USG Tile & Flooring Solutions

ENVIRONMENTAL PRODUCT DECLARATION

USG Levelrock® Brand 2500 and 2500 FR Floor Underlayments Southard, OK

USG IT'S YOUR WORLD. BUILD IT.®

USG Levelrock® Brand 2500 and 2500 FR Floor Underlayments are premium poured underlayment products with self-drying technology.

- Fast application, fast-setting allows for return of light trade traffic within hours
- Industry's most economical, highest compressive strength in class
- Ideal for wood-frame and multi-family construction
- UL designs available up to 2-hour fire rating
- Smooth, crack-resistant surface
- Helps maximize sound isolation between floors/units
- May assist in obtaining LEED® credits
- Applied by USG Levelrock® Brand authorized applicators

USG Levelrock® Brand Floor Underlayment 2500 and 2500 FR are fast applying engineered cementitious underlayments formulated and manufactured by USG for indoor use in multi-family, light-commercial and other wood-frame construction. These high-strength underlayments can be poured before drywall is installed, so they dry faster and help prevent mold by not exposing wallboard to high moisture levels. USG Levelrock® Brand 2500 engineered cementitious underlayments are also economical, as they can be applied at rates of up to 30,000 sq. ft. per day. They are formulated to provide typical compressive strengths from 2000 psi to 3200 psi at a ¾ in. minimum thickness over plywood subflooring, which meets requirements for multi-family and hotel/motel construction. USG Levelrock® Brand 2500 floor underlayments may assist in obtaining LEED credits 5.1 and 5.2.

TRACI V2.1 ENVIRONMENTAL IMPACTS (CRADLE-TO-GATE)		
Declared Unit – 1 metric tonne		
	Levelrock® Brand 2500	Levelrock® Brand 2500 FR
Global Warming Potential (kg CO_2 eq.)	2.20E+02	2.78E+02
Ozone Depletion Potential (kg CFC-11 eq.)	1.31E-07	1.02E-07
Acidification Potential (kg SO_2 eq.)	3.92E-01	5.10E-01
Eutrophication Potential (kg N eq.)	3.71E-02	4.49E-02
Photochemical Ozone Creation Potential (kg O_3 eq.)	7.70E+00	9.45E+00
Abiotic Resource Depletion Potential Fossil Fuels (MJ, LHV)	3.60E+02	4.23E+02

For over a century, sustainable practices have naturally been an inherent part of our business at USG. Today, they help shape the innovative products that become the homes where we live, the buildings where we work and the arenas where we play. From the product formulations we choose, to the processes we employ, USG is committed to designing, manufacturing, and distributing products that minimize overall environmental impacts and contribute toward a healthier living space. We believe that transparency of product information is essential for our stakeholders and EPDs are the next step toward an even more transparent USG. For additional information, visit usg.com, cgcinc.com and usgdesignstudio.com

USG CGC IT'S YOUR WORLD. BUILD IT.™

ENVIRONMENTAL PRODUCT DECLARATION

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This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and ISO 21930; 2007. 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. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

DECLARATION NUMBER	EPD 143
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
DECLARED PRODUCT	USG Levelrock® Brand Floor Underlayment 2500 USG Levelrock® Brand Floor Underlayment 2500 FR
REFERENCE PCR	ASTM, Product Category Rules for Preparing an Environmental Product Declaration for: Portland Cement, Blended Hydraulic Cement and Masonry Cement, 2014
DATE OF ISSUE PERIOD OF VALIDITY	4/17/20 5 Years
CONTENTS OF THE DECLARATION	This EPD is complete and contains the following: • Product System Documentation • Life cycle Calculation Rules • Life Cycle Assessment Results • Further Information • References
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 Levelrock® Brand 2500 floor underlayments are fast-applying engineered cementitious underlayments formulated and manufactured by USG for indoor use in multi-family, light-commercial and other wood-frame construction. These high-strength underlayments can be poured before drywall is installed, so they dry faster and help prevent mold by not exposing wallboard to high moisture levels. USG Levelrock® Brand 2500 engineered cementitious underlayments are also economical, as they can be applied at rates of up to 30,000 sq. ft. per day. They are formulated to provide typical compressive strengths from 2000 psi to 3200 psi at a ¾ in. minimum thickness over plywood subflooring, which meets requirements for multi-family and hotel/motel construction

USG Levelrock® Brand 2500 FR floor underlayment is a fast-applying engineered cementitious underlayment formulated and manufactured by USG for indoor use in multi-family, light-commercial and other wood-frame construction. Reinforced with fibers that improve impact strength, these underlayments can be poured before drywall is installed, so they dry faster and help prevent mold by not exposing wallboard to high moisture levels. USG Levelrock® Brand 2500 FR engineered cementitious underlayments are also economical, as they can be applied at rates of up to 30,000 sq. ft. per day. They are formulated to provide typical compressive strengths from 2000 psi to 3200 psi at a ¾ in. minimum thickness over plywood subflooring, which meets requirements for multi-family and hotel/motel construction.

USG Levelrock® Brand 2500, 2500 FR floor underlayments may assist in obtaining LEED credits 5.1 and 5.2..

1.2 Application

USG Levelrock® Brand 2500 and 2500 FR Self-Leveling Underlayments are cementitious underlayments designed by USG for are fast applying engineered cementitious underlayments formulated and manufactured by USG for indoor use in multi-family, light-commercial and other wood-frame construction. These high-strength underlayments can be poured before drywall is installed, so they dry faster and help prevent mold by not exposing wallboard to high moisture levels. They are formulated to provide typical compressive strengths from 2000 psi to 3200 psi at a ¾ in. minimum thickness over plywood subflooring, which meets requirements for multi-family and hotel/motel construction. USG engineered cementitious underlayments are mixed with sand (optional) and water at the job site to yield a lightweight underlayment with a smooth and monolithic surface.

1.3 Product Technical Data

The following technical construction data is relevant for the products covered by this EPD.

Table 1: Technical Specifications

Physical and Mechanical Properties	Test Standard	Approximate Values Standard (Metric)
Approximate Compressive Strength	ASTM C109 (modified)	2000 – 3200 psi[1] (13.8 to 22.1 MPa)
Approximate Dry Density		114-124 lbs./cu. ft. (1826-1986 kg/m^3)
Packaging		80 lb. (36.3 kg) multiwall paper bags

1. ASTM C109 modified refers to air drying as opposed to damp curing.

1.4 Product Composition

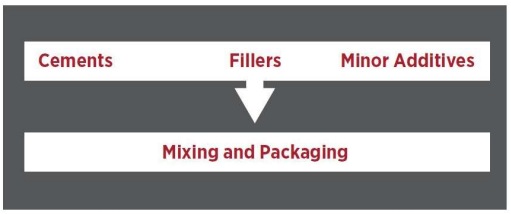
Table 2: Material Composition

Material	USG Levelrock® Brand Floor Underlayment 2500	USG Levelrock® Brand Floor Underlayment 2500 FR
Cement	**99.7%**	**99.6%**
Filler	**0.0%**	**0.0%**
Additives	**0.3%**	**0.4%**
Sum	**100.0%**	**100.0%**

Cement components may include stucco, hydrocal and Portland cement. Additives may include plasticizers, retarders, accelerators, defoamers and additional binders.

1.5 Product Manufacture

The manufacture of USG Levelrock® Brand Floor Underlayment 2500 and 2500 FR consists of the blending of the dry ingredients followed by packaging into multi-wall paper bags. The finished product is then stacked on wooden pallets and wrapped with a plastic film.



1.6 Environment and Health During Manufacturing

USG has led the building sector's effort in developing and supplying sustainable construction materials. Today, sustainability is integrated into the design and manufacture of every wall, ceiling, and flooring product. As both a producer and a buyer of raw materials, we have a responsibility to extensively review and select each material we use. Each decision we make is based on careful consideration of environmental and safety effects over time. Raw materials used in our products are carefully selected and go through a screening procedure. Incoming raw materials are tested for contaminants by an internal lab and third-party labs for consideration of use and worker, environmental, and end-user exposure. This due diligence helps to ensure our products are safe to handle in our manufacturing plants and on job sites while having minimal impact on occupant health and indoor and outdoor environments.

1.7 Packaging

USG floor underlayments are packaged in 80 lb. multi-wall paper bags. Both the production and disposal of these packaging materials was modeled in this study.

1.8 Reference Service Life

The Reference Service Life is considered not to be relevant for this cradle-to-gate study.

1.9 Extraordinary Effects

None

2. LCA Calculation Rules

2.1 Declared Unit

The declared unit for this LCA study is one metric tonne of product. This declared unit is consistent with the PCR.

Table 3: Declared Unit

NAME	USG LEVELROCK® BRAND FLOOR UNDERLAYMENT 2500 AND 2500 FR
Declared Unit (kg)	**1,000 kg**
Declared Unit (lbs.)	**2205 lbs.**

2.2 System Boundary

This EPD represents a "cradle-to-gate" LCA analysis for USG Levelrock® Brand Floor Underlayment 2500 and 2500 FR. It covers all the production steps from raw material extraction (i.e., the cradle) to packaged bags of product at the factory gate.

2.3 Estimates and Assumptions

These floor underlayment products are USG products with well-defined formulations, energy inputs and raw material transport distances. No significant assumptions were required. All material and energy inputs were accounted for as were the raw material transportation mode and distances. Additional data limitations included the use of proxy processes rather than actual supplier generated primary data. This would include such processes as Portland Cement, which is representative of US-produced Portland cement but may not necessarily be representative of USG's particular Portland cement supplier. In addition, the data is limited in that the primary data was collected during the 2017 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.

2.4 Cut-off Criteria

All inputs and outputs to a (unit) process were included in the calculation for which data is available.

In case of insufficient input data or data gaps for a unit process, the cut-off criteria was 1% of renewable and non-renewable primary energy usage and 1% of the total mass of that unit process. The total neglected input flows did not exceed 5% of energy usage and mass.

As such, some minor additives fell well below the cut-off criteria and were therefore not included in this study.

2.5 Background Data

All background was sourced from critically reviewed GaBi databases.

2.6 Data Quality

The LCA model was created using the GaBi ts software. 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 USG Levelrock® Brand Floor Underlayment 2500 and 2500 FR production, the LCI data was collected from the Southard, OK plant for the 2017 production year.

Geographical: Where possible, all processes were chosen as being representative of US manufacturing processes. Specifically, this would include electricity generation. The specific process selected for electricity generation was chosen to be specific to the specific region in the US using the updated eGRID system.

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 for panel were derived from plant data. They are representative of actual usage for the 2017 calendar year.

Completeness: All significant raw material flows used in the production of USG Levelrock® Brand Floor Underlayment 2500 and 2500 FR have been modeled.

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.

2.7 Period under Review

All raw material and energy inputs are for the 2017 calendar year.

2.8 Allocation

No allocations were required for this LCA study.

2.9 Comparability

A comparison or evaluation of EPD data is only possible if all data sets to be compared are 1) created according to EN 15804 and 2) are considered in a whole building context or utilize identical defined use stage scenarios. Comparisons are only allowable when EPDs report cradle-to-grave information using a functional unit. Refer to section 5.3 of EN 15804 for further information. Comparison of the environmental performance of panels using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. Full conformance allows EPD comparability only when all stages of the life cycle have been considered. However, variations and deviations are possible

3. Life Cycle Assessment Results

Table 4: Description of the system boundary modules

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw Material Supply	Transport	Manufacturing	Transport From Gate to Site	Assembly/Install	Use Stage	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction	Transport	Waste Processing	Disposal	Reuse, Recovery, Recycling Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Table 5: Acronym Key

ABBREVIATION	PARAMETER	UNIT
	Life Cycle Impact Assessment Indicators	
GWP	Global Warming Potential	kg CO_2 eq.
ODP	Ozone Depletion Potential	kg CFC-11 eq.
AP	Acidification Potential	kg SO_2 eq.
EP	Eutrophication Potential	kg N eq.
POCP	Photochemical ozone creation potential	kg O_3 eq.
ADP	Abiotic resource depletion potential – fossil fuels	MJ, LHV
	Resource Use Parameters	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, LHV
PERM	Use of renewable primary energy resources used as raw materials	MJ, LHV
PERT	Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, LHV
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, LHV
PENRM	Use of non-renewable primary energy resources used as raw materials	MJ, LHV
PENRT	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, LHV
SM	Use of secondary materials	kg
RSF	Use of renewable secondary fuels	MJ, LHV
NRSF	Use of non-renewable secondary fuels	MJ, LHV
FW	Net use of fresh water	m3
	Waste Parameters	
HWD	Disposed-of-hazardous waste	kg
NHWD	Disposed-of non-hazardous waste	kg
RWD	Radioactive Waste Disposed	kg
	Output Flow Parameters	
CRU	Components for reuse	kg
MFR	Materials for recycling	kg
MER	Materials for energy recovery	kg
EE	Exported energy	MJ

3.1 Life Cycle Impact Assessment Results

Table 6: LCA Results for 1 Tonne of USG Levelrock® Brand Floor Underlayment 2500

TRACI v2.1	Units	A1-A3
GWP 100	kg CO2 eq.	2.20E+02
ODP	kg CFC-11 eq.	1.31E-07
AP	kg SO2 eq.	3.92E-01
EP	kg N eq.	3.71E-02
POCP	kg O3 eq.	7.70E+00
ADP	MJ	3.60E+02

Table 7: LCA Results for 1 Tonne of USG Levelrock® Brand Floor Underlayment 2500 FR

TRACI v2.1	Units	A1-A3
GWP 100	kg CO2 eq.	2.78E+02
ODP	kg CFC-11 eq.	1.02E-07
AP	kg SO2 eq.	5.10E-01
EP	kg N eq.	4.49E-02
POCP	kg O3 eq.	9.45E+00
ADP	MJ	4.23E+02

3.2 Life Cycle Inventory Results

Table 8: Resource Use for 1 Tonne of USG Levelrock® Brand Floor Underlayment 2500

Parameter	Units	A1-A3
PERE	MJ	4.12E+02
PERM	MJ	0.00E+00
PERT	MJ	4.12E+02
PENRE	MJ	3.01E+03
PENRM	MJ	0.00E+00
PENRT	MJ	3.01E+03
SM	MJ	0.00E+00
RSF	MJ	0.00E+00
NRSF	MJ	0.00E+00
FW	m^3	3.34E-01

Table 9: Resource Use for 1 Tonne of USG Levelrock® Brand Floor Underlayment 2500 FR

PARAMETER	UNITS	A1-A3
PERE	MJ	5.91E+02
PERM	MJ	0.00E+00
PERT	MJ	5.91E+02
PENRE	MJ	3.81E+03
PENRM	MJ	0.00E+00
PENRT	MJ	3.81E+03
SM	MJ	0.00E+00
RSF	MJ	0.00E+00
NRSF	MJ	0.00E+00
FW	m^3	5.50E-01

Table 10: Output Flows and Waste Categories for 1 Tonne of USG Levelrock® Brand Floor Underlayment 2500

PARAMETER	UNITS	A1-A3
HWD	kg	2.33E-03
NHWD	kg	1.94E+01
RWD	kg	1.90E-02
CRU	kg	0.00E+00
MFR	kg	0.00E+00
MER	kg	0.00E+00
EE	MJ	0.00E+00

Table 11: Output Flows and Waste Categories for 1 Tonne of USG Levelrock® Brand Floor Underlayment 2500 FR

PARAMETER	UNITS	A1-A3
HWD	kg	1.66E-03
NHWD	kg	2.01E+01
RWD	kg	2.85E-02
CRU	kg	0.00E+00
MFR	kg	0.00E+00
MER	kg	0.00E+00
EE	MJ	0.00E+00

3.3 LCA Interpretation

The LCA results for the production of USG Levelrock® Brand Floor Underlayment 2500 and 2500 FR were dominated by raw material contributions particulary cement. For example, total cement usage was responsible for 85% of the global warming impact in a cradle-to-gate analysis for USG Levelrock® Brand Floor Underlayment 2500.

4. Further Information

4.1 VOC Emissions

USG Levelrock® Brand Floor Underlayment 2500 and 2500 FR have achieved GREENGUARD Gold Certification and qualifies as a "Low Emitting" material per California Department of Public Health CDPH/EHLB/Standard Method (CA Section 01350) for school classroom, and private office modeling scenarios, and meets USGBC's LEED® v4 emission requirements.

5. References

LCA Report

A Cradle-to-Gate (A1-A3) Life Cycle Assessment for USG Flooring Products Produced at Baltimore, MD and Gypsum, OH, Baltimore, MD and Gypsum, OH; 3/18/20. USG.

Product PCR

ASTM, Product Category Rules for Preparing an Environmental Product Declaration for: Portland Cement, Blended Hydraulic Cement and Masonry Cement, 2014

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 - Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2006 - 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: 2007 - Sustainability in building construction -- Environmental declaration of building products