Georgia-Pacific Gypsum

Environmental Product Declaration

ACCORDING TO ISO 14025 AND ISO 21930

Type III environmental product declaration (EPD) developed according to ISO 14025 and 21930 for Gypsum 5/8” ToughRock® Fireguard X® Panel

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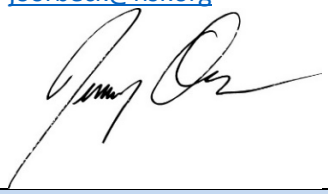
NSF Certified Environmental Product Declaration

This document is a Type III environmental product declaration by Georgia-Pacific LLC that is certified by NSF Certification, LLC as conforming to the requirements of ISO 14025 and ISO 21930. NSF Certification, LLC has assessed that the Life Cycle Assessment (LCA) information fulfills the requirements of ISO 14040 in accordance with the instructions listed in the product category rules cited below. The intent of this document is to further the development of environmentally compatible and sustainable construction methods by providing comprehensive environmental information related to potential impacts in accordance with international standards.

Environmental Product Declaration Summary

GENERAL SUMMARY	
Owner of the EPD	Georgia-Pacific Gypsum LLC 133 Peachtree St NE Atlanta, GA 30303
Product Group	ToughRock® Gypsum Panels
Product Name	5/8” ToughRock® Fireguard X® Panel 5/8” Type X (Generic name)
Product Definition	Gypsum panel is the generic name for a family of sheet products consisting of a non-combustible core primarily of gypsum with a paper or glass-mat facing. This EPD is for a gypsum panel with paper facing.
Product Category Rule (PCR)	NSF International, Product Category Rules for North American Gypsum Panels – Gypsum PCR-2019: v1. ISO 21930 Sustainability in building construction – Environmental declaration of building products, Geneva, 2017.
Declared Unit	1000 square feet, commonly referred to as MSF (92.9 square meters)

EPD INFORMATION			
Program Operator		NSF Certification, LLC	
Declaration Holder		Georgia-Pacific Gypsum LLC	
Product group Gypsum Panel	**Date of Issue** October 7, 2019 **Updated** August 20, 2020	**Period of Validity** 10/07/2019 – 10/31/2025	**Declaration Number** EPD10267
Declaration Type This declaration is a “Cradle-to-gate” EPD for 5/8” ToughRock® Fireguard X® Gypsum Panel, using a weighted average from 10 GP facilities that produce this product. Activity stages covered include the product manufacturing (modules A1 to A3). The declaration is intended for use in Business-to-Business (B-to-B) communication.			

Product Applicability and Characteristics 5/8" ToughRock® Fireguard X® gypsum panel is primarily used as an interior surface panel suitable to receive decoration for both residential and commercial building applications. ToughRock® Gypsum Panels is used in single and multiple layer wall systems and has a service life of 60 years. 5/8" ToughRock® Fireguard X® gypsum panel is 5/8" inches thick, or 1.59 cm thick. ToughRock® Gypsum Panel is manufactured to ASTM C1396, Standard Specification for Gypsum Panel.	
Content of the Declaration The declaration follows Section 9, Content of the EPD, NSF International, Product Category Rules for North American Gypsum Panels – Gypsum PCR-2019: v1.	
LCA Software and Version Number	GaBi 9.5.2.49
LCI Databases and Version Number	GaBi Database, Service Pack 40
This EPD was independently verified by NSF Certification, LLC in accordance with ISO 14025: **Internal** **External** X	Jenny Oorbeck joorbeck@nsf.org 
EPD PROJECT REPORT INFORMATION	
EPD Project Report	Life Cycle Assessment of Georgia-Pacific Gypsum Panel products, Final report 09/2019
Prepared by	Georgia-Pacific LLC 133 Peachtree St NE Atlanta, GA 30303
This EPD project report was independently verified by in accordance with ISO 14025 and the reference PCR:	Jack Geibig – EcoForm jgeibig@ecoform.com 
PCR INFORMATION	
Program Operator	NSF International 789 N. Dixboro Ann Arbor, MI 48105
Reference PCR	NSF International, Product Category Rules for North American Gypsum Panels – Gypsum PCR-2019: v1.
Date of Issue	2019
PCR review was conducted by:	Thomas Gloria, Ph.D. Jack Geibig Bill Stough

In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis

1 PRODUCT IDENTIFICATION

1.1 PRODUCT DEFINITION

ToughRock® Gypsum Panels is Georgia-Pacific Gypsum's name for a family of sheet products consisting of a noncombustible core primarily of gypsum, with paper surfacing. ToughRock® Gypsum Panels consists of paper surfaces on the face and back. ToughRock® Gypsum Panels have a noncombustible gypsum core. The panel can vary in thickness and length and can have specific paper facers and additives in the core to enhance physical and performance properties of the panel.

ToughRock® Gypsum Panels shall comply with Standard Specification for Gypsum Panel ASTM C1396/C 1396M.

1.2 PRODUCT STANDARD

Applicable product standards for gypsum panel (UNSPSC Code 30161500) include:

- ASTM C473 Standard Test Methods for Physical Testing of Gypsum Panel Products.
- ASTM C1396 / C1396M - 09a- Standard Specification for Gypsum Panel.
- ASTM D3273-12 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- ASTM E119 - 10b- Standard Test Methods for Fire Tests of Building Construction and Materials.

2 PRODUCT APPLICATION

ToughRock® Gypsum Panels are intended for use on interior wall and ceiling applications. 5/8” ToughRock® Fireguard X® Panel Gypsum Panel is selected when specific fire-resistant wall and ceiling ratings are required.

Key selection attributes include:

- **Flexural Strength:** To resist breaking when subjected to a weight or load.
- **Humidified Deflection:** To have minimal sag or deflection when subjected to humid conditions over a period of time
- **Nail Pull Resistance:** The ability of the panel to hold a nail as measured and how difficult it is to pull the nail from the gypsum panel.
- **Fire Resistance:** A classification for type X panels and used in selected and tested fire rated assemblies.

3 DECLARED UNIT

The declared unit is 1,000 square feet (MSF) of gypsum panel. The conversion factor to kilograms is 1.01 ft^2/kg (=1000 ft^2/991 kg).

Table 1: Product data summary

PRODUCT	THICKNESS INCHES (CM)	SPECIFIC DENSITY LB/MSF (KG/92.9M2)	CORE TYPE	ASTM STANDARD
5/8" ToughRock® Fireguard X® Gypsum Panel	5/8" (1.59)	2.18E003 (990.6)	Type X	C1396

3.1 TECHNICAL DATA

See Table 2 for a summary of technical data for 5/8" ToughRock® Fireguard X® gypsum panel.

Table 2: Technical Data

TECHNICAL DATA	VALUE AND UNITS/TEST RESULTS/STATEMENT	REFERENCED DOCUMENTS
"R" factor – thermal resistance in US unit [SI unit]	0.56R	ASTM C177
Safety Data Sheet	Yes	Available at gpgypsum.com
Mold resistance (if applicable)	N/A	
Water Absorption (if applicable)	N/A	
Total water absorption (if application)	N/A	
Flame Spread	15	ASTM E84
Smoke Developed	0	ASTM E84
Water Vapor transmission Desiccant Method Test	>25 US perms	ASTM E96
Abuse/Impact resistance test (if applicable)	N/A	
Total Recycled content (%)	Dependent on the facility	As defined in ISO 14021
Pre-consumer (%)	Paper only 1% (as weight of overall product)	As defined in ISO 14021
Post-consumer (%)	Paper only 4% (as weight of overall product)	As defined in ISO 14021

4 MATERIAL CONTENT

4.1 DEFINITIONS

Per ToughRock® Gypsum Panels SDS Product List C: calcium sulfate dihydrate (Gypsum), boric acid, continuous filament glass fibers, and crystalline silica (quartz).

The material content for 5/8” ToughRock® Fireguard X® gypsum panel is represented by the following quantities*:

Gypsum	–	94.2%
Gypsum paper	–	4.5%
Additives (dry and wet)	–	1.31%

*Numbers may not add up to exactly 100% due to rounding

Product formulation (wet value at the time of manufacture), on the basis of 1000 square feet (1 MSF or 92.9m^2) of 5/8"" type X gypsum panel output (dry value) with a finished density of 2.18E003 lb/MSF at 0.5% moisture content at the facility gate.

4.2 PACKAGING

Packaging consists of gypsum panel end tape (bundling tape) constructed of paper and containing water- and oil-based ink; banding, rail bags and slip sheets; cardboard and metal edge/corner protectors; risers/spacers constructed of gypsum panel; and adhesive for risers/spacers.

5 PRODUCT STAGE

The system boundary for the gypsum panel starts with the raw material acquisition and extends through the manufacturing of the panel, cradle-to-shipping gate. All transportation distances for the raw materials, chemicals and the final product were included. Data included from gypsum panel manufacturing, emissions to air, water and soil, and any solid waste or wastewater. Table 3 below describes the system boundary. The figures below illustrate the system boundary for gypsum paper manufacturing and gypsum panel manufacturing.

Table 3: Description of the system boundary

Product Stage			Construction Process Stage		Use Stage							End-of-Life Stage			
Raw Material Supply	Transport	Manufacturing	Transport	Construction-insulation process	Use Stage	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction 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

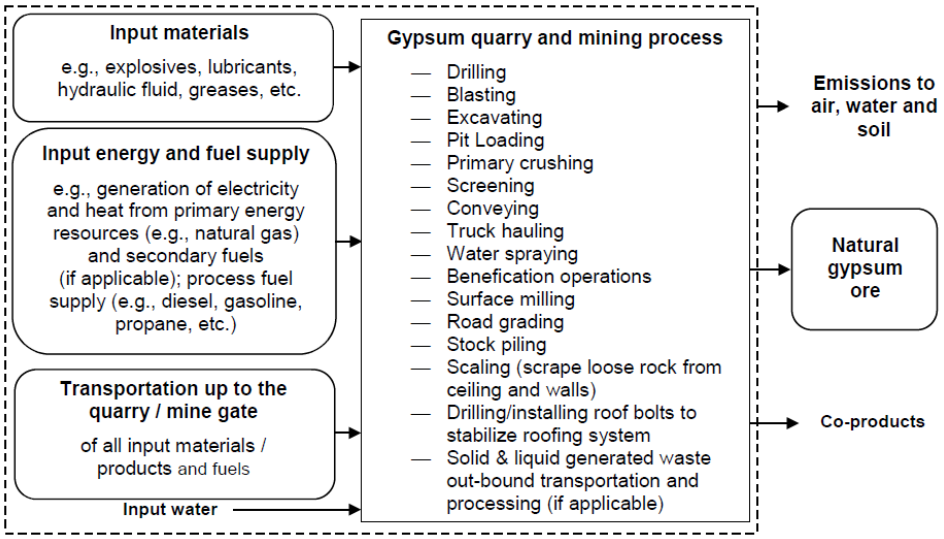


Figure 1: System boundary for gypsum quarry and mining

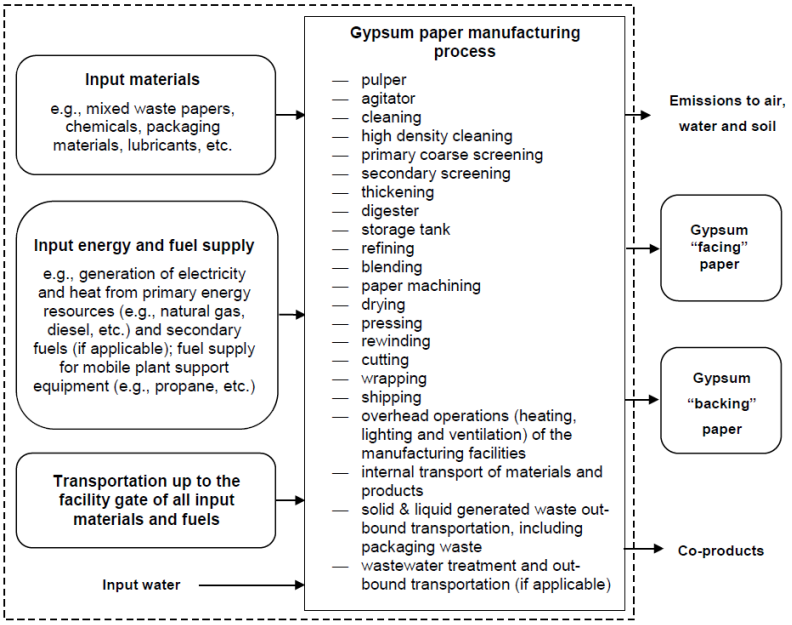


Figure 2: System boundary for gypsum paper manufacturing

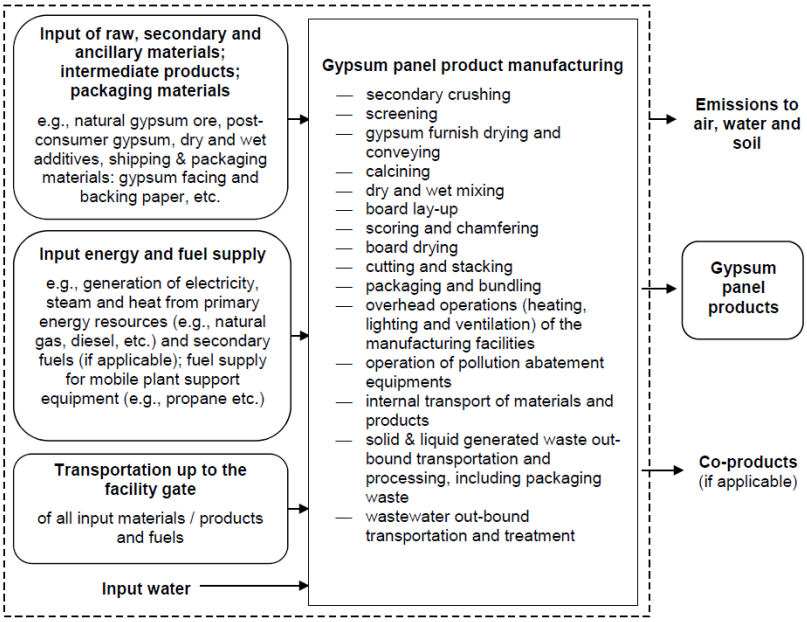


Figure 3: System boundary for gypsum panel product manufacturing

6 LIFE CYCLE INVENTORY

6.1 CUTOFF CRITERIA

The cut-off criteria follows the rules outlined in the Gypsum PCR and did not exceed 3% of the total mass, energy or environmental relevance.

6.2 DATA QUALITY

GP gypsum quarry, gypsum paper, gypsum glass mat, and panel facilities estimated, calculated, or measured the collected primary data for the production of natural gypsum, gypsum paper, gypsum glass mat, and gypsum panel product. The data was validated by the plant managers at the facilities and by the internal LCA project team.

All specific processes discussed in the Gypsum Products PCR are considered and modeled to represent gypsum panel products produced at Georgia-Pacific LLC. The background process data were supplied by the USLCI database, GaBi thinkstep LCI database and the US adjusted ecoinvent v 2.2 LCI database and modeled in GaBi 9 with the 2019 database.

6.3 REPRESENTATIVENESS

The 2017 production data from 10 facilities for 5/8" ToughRock® Fireguard X® gypsum panel represents 100% of total GP production in 2017 for that product. Secondary data from appropriate LCI datasets range from 2014-2018.

6.4 ALLOCATION

Allocation is necessary for the gypsum panel and gypsum paper facilities because the mill produces other paper or panel products. The allocation rules for the LCA follow the PCR allocation rules for gypsum products.

Mill level data such as air, water and soil emissions, gypsum raw material, paper raw material, water consumption and energy were allocated according to production mass.

FGD gypsum was performed according to the allocation rule outlined in the PCR Section 7. The FGD gypsum is considered burden free as it is not a primary material of the coal-fired power generation and is a waste input.

7 LIFE CYCLE ASSESSMENT

7.1 RESULTS OF THE LIFE CYCLE ASSESSMENT

The LCA results for 5/8" ToughRock® Fireguard X® gypsum panel are shown in Table 4. The U.S. Environmental Protection Agency's TRACI (Tool for the Reduction and Assessment of Chemical and other Environmental Impacts) life cycle impact assessment methodology (version 2.1) is applied to calculate environmental performance of gypsum panel. Per declared unit, impact indicator results, energy and material resource consumption, and waste are presented in Table 4. Impact indicators used are global warming potential (GWP), acidification potential, eutrophication potential, smog potential, and ozone depletion potential. The mass-weighted average based on annual production of each facility where 5/8" ToughRock® Fireguard X® is produced was used to determine these results. The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceedance of thresholds, safety margins, or risks.

The LCIA results were updated after the initial publication of the EPD due to a service pack update in the LCA software and databases, from service pack 39 to 40. The service pack update included updates to environmental quantities in the secondary data and some conversion factors which may impact some of the LCIA results. There were no changes made to GP primary data in this update.

Table 4: EPD Summary Results - 1 MSF of 5/8" ToughRock® Fireguard X® panel

PARAMETER	UNITS	TOTAL OF PRODUCT STAGE (A1-A3)
ENVIRONMENTAL IMPACTS		
Global warming potential (GWP 100)	kg CO_2-eq	281
Ozone depletion potential (ODP)	kg CFC-11-eq	6.36E-008
Eutrophication potential (EP)	kg N-eq	0.064
Acidification potential (AP)	kg SO_2-eq	0.443
Photochemical ozone creation potential (POCP)	kg O_3-eq	9.1
RESOURCE USE		
RPRE: Renewable Primary energy used as energy carrier (fuel)	MJ	384
RPRM: Renewable primary resources with energy content used as material	MJ	172
NRPRE: Non-renewable primary resources used as an energy carrier (fuel)	MJ	5.08E003
NRPRM: Non-renewable primary resources with energy content used as material	MJ	0.39
SM: Secondary materials	kg	287
RSF: Renewable secondary fuels	MJ	2.97E-021
NRSF: Non-renewable secondary fuels	MJ	3.49E-020
RE: Recovered energy	MJ	0
FW: Use of net fresh water resources	m^3	4.56
Abiotic depletion potential - fossil fuels (ADP_{fossil})	MJ	674
WASTE FLOWS		
HWD: Hazardous waste disposed	kg	6.47E-006
NHWD: Non-hazardous waste disposed	kg	37.4
HLRW: High-level radioactive waste, condition, to final repository	kg	9.86E-005
ILLRW: Intermediate- and low-level radioactive waste, conditioned, to final repository	kg	0.00273
CRU: Components for re-use	kg	0
MR: Materials for recycling	kg	22.2
MER: Materials for energy recovery	kg	0
EE: Exported energy	MJ	0

7.2 INTERPRETATION

The LCA study results found the manufacturing stage has the highest contribution to global warming potential, ozone depletion potential, acidification potential, eutrophication potential, and smog creation potential. The manufacturing stage includes the gypsum panel production and the energy consumption for panel manufacturing.

8 ADDITIONAL ENVIRONMENTAL INFORMATION

8.1 ENVIRONMENT AND HEALTH DURING MANUFACTURING

The following environmental abatement pollution equipment were installed at the surveyed GP facilities to control particulate matter (PM) emissions:

- Fabric Filter – high temperature and low temperature baghouses
- Bin Vents
- Precipitator
- Water Sprinklers for Dust Control

9 DECLARATION TYPE AND PRODUCT AVERAGE DECLARATION

The type of EPD is defined as a “Cradle-to-gate” EPD covering the product stage and is intended for use in Business-to-Business communication. This EPD represents an average performance for the product included in the EPD, manufactured at Georgia-Pacific facilities.

10 DECLARATION COMPARABILITY LIMITATION STATEMENT

Environmental declarations from different programs may not be comparable. The comparison of the environmental performance of gypsum wallboards using the EPD information shall be based on the product's use in and its impact on or within the building and shall consider the complete life cycle (all information modules). EPDs are only comparable if they comply with the NSF PCR for Gypsum Product Panels 2019 v1, include all relevant information modules, and are based on equivalent scenarios with respect to the context of construction works. 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 for comparison between products. EPDs without a functional unit may not be compared.

11 EPD EXPLANATORY MATERIAL

For any explanatory material, in regard to this EPD, please contact Georgia-Pacific.

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For any explanatory material, in regard to the PCR or the verification of this EPD, please contact the program operator.

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12 REFERENCES

1. ISO 14040 Environmental management – life cycle assessment – Principles and framework: International Organization for Standardization; Geneva, 2006.
2. ISO 14044 Environmental management – life cycle assessment – Requirements and guidelines; International Organization for Standardization; Geneva, 2006.
3. ISO 14025 Environmental labels and declarations– Type III environmental declarations – Principals and procedures; International Organization for Standardization; Geneva, 2006.
4. ISO 21930 Sustainability in building construction – Environmental declaration of building products; International Organization for Standardization; Geneva, 2017.
5. EN 15804 :2012 Sustainability of construction works-Environmental product declarations – Core rules for the product category of construction products
6. GaBi 9 thinkstep, Professional version
7. ecoinvent data v2.2
8. TRACI v2.1, http://www.epa.gov/nrmrl/std/sab/traci/
9. Product Category Rules for Gypsum Product Panels. 2019 v1. Program Operator: NSF International
10. Sphera Changelog GaBi Service Pack Update 39 to 40, http://www.gabi-software.com/fileadmin/GaBi_Databases/GaBi_9_2_changelog_SP40_feb2020.pdf