ENVIRONMENTAL PRODUCT DECLARATION

USG Sheetrock® Brand Firecode® X Panels

UNITED STATES GYPSUM COMPANY

Aliquippa, PA, Baltimore, MD, Bridgeport, AL, East Chicago, IN, Galena Park, TX, Hagersville, Ontario (Canada), Jacksonville, FL, Montreal, Quebec (Canada), Norfolk, VA, Plaster City, CA, Rainier, OR, Shoals, IN, Sigurd, UT, Sperry, IA, Sweetwater, TX, Washingtonville, PA

The original 5/8 in. (15.9 mm) Type X panels for interior wall and ceiling applications, USG Sheetrock® Brand Firecode® X Panels provide additional fire resistance over Regular panels and comply with ASTM C1396, *Standard Specification for Gypsum Board*, for 5/8 in. (15.9 mm) and Type X gypsum wallboard. These panels meet Underwriters Laboratories Inc. (UL) Classification as to fire resistance, surface-burning characteristics and non-combustibility. They achieve GREENGUARD Gold Certification and qualify as a low VOC emitting material (meets CA 01350).

USG

For over a century, sustainable practices have naturally been an inherent part of business at USG. 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 Environmental Product Declarations are the next step toward an even more transparent USG. Contained in this Underwriter's Laboratory certified, ISO compliant EPD is information regarding:

- The Life Cycle Assessment and impact measures including global warming and energy use
- Product performance attributes including fire, seismic, corrosion resistance, and exposure
- Product composition, ingredients, and sources
- Information on the manufacturing process
- Installation and application practices

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ENVIRONMENTAL PRODUCT DECLARATION
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ENVIRONMENTAL PRODUCT DECLARATION

USG Sheetrock® Brand Firecode® X Panels

According to ISO 14025/40/44 and 21930:2017

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. 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.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	USG
DECLARATION NUMBER	4787352797.111.1
DECLARED PRODUCT	USG Sheetrock® Brand Firecode® X Panels 5/8"
REFERENCE PCR	NSF International PCR for Gypsum Panel Products, v.1e 2019
DATE OF ISSUE	October 1, 2020
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Life cycle assessment results Testing results and verifications

The PCR review was conducted by:	PCR Review Panel NSF International's National Center for Sustainability Standards ncss@nsf.org
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories INTERNAL ☐ EXTERNAL ☒	Grant R. Martin Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria Thomas P. Gloria, Industrial Ecology Consultants

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2.0 Product Information

2.1 Product Description

USG Sheetrock® Brand Firecode® X Panels (UL Type SCX) are 5/8 in. (15.9 mm) Type X gypsum panels that feature a noncombustible gypsum core that is encased in 100% recycled face and back papers that form a high strength composite design. The face paper is folded around the long edges to reinforce and protect the core, and the ends are cut square and even. The long edges of the panels are tapered, allowing joints to be reinforced and concealed with USG Sheetrock® Brand joint treatment systems. The panels are UL Classified for fire resistance and can be used in any UL Design in which Type SCX panels are listed. On the face along the long edge of each panel, the UL Type Designation is printed for easy identification by building inspectors.

2.2 Product Description Designated Application

These gypsum board products are intended for commercial or residential applications where 5/8 in. (15.9 mm) Type X panels are required in both new or repair and remodel construction and for load-bearing and non-load-bearing wood- or steel-framed fire-rated walls and ceilings.

2.3 Technical Data

Table #1: Summary of the technical data for 5/8" Type X gypsum boards

Technical Data	Value and Units/Test Results /Statement	Referenced document
"R" factor-thermal resistance in US unit (SI unit)	0.45 °F x ft.^{2} x h/Btu [0.08 K x m^2/W]	ASTM C518
Safety Data Sheet – Yes/No	Yes	Available at usg.com
Surface burning characteristics		
Flame Spread	15[1]	ASTM E84
Smoke Developed	0[1]	ASTM E84
Core Hardness **Field**	Not less than 11 lbf (49 N)[1]	C473 (B)
End	Not less than 11 lbf (49 N)[1]	C473 (B)
Edge	Not less than 11 lbf (49 N)[1]	C473 (B)
Flexural Strength **Parallel**	Not less than 46 lbf (205 N)[1]	C473 (B)
Perpendicular	Not less than 147 lbf (654 N)[1]	C473 (B)
Humidified Deflection	Not greater than 5/8" (15.9 mm)[1]	C473
Nail Pull Resistance	Not less than 87 lbf (387 N)[1]	C473 (B)

1. Per ASTM C1396 for 5/8 in. (15.9 mm) gypsum wallboard.

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2.4 Placing on the Market/Application Rules

Standard application rules for gypsum board are presented in the USG Construction Handbook available online at USG.com.

2.5 Product Material Content

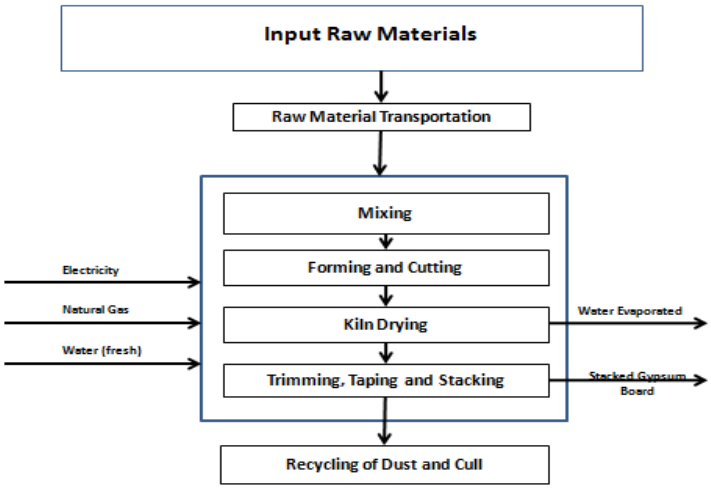
The product specifications and formula for USG Sheetrock® Brand Firecode® X Panels is listed below.

Table #2: Product specifications and formula for 5/8" USG Sheetrock® Brand Firecode® X Panels

	Measurement	Value
Product Specifications	Thickness	5/8 in. (15.9 mm)
	Lengths	8-16 ft. (2438-4877 mm)
	Width	48" (1218 mm), 54" (1372 mm)
	Weight (nominal)	2.2 lbs./sq. ft. (10.7 kg/m^2)
	Edges	Tapered

	Additive	Amount (kg/1000 sq ft)
Product Formulation	Gypsum	440
	Paper	34
	Additives	24

2.6 Product Material Content



The manufacture of gypsum board starts with the combining of the dry ingredients in a screw conveyor, feeding of this dry ingredient mixture into a pin mixer where these dry ingredients are mixed with water and wet additives. The resulting slurry is fed between two sheets of paper; facing paper (Manila) on the bottom and backing paper (Newsline) on the top. The wet gypsum board is allowed to hydrate after which the hard board is cut and transferred into a kiln for evaporation of excess water. After removal of the evaporative water, the board is cut to its final size, end tapes are applied and the resulting product is ready for shipment. Any gypsum board not meeting quality control specifications is recycled on-site.

Figure #1: Process diagram for the production of 5/8" Type X gypsum boards

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2.7 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. All appropriate equipment required by federal, state and local regulations are in place at all USG manufacturing facilities.

2.8 Packaging

End tape is applied to every two pieces to form a unit for shipment. A quantity of units are collected and placed on sleutters (i.e., spacers) for easy pick-up by fork lift trucks.

2.9 Product Installation

For installation of gypsum panel products, refer to Gypsum Association's GA-216, Specifications for the Application and Finishing of Gypsum Panel Products, ASTM C840, Standard Specification for Application and Finishing of Gypsum Board, published UL Design or GA File Number and USG Gypsum Construction Handbook.

2.10 Environment and Health during Use Stage

USG gypsum board is not a controlled product under GHS (Globally Harmonized System).

2.11 Reference Service Life

Per the PCR, the reference service life for this cradle-to-gate (A1-A3) analysis is reported as not specified.

2.12 End-of-Life

Currently, gypsum board is typically disposed of in a building and construction landfill. In certain areas, USG has agreements with third-party gypsum waste recyclers who collect gypsum construction waste at jobsites for recycling and then transport this post-consumer gypsum raw material to specific USG manufacturing plants for use in the manufacturing of new wallboard. There are several alternative options to landfilling such as the use of reground gypsum wallboard for soil amendment applications. Contact your local EPA for reuses rules and regulations.

2.13 Documentation on Additional Environmental Information

USG Sheetrock® Brand Firecode® X Panels (UL Type SCX) is certified to meet CDPH 01350 V2.1. Certification can be found at spot.ul.com. Additional product information can be found at usg.com

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3.0 LCA: Calculation Rules

3.1 Declared or Functional Unit

Table #3: Declared unit and product density for USG Sheetrock® Brand Firecode® X Panels

Gypsum Board	Value and Units
Declared Unit	1,000 sf
Declared Density	2232 lbs./MSF
Declared Density	20.7 kg/m^2

3.2 System Boundary

The system boundaries are cradle to shipping gate (modules A1-A3) and include the following system processes in the production of 5/8" USG Sheetrock® Brand Firecode® Type X gypsum board: materials production, materials transportation from suppliers to the gypsum board production facility, paper manufacturing, waste management and transportation.

3.3 Estimates and Assumptions

All paper raw material and energy data is specific to the manufacture of USG Manila and Newsline papers at the specific USG paper mill. All USG Sheetrock® Brand Firecode® X gypsum board raw material and energy inputs are specific to the specific products produced at the gypsum board plant.

3.4 Criteria for the Exclusion of Inputs and Outputs

The cut-off criteria for input flows to be considered within each system boundary were as follows:

Mass – if a flow is less than 1% of the cumulative mass of the model flows it may be excluded, providing its environmental relevance is minor.

Energy – if a flow is less than 1% of the cumulative energy of the system model it may be excluded, providing its environmental relevance is minor.

The sum of the excluded material flows must not exceed 5% of mass, energy or environmental relevance.

3.5 Data Requirements and Data Sources

Manufacturer specific data was obtained from each United States gypsum board manufacturing plant.

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 Sheetrock® Brand Firecode® X Panels, the LCI data was collected from each gypsum board plant for the 2016 calendar 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 raw materials.

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

Completeness: Virtually all the significant raw material flows (> 99%) used for panel production has 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.

3.6 Allocation

The LCI data was collected for the gypsum board plant for the 2016 production year. Raw material and energy inputs were allocated to USG Sheetrock® Brand Firecode® X Panels based on the reduced mass of those panels.

3.7 Comparability of EPDs

Any comparison of EPDs shall be subject to the requirements of ISO 21930. For comparison of EPDs which report different module scopes, such that one EPD includes module D and the other does not, the comparison shall only be made on the basis of Modules A1, A2, and A3. Additionally, when Module D is included in the EPDs being compared, all EPDs must use the same methodology for calculation of Module D values.

Full conformance with the North American Product Category Rule for Designated Steel Construction Products ensures EPD comparability when all stages of a product's life cycle have been duly considered; however, variations and deviations are possible.

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4.0 LCA Results

This Environmental Product Declaration (EPD) conforms to ISO 14025, ISO 14040, ISO 14044, and ISO 21930:2017.

Scope of Results Reported: The PCR requires the reporting of a limited set of LCA metrics; therefore, there may be relevant environmental impacts beyond those disclosed by this EPD. The EPD does not indicate that any environmental or social performance benchmarks are met nor thresholds exceeded.

Accuracy of Results: This EPD has been developed in accordance with the PCR applicable for the identified product following the principles, requirements and guidelines of the ISO 14040, ISO 14044, ISO 14025 and ISO 21930:2017 standards. The results in this EPD are estimations of potential impacts. The accuracy of results in different EPDs may vary as a result of value choices, background data assumptions and quality of data collected.

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. Such comparisons can be inaccurate and could lead to the erroneous selection of materials or products which are higher-impact, a least in some impact categories. Any comparison of EPDs shall be subject to the requirements of ISO 21930:2017. For comparison of EPDs which report different module scopes, such that one EPD includes Module D and the other does not, the comparison shall only be made of the basis of Modules A1, A2, and A3. Additionally when Module D is included in the EPDs being compared, all EPDs must use the same methodology for calculation of Module D values.

Figure #2: System Boundary

Product stage				Construction process stage				Use 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

The values presented below represent a volume weighted average for the production facilities for this product.

USG Sheetrock® Brand Firecode® X Panels

According to ISO 14025/40/44 and 21930:2017

Table #4: LCA Results using TRACI 2.1 Impacts

Results of the LCA- Environmental Impact: 1000 sq. ft of USG Sheetrock® Brand Firecode® X Panels		
Parameter	**Units**	Modules included in LCA: A1-A3 ( ) range
Global warming potential	kg CO2-Eq.	2.70E+02 (2.15E+02 - 3.38E+02)
Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	5.32E-08 (3.06E-08 - 7.90E-08)
Acidification potential	kg SO2 Eq.	4.02E-01 (3.10E-01 - 8.16E-01)
Eutrophication potential	kg N Eq.	3.65E-02 (2.60E-02 - 6.20E-02)
Photochemical ozone creation potential	kg O3 Eq.	9.68E+00 (6.21E+00 - 2.28E+01)
Abiotic Depletion potential-fossil fuels	MJ	6.06E+02 (4.58E+02 - 8.19E+02)

Table #5: LCA Results for Resources Usages

Results of the LCA- Resource Use: 1,000 sq. ft of USG Sheetrock® Brand Firecode® X Panels		
Parameter	**Units**	**Modules included in LCA: A1-A3 ( ) range**
RPR_E - Renewable primary resources used as an energy carrier (fuel) materials	MJ, NCV	2.01E+02 (1.05E+02 – 4.54E+02)
RPR_M - Renewable primary resources with energy content used as material	MJ, NCV	0.00E+00 (0.00E+00 - 0.00E+00)
$NRPR_E$ – Non-renewable primary resources used as an energy carrier (fuel) materials	MJ, NCV	4.48E+03 (3.46E+03 - 5.94E+03)
$NRPR_M$ – Non-renewable primary resources with energy content used as material	MJ, NCV	0.00E+00 (0.00E+00 - 0.00E+00)
SM - Secondary material	Kg	4.71E+02 (3.40E+01 - 1.03E+03)
RSF - Renewable secondary fuels	MJ, NCV	0.00E+00 (0.00E+00 - 0.00E+00)
NRSF – non-renewable secondary fuels	MJ, NCV	0.00E+00 (0.00E+00 - 0.00E+00)
RE – Recovered energy	MJ, NCV	0.00E+00 (0.00E+00 - 0.00E+00)
Consumption of freshwater	m^3	1.36E+00 (9.99E-01 - 2.85E+00)

Table #6: LCA Results for Output Flows and Waste Categories

Results of the LCA- OUTPUT FLOWS and WASTE CATEGORIES: 1,000 sq. ft of USG Sheetrock® Brand Firecode® X Panels		
Parameter	**Units**	**Modules included in LCA: A1-A3 ( ) range**
Hazardous waste disposed	Kg	5.55E-05 (4.27E-05 - 6.08E-05)
Non-hazardous waste disposed	Kg	3.34E+00 (2.14E+00 - 4.23E+00)
High Level radioactive waste disposal	Kg	6.11E-02 (1.91E-02 - 1.42E-01)
Intermediate and low-level Radioactive waste	Kg	na

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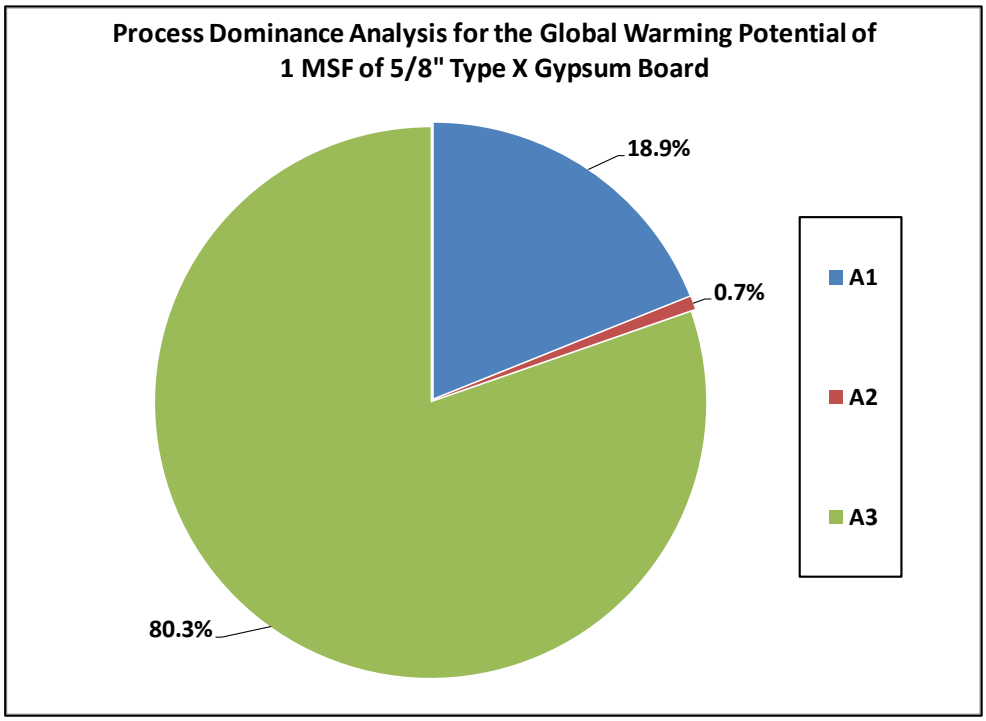
5.0 LCA Interpretation

The figure below graphically depicts the relative contributions for the cradle-to-gate production of 1,000 sf of USG Sheetrock® Brand Firecode® X Panels. The dominant source of greenhouse gases are generated during the board drying process. This analysis is typical for all gypsum plants covered in this study. Future reductions in Global Warming Potential should be directed at reducing the amount of water entering the dryer.

Figure #2: Process Dominance Analysis for the Production of 1 MSF of 5/8" Type X gypsum boards



USG Sheetrock® Brand Firecode® X Panels

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6.0 References

LCA Report

A Cradle-to-Gate (A1-A3) Life Cycle Assessment of USG Sheetrock® Brand Firecode® X Panels, September 15, 2020 USG (Confidential)

PCR Standards

NSF, "Product Category Rules for Gypsum Panel Products", Valid to July 17, 2024

PCR Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL Environment Standard 10010 Version 3.2, 2018

UI Program Instructions Version 2.5, March 2020

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