	1.82E-06	2.27E-04
Photochemical Ozone Creation Potential (POCP)	kg O3-Equiv.	1.43E-02	5.56E-04	1.31E-03	0.00E+00	8.03E-05	7.84E-04	1.70E-02
Abiotic Depletion Potential (ADP) fossil fuels	MJ	1.02E+00	3.29E-02	8.03E-02	0.00E+00	2.35E-03	1.14E-02	1.15E+00

Table 12: North American LCA Environmental Impacts – 0.0929 Square Meters (1 Square Foot) of 3/4" Greenville Olympia™ Micro™ Illusion Two/24 Acoustical Panels (A1-C4)

Impact Category	Units	A1-A3	A4	A5	B1-B7	C2	C4	A1-C4
Global Warming Potential, excl. biogenic carbon (GWP)	kg CO2 eq.	4.73E-01	1.40E-02	3.84E-02	0.00E+00	1.03E-03	5.49E-03	5.31E-01
Ozone Depletion Potential (ODP)	kg CFC 11-eq.	1.69E-11	3.77E-17	1.29E-12	0.00E+00	2.68E-18	3.02E-16	1.82E-11
Acidification Potential (AP)	kg SO2 eq.	6.06E-04	2.05E-05	5.84E-05	0.00E+00	2.90E-06	3.41E-05	7.22E-04
Eutrophication Potential (EP)	kg N eq.	1.56E-04	2.97E-06	1.37E-05	0.00E+00	3.03E-07	1.51E-06	1.75E-04
Photochemical Ozone Creation Potential (POCP)	kg O3-Equiv.	1.11E-02	4.60E-04	1.05E-03	0.00E+00	6.62E-05	6.47E-04	1.33E-02
Abiotic Depletion Potential (ADP) fossil fuels	MJ	8.31E-01	2.72E-02	6.53E-02	0.00E+00	1.93E-03	9.42E-03	9.34E-01

Table 13: Resource and Waste Flows for 0.0929 Square Meters (1 Square Foot) of 5/8" Greenville Olympia™ Micro™ Acoustical Panels (A1-C4)

Use of Primary Resources	Units	A1-A3	A4	A5	B1-B7	C2	C4	A1-C4
Renewable primary resources used as an energy carrier (RPRE)	MJ, NCV	7.34E-01	7.91E-03	5.67E-02	0.00E+00	5.62E-04	1.17E-02	8.11E-01
Renewable primary resources with energy content used as material (RPRM)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable primary resources used as an energy carrier (NRPRE)	MJ, NCV	6.58E+00	1.98E-01	5.16E-01	0.00E+00	1.41E-02	7.18E-02	7.38E+00
Non-renewable primary resources with energy content used as material (NRPRM)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary material, fuel, and recovered energy	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Secondary material (SM)	kg	1.28E-01	0.00E+00	9.62E-03	0.00E+00	0.00E+00	0.00E+00	1.38E-01
Renewable secondary fuel (RSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuel (NRSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable energy (RE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Consumption of fresh water	m3	4.44E-03	2.71E-05	3.37E-04	0.00E+00	1.93E-06	1.81E-05	4.82E-03
Emissions inventory parameters for transparency	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Biogenic carbon content of product	kg CO2-eq.	-9.67E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.67E-02	0.00E+00
Calcination uptake from carbonation	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon of bio-based packaging	kg CO2-eq.	-7.10E-03	0.00E+00	7.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Land use change	kg CO2-eq.	1.10E-04	1.60E-05	1.07E-05	0.00E+00	1.14E-06	1.67E-05	1.55E-04
Combustion of waste from renewable sources used in production	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Combustion of waste from non-renewable sources used in production	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Indicators describing waste	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Hazardous waste disposed	kg	8.41E-09	5.71E-13	6.33E-10	0.00E+00	4.06E-14	1.55E-12	9.05E-09
Non-hazardous waste disposed	kg	5.28E-02	1.73E-05	3.00E-02	0.00E+00	1.23E-06	3.59E-01	4.42E-01
High-level radioactive waste	kg	1.78E-04	5.69E-07	1.35E-05	0.00E+00	4.05E-08	8.07E-07	1.92E-04
Intermediate and low-level waste	kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Assignments of output flows at the end-of-life	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Components for re-use (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (MR)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Recovered energy exported (EE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 14: Resource and Waste Flows for 0.0929 Square Meters (1 Square Foot) of 3/4" Greenville Olympia™ Micro™ 0.6 NRC Acoustical Panels (A1-C4)

Use of Primary Resources	Units	A1-A3	A4	A5	B1-B7	C2	C4	A1-C4
Renewable primary resources used as an energy carrier (RPRE)	MJ, NCV	9.65E-01	9.90E-03	7.45E-02	0.00E+00	7.06E-04	1.47E-02	1.06E+00
Renewable primary resources with energy content used as material (RPRM)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable primary resources used as an energy carrier (NRPRE)	MJ, NCV	8.40E+00	2.49E-01	6.58E-01	0.00E+00	1.77E-02	9.02E-02	9.42E+00
Non-renewable primary resources with energy content used as material (NRPRM)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary material, fuel, and recovered energy	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Secondary material (SM)	kg	2.22E-01	0.00E+00	1.66E-02	0.00E+00	0.00E+00	0.00E+00	2.38E-01
Renewable secondary fuel (RSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuel (NRSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable energy (RE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Consumption of fresh water	m3	6.02E-03	3.40E-05	4.57E-04	0.00E+00	2.42E-06	2.27E-05	6.54E-03
Emissions inventory parameters for transparency	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Biogenic carbon content of product	kg CO2-eq.	-1.21E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-01	0.00E+00
Calcination uptake from carbonation	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon of bio-based packaging	kg CO2-eq.	-7.10E-03	0.00E+00	7.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Land use change	kg CO2-eq.	1.56E-04	2.01E-05	1.48E-05	0.00E+00	1.43E-06	2.10E-05	2.14E-04
Combustion of waste from renewable sources used in production	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Combustion of waste from non-renewable sources used in production	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Indicators describing waste	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Hazardous waste disposed	kg	1.62E-08	7.15E-13	1.22E-09	0.00E+00	5.10E-14	1.94E-12	1.74E-08
Non-hazardous waste disposed	kg	7.63E-02	2.16E-05	3.82E-02	0.00E+00	1.54E-06	4.51E-01	5.65E-01
High-level radioactive waste	kg	2.23E-04	7.13E-07	1.69E-05	0.00E+00	5.08E-08	1.01E-06	2.42E-04
Intermediate and low-level waste	kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Assignments of output flows at the end-of-life	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Components for re-use (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (MR)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Recovered energy exported (EE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 15: Resource and Waste Flows for 0.0929 Square Meters (1 Square Foot) of 3/4" Greenville Olympia™ Micro™ Illusion Two/24 Acoustical Panels (A1-C4)

Use of Primary Resources	Units	A1-A3	A4	A5	B1-B7	C2	C4	A1-C4
Renewable primary resources used as an energy carrier (RPRE)	MJ, NCV	7.62E-01	8.19E-03	5.89E-02	0.00E+00	5.83E-04	1.22E-02	8.42E-01
Renewable primary resources with energy content used as material (RPRM)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable primary resources used as an energy carrier (NRPRE)	MJ, NCV	6.83E+00	2.06E-01	5.36E-01	0.00E+00	1.46E-02	7.44E-02	7.66E+00
Non-renewable primary resources with energy content used as material (NRPRM)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary material, fuel, and recovered energy	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Secondary material (SM)	kg	1.34E-01	0.00E+00	1.00E-02	0.00E+00	0.00E+00	0.00E+00	1.44E-01
Renewable secondary fuel (RSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuel (NRSF)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable energy (RE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Consumption of fresh water	m3	4.63E-03	2.81E-05	3.52E-04	0.00E+00	2.00E-06	1.88E-05	5.03E-03
Emissions inventory parameters for transparency	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Biogenic carbon content of product	kg CO2-eq.	-1.01E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-01	0.00E+00
Calcination uptake from carbonation	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon of bio-based packaging	kg CO2-eq.	-7.10E-03	0.00E+00	7.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Land use change	kg CO2-eq.	1.15E-04	1.66E-05	1.12E-05	0.00E+00	1.18E-06	1.73E-05	1.61E-04
Combustion of waste from renewable sources used in production	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Combustion of waste from non-renewable sources used in production	kg CO2-eq.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Indicators describing waste	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Hazardous waste disposed	kg	8.79E-09	5.91E-13	6.62E-10	0.00E+00	4.20E-14	1.60E-12	9.45E-09
Non-hazardous waste disposed	kg	5.40E-02	1.79E-05	3.10E-02	0.00E+00	1.27E-06	3.72E-01	4.57E-01
High-level radioactive waste	kg	1.85E-04	5.89E-07	1.40E-05	0.00E+00	4.19E-08	8.36E-07	2.00E-04
Intermediate and low-level waste	kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Assignments of output flows at the end-of-life	**Units**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C2**	**C4**	**A1-C4**
Components for re-use (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (MR)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Recovered energy exported (EE)	MJ, NCV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

5.2 LCA Results

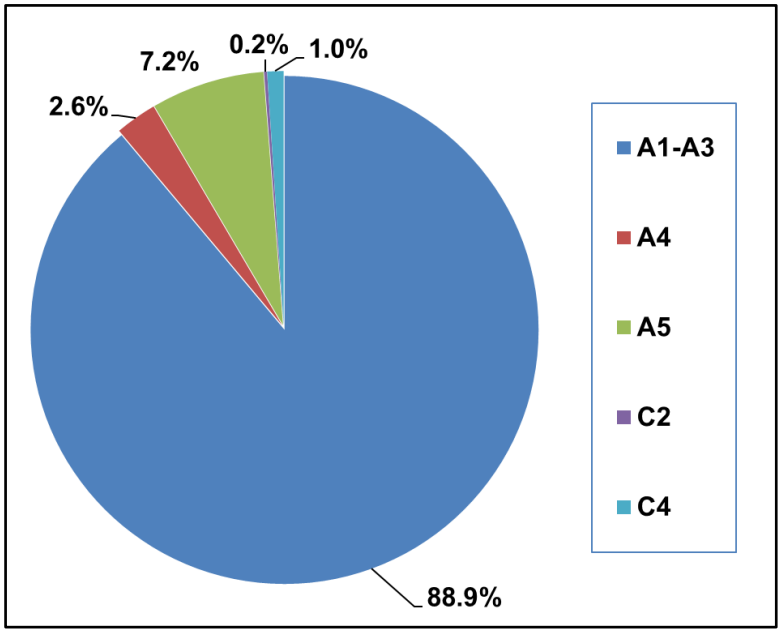
Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building or construction works has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase only when product or construction works performance and specifications have been established and serve as a functional unit for comparison.

Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparisons can be inaccurate and could lead to erroneous selection of materials or products that have higher impact, at least in some impact categories.

5.3 LCA Interpretation

The LCA results for the production of wet-formed mineral fiber ceiling panels were dominated by energy usage; primarily gas usage during the drying process. Drying energy was the key input influencing the LCA measures.

Figure 3: Process Dominance Analysis for GWP for the Production of 1 Square Foot of Olympia™ Acoustical Panels



6 References

LCA Report

A Cradle-to-Gate and Cradle-to-Grave Life Cycle Assessment of USG Greenville Wet-felted Acoustical Panels, 4/24/24. USG (Confidential)

Product PCR

UL Environment: Product Category Rules for Building-Related Product and Services - Part A: Calculation Rules for the LCA and Requirements. ULE 10010 V3.2, December 2018.

UL Environment: PCR Guidance for Building-Related Products and Services; Part B: Non-Metal Ceiling Panel EPD Requirements; April 13, 2021

Sustainability Reporting Standards

EN 15804:2012-04 - Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction product

ISO 14025:2006 - Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 14040:2006/Amended 1:2020 - Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2006/amended 2: 2020 - Environmental management – Life cycle assessment – Requirements and guidelines

ISO 14046:2013 - Environmental management- Water footprint- Principles, requirements and guidelines

ISO 15392:2008 - Sustainability in building construction- General principles

ISO 15686-1:2011 - Buildings and constructed assets- Service life planning- Part 1: General principles

ISO 15686-2:2008 - Buildings and constructed assets- Service life planning Part 2: Service life prediction procedures

ISO 15686-7:2008 - Buildings and constructed assets- Service life planning Part 7: Performance evaluation for feedback of service life data from practice

ISO 15686-8:2008 - Buildings and constructed assets- Service life planning Part 8: Reference service life and service life estimation

ISO 21930:2017 - Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services