

Part B: Product group definition | Joint Compound | Part B #24-002

This Part B conforms to the ACLCA PCR Open Standard version 1.0 (May 2022) at the following level:

 1 – Transparency 2 – Procurement 3 – Data source

Initiated by	Drywall Finishing Council (DWFC) - https://dwfc.org/		
Working group members	Jim Mellentine, Thrive ESG (PCR committee chair) Tony Warrington, Southern Wall Products Chris Miner, National Gypsum Company Paul Palyukh, National Gypsum Company Peter Murphy, Freeman Products Samantha Schneider, CertainTeed Gypsum Guy Rosenthal, USG Mark Englert, USG Derik Harlow, USG Yanfei Peng, USG Bob Negri, Clear Vision Solutions Aurelio Márquez Ramos, Panel Rey SA JoLee Dominowski, Dow Construction Chemicals Madison Johnson, Dow Construction Chemicals		
Public notices of development/outreach	<ul style="list-style-type: none"> Public notice on the Sustainable Minds website announcing the creation of a Part B on June 13, 2024: http://www.sustainableminds.com/transparency-report-program/part-b Email blast on July 3, 2024 to mailing lists of LCA professionals, building and construction industry and trade associations, and manufacturers with published transparency documentation listed in the Transparency Catalog under the thermal and moisture protection and finishes CSI MasterFormat Divisions (07 00 00 & 09 00 00), requesting participation on the PCR committee. Email blast on October 31, 2024 to the same mailing lists requesting public comment. 		
Non-participating parties	No interested parties were identified who did not participate in the working group.		
New Part B?	No	Part B version number	2.0
Publication date	December 13, 2024		
Validity period	12/13/2024 – 12/12/2029		
Expected renewal schedule	Sustainable Minds intends to notify the working group and post update/renewal information on its website approximately six months prior to expiration to determine update, extension, or expiration options for this Part B.		

Product group

Name	Joint compound	CSI MasterFormat® #	09 21 16 Gypsum Board Assemblies 09 23 00 Gypsum Plastering 09 29 00 Gypsum Board 07 92 00 Joint Sealants
Description	Joint compound as defined by ASTM C474 and C475 and applied in construction projects in accordance with GA-214. Joint compound is used in the finishing of interior gypsum panel products as defined per ASTM C1178, C1278, C1396, C1629, C1658, and C1766, CMU block, and any cementitious material. This includes both ready mixed and dry powders used in the finishing of interior surfaces: <ul style="list-style-type: none"> Ready mixed <ul style="list-style-type: none"> Drying compound <ul style="list-style-type: none"> Lightweight (<12lbs/gallon) Conventional (≥12lbs/gallon) Setting compound <ul style="list-style-type: none"> Lightweight (<12lbs/gallon) Conventional (≥12lbs/gallon) 		

	<ul style="list-style-type: none"> • Dry powders <ul style="list-style-type: none"> ○ Drying compound <ul style="list-style-type: none"> ▪ Lightweight (<12lbs/gallon) ▪ Conventional (≥12lbs/gallon) ○ Setting compound <ul style="list-style-type: none"> ▪ Lightweight (<12lbs/gallon) ▪ Conventional (≥12lbs/gallon) <p>Example uses of joint compound include compound for taping, fill coats, finish coats, finishing corner reinforcement trims, finishing fasteners, and skim coats.</p>
Exclusions	<p>This product group does not include:</p> <ul style="list-style-type: none"> • Gypsum plaster • Gypsum board • Fasteners, joint reinforcement tape, corner reinforcement, and decorative trims • Finished gypsum board repair
Geographic representativeness	North America
Product-specific terms	<p>Density: “Lightweight” and “Conventional” densities listed above for dry powders include the weight of water as recommended by the manufacturer.</p> <p>Shrinkage rate: per ASTM C474, shrinkage is defined as one (1) minus the ratio of the volume of the dry patty to that of the wet patty expressed as a percentage.</p>

Program operator responsibilities

Existing PCRs, EPDs, TRs, or LCAs	<ul style="list-style-type: none"> • This Part B shall be used in conjunction with the latest version of Sustainable Minds Part A: LCA calculation rules & report requirements (version 2023 at time of publication of this Part B) • Expired PCR: UL Environment: Product Category Rules (PCR) Guidance for Building-Related Products and Services Part B: Joint Compound (Version 1.0) (expired 8/3/2021) (see harmonization activities pursued) • Relevant PCR: NSF: Product Category Rule for Environmental Product Declarations: PCR for Gypsum Panel Products (version 1.1) • Relevant PCR: SmartEPD: Part B PCR for Gypsum Panels (in development) • Relevant PCR: EPD Norge: Product Category Rules Part B for Technical – Chemical products for the building- and construction industry (version 3.0) • Underlying LCA: Karim, R., Das, S., Wu, T., Joint Compound LCA Background Report on behalf of Drywall Finish Council, Sphera, January 2024 • EPD generated using underlying LCA: Joint Compound, Drywall Finishing Council, May 2024, https://dwfc.org/wp-content/files/1130.EPD-DWFC-Draft_APR_2024_v2.pdf
Justification for new Part B if relevant non-expired PCR exists	Several members of the original PCR Committee for version 1 of the UL PCR for joint compound expressed interest in updating the PCR according to the newest standards and practices. See harmonization activities below.
Harmonization activities pursued	Sustainable Minds announced the creation of this product group definition to the original PCR Committee members, other program operators, LCA analysts, and manufacturers via email, and posted an update on its website. Since version 1 of the UL PCR for joint compound was found to have its validity period extended without updates to the content of the PCR, Sustainable Minds reached out to the program operator to inquire whether that PCR would be updated to newer standards and practices. UL replied that they would end the validity period of that PCR upon publication of this Sustainable Minds Part B to maintain harmony in the market.

Functional performance

Standard/certification (most recent edition, conformance not required for PCR conformance)	URL
Functional performance – ASTM C474	https://www.astm.org/c0474-15r20.html
Functional performance – ASTM C475/C475M	https://www.astm.org/c0475_c0475m-17r22.html
Functional performance – GA-214	https://www.gypsumpublications.com/product/2213/levels-of-finish-for-gypsum-panel-products-pdf-download-ga-214-2021-pdf
Functional performance – GA-216	https://www.gypsumpublications.com/product/2359/ga-216-2024-pdf
Functional performance – ASTM C840	https://www.astm.org/c0840-20.html

System boundary

System boundary	<p>The type of EPD shall be specified as cradle to grave. The modules considered in the LCA shall be described in brief as per “System boundaries” outlined in ISO 21930:2017 section 5.2. Module D may be optionally declared. It should be apparent as to what processes are considered in each module per the module descriptions in ISO 21930:2017 section 7.1.7.</p> <p>While it is unclear whether capital goods and infrastructure are significant to the overall impacts of the products, it is known that they are quantified inconsistently, varying based on the secondary data sets used and the database used. To reduce possible artificial variation in EPD results across the product group, capital goods and system infrastructure flows shall be excluded from the system boundary by default, with justification required for alternative assumptions.</p> <p>When reporting Global Warming Potential (GWP 100 years) per ISO 21930:2017, biogenic CO₂ and biogenic CH₄ shall be included in the main GWP results; biomass carbon uptake and re-release of carbon in the form of CO₂ and CH₄ shall also be reported separately based on the biogenic carbon content of the product to be declared (see ISO 21930 Section 7.2.7).</p>
------------------------	--

Functional unit

Unit	<p>92.9 m² (1000 ft²) of covered substrate considering an installation scenario as defined by a GA-214 Level 4 finish, with the quantity adjusted for the measured shrinkage (testing per ASTM C474) for a building estimated service life (ESL) of 75 years.</p> <p>The reference flow to achieve the functional unit shall be a volume of compound as calculated in the following equation:</p> $\text{Volume needed to fulfill functional unit} \left(\frac{\text{gal}}{\text{MSF}} \right) = \frac{10.1 \text{ gal/MSF}}{(1 - \text{shrinkage rate \%}) \times (1 - \% \text{ installation waste})}$
Rationale	<p>Products are available and used in the North American market. Finishing an interior space to a GA-214 Level 4 finish includes treatment of joints, fasteners, flat joints (butts, tapers), angle joints, corner reinforcement, and decorative trim.</p> <p>The reference flow calculation above is based on the PCR committee participants’ industry knowledge, which indicates a typical application rate of joint compound is 130 gallons per 10,000 square feet for a conventional weight formulation with a shrinkage rate of 20% and average installation waste rate of 3%.</p> <p>The following examples for volume needed to fulfill functional unit are provided for illustrative purposes:</p> <p>Example 1 (20% shrinkage) = $\frac{10.1}{(1 - 0.20) \times (1 - 0.03)} = 13.02 \text{ gal/MSF}$</p> <p>Example 2 (25% shrinkage) = $\frac{10.1}{(1 - 0.25) \times (1 - 0.03)} = 13.88 \text{ gal/MSF}$</p> <p>Example 3 (15% shrinkage) = $\frac{10.1}{(1 - 0.15) \times (1 - 0.03)} = 12.25 \text{ gal/MSF}$</p>

Additional rules for comparability

1. TR/EPD types	Product-specific and/or industry-wide TRs/EPDs may be created from this PCR. For industry-wide TRs/EPDs, refer to the industry-wide TR/EPD additional rules section.
2. Additional rules to Part A	<ul style="list-style-type: none"> The construction of water and wastewater infrastructure are excluded. EPDs that use secondary data for any unit process that contributes 30% or more to any disclosed environmental impact category shall disclose the data source (database name and version, LCA modeling software type and version implemented, dataset name, dataset geography, and dataset allocation method). This criterion applies to the LCI being used, and not the actual unit process data being reported by the manufacturer. Materials considered confidential may be reported as “proprietary ingredient” along with the database name and version. Mass should be used as the primary basis for co-product allocation. Allocation methods deemed more appropriate than allocation by mass may be used, but only when justified. The method used for co-product allocation shall be disclosed in the EPD.

	<ul style="list-style-type: none"> • For materials that cross the system boundary, the allocation rules in the latest Sustainable Minds Part A PCR shall apply (section 6.1 of Part A version 2023 as of the publication date of this Part B). • TRs/EPDs shall disclose the following information for each covered product: <ul style="list-style-type: none"> ○ Volume – L (gal) ○ Declared density (wet, per ASTM C474) – kg/L (lb/gal) ○ Volume shrinkage rate (per ASTM C474) – % ○ Edge and check crack resistance (per ASTM C474) – value/meets requirements ○ Microbial resistance (putrefaction) (per ASTM C474) – days ○ The volume of the typical container and number of typical containers of joint compound as delivered to the site of installation/application as required to fulfill the functional unit ○ If additives such as fire retardants, softeners, or biocides are used, their functional chemical group must be indicated. ○ Information on product-specific packaging: type, composition, and possible reuse of packaging materials (paper, pallets, foils, etc.) • Conformance of the product to ASTM C475 or other similar standard(s) must be disclosed in the TR/EPD. Standards must be quoted as illustrated in the example. The most recent year of publication shall be used and cited. <ul style="list-style-type: none"> ○ ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
3. Default life cycle stage scenario(s)	<p><u>Extraction and upstream production (A1)</u></p> <p>When materials used in the product are represented by secondary data, the electricity grid profile of the data set shall be adapted to the source country or region, if known and possible with the selected data set. Average data sets with “Global” or “Rest of World” average electricity profiles may only be used if the material source location is unknown or adapting the electricity grid is not possible.</p> <p>In cases when the EPD owner purchases manufactured components, the manufacturing process activity at the upstream supplier shall be counted in this stage, in addition to the upstream raw material extraction. For example, if a manufacturer purchases a plastic container that is used to package the joint compound, the plastic cannot be simply represented by raw plastic resin alone. Additional manufacturing must be added to represent the manufacturing of raw plastic resin into the container.</p> <p><u>Transport to factory (A2)</u></p> <p>In cases when the EPD owner maintains multiple suppliers for the same material or part, the life cycle inventory and impact assessment results shall reflect a weighted average transportation distance from the multiple suppliers for each mode of transport used. To simplify the calculation for those with many suppliers for the same material or part, suppliers that provide less than 5%, by mass, of a particular material or part may be excluded from the calculation of weighted average transport distance, subject to existing cut-off requirements in ISO 21930:2017.</p> <p>If the location of a material/part supplier is unknown, a default distance of 500 miles (800 km) by diesel-powered Class 8 semi-truck must be assumed unless otherwise justified.</p> <p><u>Manufacturing (A3)</u></p> <p>Packaging inputs in this stage must account for pallets as well as any shrink wrap or other packaging required for transport to the customer. Since some pallets are disposed of at the installation site and some are returned to the manufacturer, the manufacturer should account for pallets based on the number of pallets purchased during the time period of data collection for the LCA and assign an average amount per unit of production. Since recycling infrastructure for pallets and other packaging materials is not widely available, the full burden of the pallets and packaging must be counted in the life cycle.</p> <p>Space heating at the manufacturing site(s) shall be included in the system boundary.</p> <p><u>Transport to site (A4)</u></p> <p>Transport distances should be based on the weighted average distance to customers based on sales data, if available.</p>

Land transport

If primary data are unavailable, assume land transport distance in the destination country is 500 miles (800 km) by diesel-powered Class 8 semi-truck with an empty return trip of the same distance (for a total of 1,000 miles (1,600 km) round trip). This includes transport to the final installation site if multiple transport legs are needed.

Warehouse/distribution center and retail

Energy consumption in warehouses, distribution centers, and retail facilities during transport to the final customer shall be omitted from the analysis.

Installation (A5)

The installation stage shall include, as applicable, any ancillary materials, electricity and/or water consumption (e.g., from water added during the application process), and disposal of product packaging waste and other waste materials directly related to installation of the product. A 3% installation waste shall be included by default unless supporting documentation is provided. This waste includes waste from sanding, clean-up, and other losses. Unless otherwise justified, it shall be assumed this waste is disposed of in a landfill.

The installation of joint compound generates minimal airborne dust. In a study conducted by USG in 2017 on real residential new construction sites, airborne dust from a mid-weight all-purpose ready mix compound was measured at $<5 \text{ mg/m}^3$, thus less than 1 g of dust that remained airborne for more than 1 minute was generated per 1000 SF of drywall finished. Well over 90% of sanding dust was of particle sizes that fell to the floor within seconds, and the amount swept up and sent to landfill amounted to $<1\%$ of the amount applied. Therefore, dust is considered to be well below the cut-off threshold and therefore, may be omitted from the inventory.

Unless otherwise justified, the following installation energy shall be assumed:

- A mixing drill runs for 1.5 minutes and has a power rating of 0.96 kW, for a consumption of 0.024 kWh electricity. The average US electricity grid mix shall be used to model this electricity.
- Sanding is typically done by hand, and no energy is required for this activity.
- The product is installed in a building with ambient temperature above $10 \text{ }^\circ\text{C}$ ($50 \text{ }^\circ\text{F}$), which is suitable for drying without additional space heating required.

For products that have indoor applications, the VOC emissions shall be determined in accordance with the "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers Version 1.2" or California Specification 01350. This is optional for products that are exclusively intended for outdoor applications.

Disposal of packaging shall follow the requirements of section 6.2 of Sustainable Minds Part A, except for plastic pails. Due to the leftover/residual compound remaining in the pails, they are commonly unwashed and sent to landfill. Therefore, all plastic pails shall be assumed to be disposed of in a landfill unless primary data is available to support an alternate assumption.

Building estimated service life and product reference service life

This Part B uses a building estimated service life (ESL) of 75 years. All use stage activity and impacts shall be counted for the full ESL period.

The default reference service life (RSL) for joint compound shall be 75 years unless otherwise justified. Justification shall include a guarantee by the signature of the most senior officer of the product manufacturer. The default 75-year RSL for joint compound is based on the expected life of gypsum panels, to which the joint compound is applied. The latest PCR for Gypsum Panels states an RSL of 75 years.

Use (B1-B7)

Once installed, joint compound is not expected to have any maintenance requirements or require any water or electricity for operation over its reference service life. When reporting a default RSL of 75 years, impacts associated with modules B1-B7 are therefore assumed to be zero.

	<p>Since the RSL is 75 years, there are no replacements anticipated over the life of the building. If the RSL is greater than remaining life of the building, the aspects and impact of a whole RSL must be used, not a fractional RSL corresponding to the remaining expected building life.</p> <p><u>Deconstruction/demolition (C1)</u></p> <p>In the absence of primary data, the EPD owner may assume that the joint compound reaches its end of life along with the building and is removed during the demolition process. As such, energy or material inputs may be assumed negligible for this stage unless otherwise justified.</p> <p><u>Transport to waste processing or disposal (C2)</u></p> <p>In the absence of primary data, the transport distance to waste processing or disposal shall follow the latest version of the US EPA WARM model (20 miles (32.2 km) as of this writing). Outside of North America, other appropriate regional or national assumptions may be used.</p> <p><u>Waste processing (C3)</u></p> <p>In the absence of primary data, the default assumption is that 100% of products are disposed in a sanitary landfill at end of life. In that case, no waste processing activity is applicable in this stage. Justifications for other end-of-life pathways, such as recycling, refurbishment, or other pathway in a product take-back program require evidence such as documentation of the program and documented number or share of units sold that participate in the program.</p> <p><u>Waste disposal (C4)</u></p> <p>The EPD owner shall assume 100% disposal in a sanitary landfill in North America unless otherwise justified as described in C3 above. The landfill process shall be modeled based on the mass of joint compound using secondary data to model inert waste, unless otherwise justified.</p> <p><u>Benefits and loads beyond the system boundary (D), Optional</u></p> <p>Since the default end-of-life assumption is 100% landfill, there are no anticipated burdens or benefits beyond the system boundary. However, if alternative end-of-life pathways are justified, such benefits and burdens may be quantified or qualitatively described in this stage.</p>
4. Additional data quality requirements	None

Additional LCA calculation rules

N/A	Optional	Required	<i>Indicate whether conformance is the manufacturer's choice or required for TRs/EPDs.</i>
		X	ISO 21930:2017: conformance is required by construction product manufacturers

Industry-wide TR/EPD additional rules

Minimum participation	The minimum required level of market participation is 50% of the North American market, measured by annual production volume. The annual production volume of the industry should be determined by either the latest analysis published by Maia Research or by other Gypsum Association wallboard estimates. As of the publication of this PCR, the latest version of the Maia Research analysis showed that the market size for North America in 2022 was 396,800 short tons of joint compound, and the Gypsum Association Q4 2023 estimate was 25.8 million MSF of wallboard produced in 2023, equating to 1.93 million short tons (wallboard MSF multiplied by 13 gal joint compound per MSF, assuming a joint compound density of 11.5 lb/gal).
Retroactive pathway requirements	A manufacturer who did not participate in the original industry-wide TR/EPD submits their product-specific LCA primary data, under NDA, to the party responsible for collecting and averaging data for the industry-wide TR/EPD. The data must follow the Part B for the product group and be reviewed to make sure it can be used in the next update of the industry-wide TR/EPD. The manufacturers who submitted data may compare their product-specific TRs/EPDs to the industry-wide TR/EPD no sooner than 12 months after the industry-wide TR/EPD publication date. After a minimum of two new participants submit data, an early update is forced, which is paid for by the new participants. The original participants may choose whether to update their data early. The party responsible for collecting and averaging data for the industry-wide TR/EPD shall maintain an ongoing list of manufacturers who submitted data to publicly contribute to the next update of the industry-wide TR/EPD.

Required impact categories	Global warming, acidification, eutrophication, ozone depletion, smog
LCIA method & version #	Comparisons to the industry average shall use the same LCIA method & version as the industry average. Company-specific results may also be reported using other method(s).

Part B development information

Part B review panel	<p>This Part B was reviewed for conformance to ISO 14025, ISO 21930:2017, and the ACLCA PCR Open Standard v1.0 by the following parties:</p> <table border="0"> <tr> <td>Thomas P. Gloria, Ph. D., Chair Industrial Ecology Consultants t.gloria@industrial-ecology.com</td> <td>Lindita Bushi, Ph.D. Athena Sustainable Materials Institute lindita.bushi@athenasmi.org</td> <td>Michael Schmeida, MSc., LEED AP, FASTM Gypsum Association mschmeida@gypsum.org</td> </tr> </table>	Thomas P. Gloria, Ph. D., Chair Industrial Ecology Consultants t.gloria@industrial-ecology.com	Lindita Bushi, Ph.D. Athena Sustainable Materials Institute lindita.bushi@athenasmi.org	Michael Schmeida, MSc., LEED AP, FASTM Gypsum Association mschmeida@gypsum.org
Thomas P. Gloria, Ph. D., Chair Industrial Ecology Consultants t.gloria@industrial-ecology.com	Lindita Bushi, Ph.D. Athena Sustainable Materials Institute lindita.bushi@athenasmi.org	Michael Schmeida, MSc., LEED AP, FASTM Gypsum Association mschmeida@gypsum.org		
Open consultation	Sustainable Minds solicited public comments on this Part B from October 31, 2024 – December 6, 2024. This consultation period and list of parties to submit comments were made available to the review panel.			
Update justification	This Part B was updated upon consideration of manufacturers looking to create new TRs/EPDs beyond the validity period of the previous version of the PCR.			
Conflict statement	Funding sources used to develop this Part B were disclosed to the working group during the development process. The policies identified in Sustainable Minds' Program Governance were followed to identify and resolve any potential conflicts of interest.			
Sustainable Minds information	<p>This Part B was developed by Sustainable Minds and participating interested parties according to the Sustainable Minds Program Governance available at http://www.sustainableminds.com/transparency-report-program/how-it-works.</p> <p>For questions about this or another Part B, to submit comments on this Part B, or to obtain a template for developing a transparency report, contact us using the information on the following page: http://www.sustainableminds.com/contact-us.</p>			