



Environmental Product Declaration

Program Operator: Smart EPD®

www.smartepd.com

IN ACCORDANCE WITH ISO 14025:2006 AND EN 15804+A2:2019/AC:2021



SmartEPD-2026-150-1038-01.2

DURAGRATE® ISO

Date of Issue

Aug 25, 2026

Expiration Date

Aug 25, 2031

Last Updated

Sep 14, 2026



Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

General Information

Strongwell

400 Commonwealth Ave. Bristol, Virginia 24201

276.645.8000

bmutnuri@strongwell.com

 [strongwell.com](https://www.strongwell.com)



Product Name:	DURAGRATE® ISO
Declared Unit:	1 kg
Declaration Number:	SmartEPD-2026-150-1038-01.2
Date of Issue:	August 25, 2026
Expiration:	August 25, 2031
Last updated:	September 14, 2026
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5, B1 - B7, C1 - C4, D
Market(s) of Applicability:	Global

General Organization Information

Founded in 1956, Strongwell is a recognized world leader in pultrusion technology and pultruded fiber reinforced polymer (FRP) composites. With three facilities in the U.S. and one in Mexico, the company manufactures a wide variety of products for its diverse customer base, including structural shapes, grating, handrail, structural building panels, decking systems, composite armor, ladder rail, and many OEM products.

Further information can be found at: <https://www.strongwell.com/>

Limitations, Liability and Ownership

Limitations - EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use; have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

Liability - Responsibility for the accuracy and completeness of background data used in this assessment lies with the respective data providers, and not with the EPD program operator or the authors of PCR 2019:14. Strongwell Corporation, as the EPD owner and declarant, bears full responsibility for the foreground data submitted in support of this EPD, including product composition, manufacturing process data, and all site-specific primary inputs. The EPD program operator is not liable for any damages arising from the use or misuse of the EPD or its underlying LCA results. The third-party verifier's liability is limited to the correctness of the verification statement and does not extend to the underlying data provided by the manufacturer. In case EPD results are applied downstream for whole-building LCA or product comparison tools, liability for misapplication or misinterpretation rests with the user of the EPD data, and not with Strongwell Corporation or the LCA practitioner.

Ownership - This EPD and the underlying LCA study are owned by Strongwell Corporation as the commissioning company and EPD declarant. The EPD is registered with and published by the EPD program operator, who maintains the right to withdraw or suspend the EPD if it is found to be non-conformant with program requirements or PCR 2019:14. The underlying LCA report, life cycle inventory data, and associated documentation remain the intellectual property of Strongwell Corporation unless contractually assigned to a third party.

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

Reference Standards

Standard(s):	ISO 14025:2006 and EN 15804+A2:2019/AC:2021
Core PCR:	EPD International PCR for Construction Products 2019:14 (EN 15804:A2:2019/AC:2021) v2.0.1
	Date of issue: June 05, 2025
	Valid until: April 07, 2030
Sub-category PCR review panel:	 Contact Smart EPD for more information.
General Program Instructions:	 Smart EPD General Program Instructions v.2.0, March 2025

Verification Information

LCA Author/Creator:	 Mayank Kumar Singh, Brian Bunte  NextGen ESG  sustainability@nextgenesg.co
EPD Program Operator:	 Smart EPD  info@smartepd.com  www.smartepd.com  585 Grove St., Ste. 145, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071:  Terrie Boguski  tboguski@harmonyenviro.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s):  Terrie Boguski  tboguski@harmonyenviro.com

External

External

Product Information

Declared Unit:	1 kg
Mass:	1 kg
Product Specificity:	 Product Average  Product Specific

Product Description

DURAGRATE® ISO is a premium-quality molded fiberglass mesh grating panel manufactured using an isophthalic polyester resin system and features corrosion resistance, fire retardance, impact resistance, bidirectional load bearing, low electrical and thermal conductivity, and ease of installation. It is suited for chemical-resistant industrial flooring, walkways, platforms, and trench covers in moderately corrosive environments where improved corrosion resistance over standard grades is required.

Further information can be found at: <https://www.strongwell.com/products/grating/>

Product Specifications

Product Classification Codes: EC3 - CastDecksAndUnderlayment

Product Composition Diagram



Table 1. Material Composition

Material/Component Category	Origin	kg Mass
Pigment	U.S.	9.70E-03
Roving 1	U.S.	2.46E-01
unsaturated Polyester Resin	U.S.	3.04E-01
Vinyl Ester Resin	U.S.	1.94E-02
Quartz	U.S.	1.60E-02
Miscellaneous	U.S.	4.90E-01

Packaging Material	Origin	kg Mass
Cardboard	U.S.	0.00609
Paper	U.S.	0.0000363
Plastic	U.S.	0.000828
Plastic wrap	U.S.	0.00119
PU Foam	U.S.	0.000332
Steel	U.S.	0.00109
Wood crate	U.S.	0.0879

Biogenic Carbon Content	kg C per kg
Biogenic carbon content in product	0
Biogenic carbon content in accompanying packaging	0.0332

Hazardous Materials
NA

EPD Data Specificity

Primary Data Year:2025

Manufacturing Specificity:

✗ Industry Average

✗ Manufacturer Average

✓ Facility Specific

Averaging:
Averaging was not conducted for this EPD

Table 2. System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓

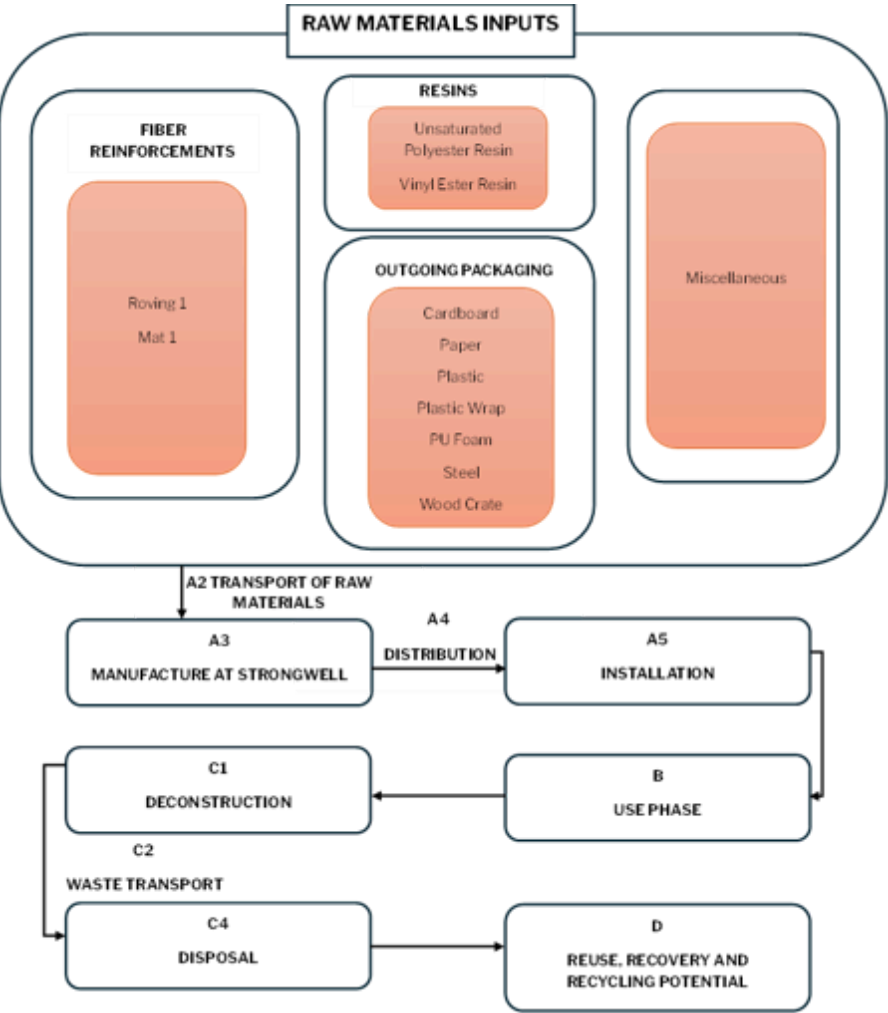
Use	B1	Use	✓
	B2	Maintenance	✓
	B3	Repair	✓
	B4	Replacement	✓
	B5	Refurbishment	✓
	B6	Operational Energy Use	✓
	B7	Operational Water Use	✓
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	✓

Note:
ND = Module not declared

Plants

 Strongwell Bristol, VA Plant 400 Commonwealth Ave, Bristol, Virginia 24201, USA

Product Flow Diagram



Software And Database

LCA Software:	☰ SimaPro v. 10.3
LCI Foreground Database(s):	☰ Ecoinvent v. 3.12 📍 Europe/Global 🗑️ Cut-off by classification ☰ US LCI v. 1.2025-06.0 📍 U.S. 🗑️ Cut-off by classification
LCI Background Database(s):	☰ Ecoinvent v. 3.12 📍 Europe/Global 🗑️ Cut-off by classification ☰ US LCI v. 1.2025-06.0 📍 U.S. 🗑️ Cut-off by classification

A foreground LCI database is the database used to model the primary, site-specific data collected for this EPD. A background LCI database is the database used to model generic or non-specific data.

Data Quality

Primary (foreground) data were collected directly from Strongwell's Bristol, VA manufacturing facility, covering material inputs, energy consumption, and waste generation for calendar year 2025. This data is considered temporally, geographically, and technologically representative of current DURAGRATE® ISO production.

Primary data accuracy reflects non-verified, facility-submitted quantities from utility invoices and bills of materials; completeness is high, with all major material and energy flows captured and no data gaps identified.

Background data for raw material production were sourced from ecoinvent v3.12 and the USLCI database. Background data are generally representative in technological and geographic terms, reflecting US or US-adapted production conditions consistent with Strongwell's supply chain. Temporal representativeness varies by dataset.

A data quality assessment was carried out for all foreground and background datasets using a pedigree matrix (Weidema et al., 2013) across the five criteria of reliability, completeness, and temporal, geographical, and technological correlation, supplemented by a dataset-level assessment using the PEF Method (European Commission, 2021); the detailed evaluation is documented in the LCA report (Section 5.9 and Appendix S).

The reported impact assessment values in this EPD give no sufficient reason to believe that any of the employed generic material or process LCI data is not representative of DURAGRATE® ISO and therefore should not introduce error to the reported impact category.

Table 3 presents the datasets for unit processes that individually contribute more than 10% to the GWP-GHG results of modules A1-A3.

Table 3. Data Sources

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
E-glass, at plant {US}	Database	USLCI+	2011	Secondary	0%
Unsaturated polyester (UPR) resin, at plant {US}	Database	USLCI+	2011	Secondary	0%
Electricity, medium voltage {US-SERC} market for electricity, medium voltage Cut-off, U	Database	ecoinvent 3.12	2025	Primary	20%
Miscellaneous	Database	ecoinvent 3.12	2025	Secondary	0%

Life Cycle Module Description

A1-A3 - Module A1 covers the production of the primary raw materials, glass fiber reinforcement (mat and roving) and the thermosetting resin matrix, together with fillers and specialised additives. A raw material input is identified as "Miscellaneous"; these are proprietary formulation materials Strongwell has designated commercially sensitive, whose identities are withheld from public disclosure. No material has been excluded on this basis, each is fully accounted for in the inventory and modelled using a representative proxy dataset. Module A2 covers transport of these materials from suppliers to Strongwell's Bristol, VA facility, based on supplier-specific distances by road. Module A3 covers manufacturing by pultrusion, in which the reinforcing fibers and liquid resin are pulled through a heated forming die to produce a constant-cross-section profile. Primary energy, VOC emissions, and manufacturing waste were collected as facility-specific primary data and allocated by mass. Manufacturing electricity is modelled on a market-based approach using a residual electricity mix for the facility's sub-regional grid. Product packaging and its inbound transport are included within A3.

A4-A5 - Module A4 covers transport of the finished product and its packaging from the facility to the installation site, based on weighted-average distances. Module A5 covers installation, including the field-assembly hardware required to fix the product and the energy consumed on site. All packaging reaches end of life at installation and is assumed to be landfilled. A4-A5 inputs are carried forward from Strongwell's previous LCA study and applied uniformly across all declared products.

B1-B7 - The product requires no maintenance, repair, or replacement over the service life of the structure and consumes no energy or water in use. Modules B1-B7 are included within the system boundary and declared as zero.

C1-C4 - Module C1 covers the energy for on-site deconstruction; C2 covers road transport of the product and residual hardware to disposal; C3 (waste processing) is null; and C4 covers final disposal, with the product and hardware assumed to be 100% landfilled. C1-C2 assumptions are carried forward from the previous LCA study.

D - As the product and hardware are entirely landfilled with no reuse, recycling, or energy recovery, Module D is declared as zero.

LCA Discussion

Allocation Procedure

Allocation follows the principles set forth in EN 15804+A2 and ISO 14040/14044, ensuring a transparent and consistent distribution of inputs and outputs across the life cycle stages of the product's life cycle. The allocation methods used in this study were selected to best align with the physical relationships within the production system. Where multiple products share common manufacturing processes, inputs and outputs are allocated by mass (kg) of product manufactured, consistent with the declared unit.

Cut-off Procedure

Cut-off criteria is applied in accordance with EN 15804+A2, ensuring that all relevant mass, energy, and environmental impact contributions are accounted for. Individual flows representing less than 1% of the total mass, energy, or environmental impact may be excluded, provided that their cumulative exclusion does not exceed 5% of the total impact for any environmental indicator. All known primary materials, production processes, and energy flows are included; infrastructure, capital equipment, and personnel-related impacts are excluded from the system boundary unless captured within background datasets. No material or energy input or output was deliberately excluded from the system boundary.

Renewable Electricity

Energy Attribute Certificates (EACs) such as
Renewable Energy Certificates (RECs) or Power
Purchase Agreements (PPAs) are included in the
baseline reported results:

✗ No

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Liters of Fuel:	33.662 l/100km
Vehicle Type:	Truck
Transport Distance:	1960 km
Capacity Utilization:	50 %
Packaging Mass:	9.74E-02 kg
Weight of products transported:	1 kg
Capacity utilization volume factor:	=1
Assumptions for scenario development:	The finished product and its packaging are transported together from the manufacturing facility to the point of installation by truck, over a weighted-average distance of 1,960 km by road, with 10,900 km by ship/barge applied where oceanic transport is relevant. These distances are derived from Strongwell's previous LCA study of STRONGIRT®, DURAGRID® Grating, and Structural Channel, which established representative distances reflective of Strongwell's regional distribution patterns. Since packaging travels with the finished product, the same distance and mode assumptions apply to both.

Installation in to the building/construction site (A5)

A5 Module

Ancillary Materials:	0.019 kg
Electricity Consumption:	0.005 kWh
Waste Materials at the Construction Site Before	0 kg
Waste Processing:	
Mass of Packaging Waste Specified by Type:	9.74E-02 kg
Biogenic Carbon Contained in Packaging (kg C):	0.0332 kg
Assumptions for scenario development:	Installation of the product requires field-assembly hardware and on-site energy, both carried forward from Strongwell's previous LCA study. A common fastener set is normalized to 1 kg of product (2.25 screws and washers per declared unit: ¼-inch screws at 3.5 g and #14 washers at 5 g, modelled as cold-rolled coil steel); installation energy reflects a 600 W drill operating for approximately 30 seconds, drawn from the US electricity consumption mix. Ancillary hardware is transported to the installation site by road, with a default 100 km distance assumption applied. All product packaging reaches end of life at the installation stage and is assumed to be 100% landfilled as a worst-case scenario, transported 100 km by truck to disposal; biogenic carbon in packaging waste is treated per the biogenic carbon methodology (Section 3.2.9 of the LCA report). No installation scrap or product loss is assumed at this stage.

Use (B1)

B1 Module

Maintenance (B2)

B2 Module

Repair (B3)

B3 Module

Replacement (B4)

B4 Module

Refurbishment (B5)

B5 Module

Operational Energy Use (B6) & Operational Water Use (B7)

B6 & B7 Modules

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

Collected with Mixed Construction Waste:	1.019 kg
--	----------

Recovery

Reuse:	0 kg
Recycling:	0 kg
Landfill:	1.019 kg
Incineration:	0 kg
Incineration with Energy Recovery:	0 kg
Energy Conversion:	0 kg

Disposal

Product or Material for Final Disposal:	1 kg
Removals of Biogenic Carbon:	0 kg CO2

Assumptions for scenario development:

At end of life, the installed product and any residual attached hardware are removed and directed entirely to landfill, consistent with the previous LCA study. Deconstruction (C1) consumes on-site energy equal to the installation energy. End-of-life waste, including deconstructed hardware, is transported (C2) to the disposal facility by road (truck) over 100 km. Waste processing (C3) is null as no mechanical or chemical processing is assumed prior to disposal. At final disposal (C4), the product and hardware are assumed to be 100% landfilled with no recycling, reuse, or energy recovery. Landfill emissions are accounted over a 100-year period following disposal.

Reuse, Recovery and / or Recycling Potentials & Relevant Scenario Information (D)

D Module

Further assumptions for scenario development:	Module D is declared and reported as zero. As the product and associated hardware are directed entirely to landfill at end of life, there are no net benefits or loads beyond the system boundary to credit. This reflects the predominant end-of-life pathway for FRP composite materials in North American markets, where established reuse, recycling, and energy recovery infrastructure for these materials remains limited at commercial scale.
---	---

Results

Table 4. Environmental Impact Assessment Results

EF3.1

per 1 kg of product.

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Unit	Method	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP- total	kg CO2 eq	EF3.1	2.37e+0	2.94e-1	1.04e-1	0	0	0	0	0	0	0	2.91e-3	1.09e-2	0	6.41e-3	0
GWP- fossil	kg CO2 eq	EF3.1	2.51e+0	2.94e-1	8.32e-2	0	0	0	0	0	0	0	2.91e-3	1.09e-2	0	6.40e-3	0
GWP-biogenic	kg CO2 eq	EF3.1	-1.39e-1	4.47e-5	2.07e-2	0	0	0	0	0	0	0	-1.93e-7	2.85e-6	0	2.13e-6	0
GWP-luluc	kg CO2 eq	EF3.1	1.29e-3	1.62e-4	4.59e-5	0	0	0	0	0	0	0	0	5.11e-6	0	3.63e-6	0
ODP	kg CFC11 eq	EF3.1	4.26e-8	4.56e-9	5.05e-10	0	0	0	0	0	0	0	4.50e-11	1.73e-10	0	1.87e-10	0
AP	mol H+ eq	EF3.1	7.78e-3	1.71e-3	2.69e-4	0	0	0	0	0	0	0	7.17e-6	2.87e-5	0	4.40e-5	0
PM	disease incidence	EF3.1	1.01e-7	2.39e-8	4.12e-9	0	0	0	0	0	0	0	1.27e-10	1.05e-9	0	1.03e-9	0
IRP	kBq U235 eq	EF3.1	7.71e+7	3.33e-3	8.88e+5	0	0	0	0	0	0	0	8.88e+5	1.35e-4	0	8.99e-5	0
POCP	kg NMVOC eq	EF3.1	2.15e-2	2.26e-3	2.07e-4	0	0	0	0	0	0	0	6.97e-6	4.33e-5	0	6.85e-5	0
EP-fw	kg P eq	EF3.1	6.11e-4	2.91e-5	1.64e-5	0	0	0	0	0	0	0	4.01e-9	1.21e-6	0	5.62e-7	0
EP-marine	kg N eq	EF3.1	1.97e-3	6.11e-4	1.07e-4	0	0	0	0	0	0	0	2.22e-6	7.53e-6	0	1.74e-5	0
EP-terrestrial	mol N eq	EF3.1	1.97e-2	6.72e-3	6.66e-4	0	0	0	0	0	0	0	2.47e-5	8.07e-5	0	1.89e-4	0
SQI	dimensionless	EF3.1	2.18e+1	3.47e+0	2.90e-1	0	0	0	0	0	0	0	3.59e-4	1.61e-1	0	3.07e-1	0
WDP	m3 world eq deprived	EF3.1	-3.54e+0	1.93e-2	-4.52e-2	0	0	0	0	0	0	0	-4.73e-2	8.11e-4	0	6.76e-3	0
ADP-fossil	MJ, net calorific value	EF3.1	2.84e+1	4.12e+0	8.16e-1	0	0	0	0	0	0	0	3.38e-2	1.59e-1	0	1.54e-1	0
ADP-minerals&metals	kg Sb eq	EF3.1	8.06e-6	8.00e-7	3.00e-7	0	0	0	0	0	0	0	3.53e-10	3.15e-8	0	9.52e-9	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Table 6. Waste and Output Flow Indicators

per 1 kg of product.

Indicator	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NHWD	kg	5.93e-2	0	9.74e-2	0	0	0	0	0	0	0	0	0	0	1.02e+0	0
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	9.69e-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note:

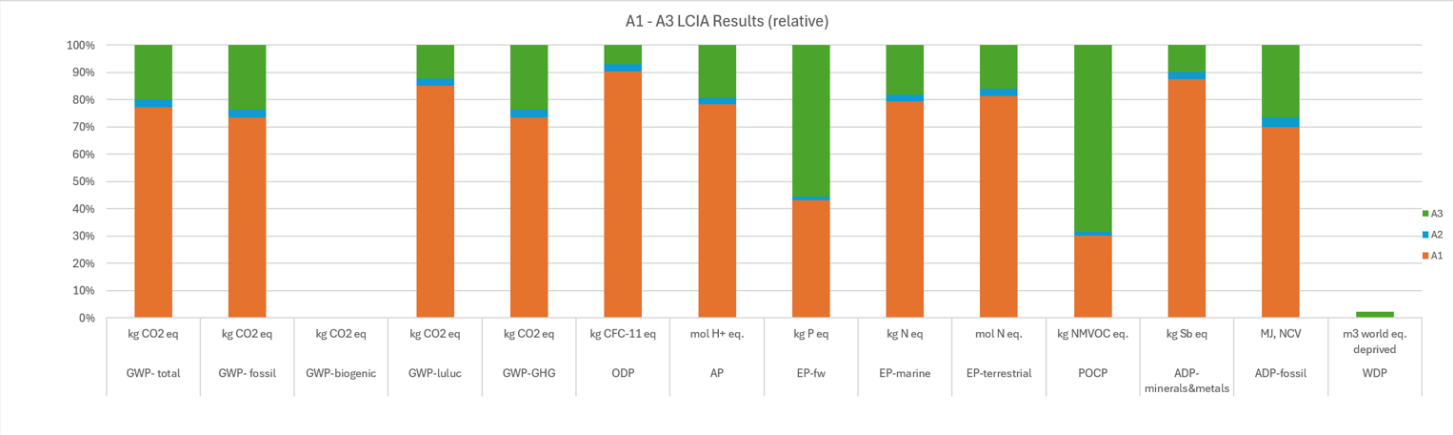
Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Interpretation

The cradle-to-gate GWP of DURAGRATE® ISO is 2.37E+00 kg CO₂ eq per kg of declared product. Raw material extraction (A1) is the dominant contributor at 77% of total GWP, driven by polyester resin and glass fiber reinforcement. Transport of raw materials (A2) contributes 3%. The manufacturing stage (A3) accounts for 20% of GWP, from electricity consumption at the VA facility using the US-SERC grid. Acidification potential (AP) is 7.78E-03 mol H⁺ eq. Abiotic depletion potential for fossil resources (ADP-fossil) is 2.84E+01 MJ. NCV. Net water deprivation potential (WDP) is negative (−3.54E+00 m³ world eq.), reflecting the specific water consumption profile of the isophthalic resin production process. Photochemical ozone creation potential (POCP) is 2.15E-02 kg NMVOC eq. Freshwater eutrophication potential (EP-fw) is 6.11E-04 kg P eq. No secondary materials or renewable secondary fuels are used in the production of this product.



Additional Environmental Information

NA

Table 7. Other Environmental Impacts

Impact Category	Unit	Method	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq	IPCC AR5 GWP 100	2.51e+0	2.94e-1	8.32e-2	0	0	0	0	0	0	0	2.91e-3	1.09e-2	0	6.41e-3	0

Note:

Abbreviations:

GWP-IOBC/GWP-GHG = Climate change indicator with instantaneous oxidation of biogenic carbon. The GWP-IOBC indicator has zero contribution to GWP from biogenic carbon temporary stored in products and packaging. The GWP-IOBC indicator, also called GWP-GHG, is identical to GWP-total except that the characterization factor (CF) for biogenic CO2 is set to zero.

Further Information

Version History

This Environmental Product Declaration is the original version of the EPD for DURAGRATE® ISO. The date published and registered declaration number are on the cover page. Any subsequent revision will be recorded here with a description of the change, and the current declaration will supersede all prior versions.

Intended Communication

Business-to-business (B2B)

References

AR6 Synthesis Report: Climate Change 2023. (n.d.). IPCC.
<https://www.ipcc.ch/report/ar6/syr/>

Carrier, M., Loppinet-Serani, A., Denux, D., Lasnier, J., Ham-Pichavant, F., Cansell, F., & Aymonier, C. (2010).

DATASmart LCI for the North American region - SimaPro database. (2025, May 21). SimaPro.
<https://simapro.com/products/datasmart-lci-package/>

De Laurentiis, V., Secchi, M., Bos, U., Horn, R., Laurent, A., & Sala, S. (2018). Soil quality index: Exploring options for a comprehensive assessment of land use impacts in LCA. *Journal of Cleaner Production*, 215, 63–74. <https://doi.org/10.1016/j.jclepro.2018.12.238>

Deng, X., Li, Y., & Fei, X. (2011). The mRNA abundance of *pepc2* gene is negatively correlated with oil content in *Chlamydomonas reinhardtii*. *Biomass and Bioenergy*, 35(5), 1811–1817. <https://doi.org/10.1016/j.biombioe.2011.01.005>

EN 15804:2012+A2:2019. (2019). Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products. iTeh Standards. <https://standards.iteh.ai/catalog/standards/cen/c98127b4-8dc2-48a4-9338-3e1366b16669/en-15804-2012a2-2019>

Environmental labels and declarations — Type III environmental declarations — Principles and procedures, ISO Standard 14025:2006.
<https://www.iso.org/standard/38131.html>

EPD International. (n.d.). EPD International.
https://www.environdec.com/pcr-library/pcr_6b99d07c-4b75-4763-4485-08dd775d2e49

EUR-LEX - 32021H2279 - EN - EUR-LEX. (n.d.).
<https://eur-lex.europa.eu/eli/reco/2021/2279/oj/eng>

loelovich, M. (2018). Energy potential of natural, synthetic polymers and waste materials - a review. *Academic Journal of Polymer Science*, 1(1).
<https://doi.org/10.19080/ajop.2018.01.555553>

Inc, I. (2024, March 6). EN 15941:2024 - Data quality for environmental assessment in construction. iTeh Standards.
https://standards.iteh.ai/catalog/standards/cen/95f4bf84-5e4b-4136-b6f9-6fc4ca959886/en-15941-2024?srsId=AfmBOorphicf5hpDy7J4d5N4bojvXAw1BDYZO04TBFLAHIN6UURN_Lzr

ISO 14040:2006. (n.d.). ISO.
<https://www.iso.org/standard/37456.html>

ISO 14044:2006. (n.d.). ISO.
<https://www.iso.org/standard/38498.html>

Roijen, B. & SGS INTRON B.V. (2024). LCA of Composite Waste Processing. In Report SGS INTRON B.V. (Report A144650/R20241613a; pp. 2–31).
<https://www.assocompositi.it/wp-content/uploads/2024/11/EuCIA-final-report-on-LCA-co-processing.pdf>

Sansom, M., & Meijer, J. (2002). Life-cycle Assessment (LCA) for steel construction.

Sustainability consulting for LCA & impact insights | PRé. (2026, April 13). PRé Sustainability.
<https://pre-sustainability.com/>

Strongwell Corporation. (2025). A life cycle assessment of STRONGIRT, DURAGRID Grating, and Structural Channel [LCA Report]

Thermogravimetric analysis as a new method to determine the lignocellulosic composition of biomass. *Biomass and Bioenergy*, 35(1), 298–307.
<https://doi.org/10.1016/j.biombioe.2010.08.067>

U.S. Life Cycle Inventory Database | Energy Systems Analysis | NLR. (n.d.).
<https://www.nlr.gov/analysis/lci>

Weidema, B. P., Bauer, C., Hischier, R., Mutel, C., Nemecek, T., Reinhard, J., Vadenbo, C. O., & Wernet G. (2013). Overview and methodology: Data quality guideline for the ecoinvent database version 3. In *Ecoinvent Report 1(V3)*
https://19913970.fs1.hubspotusercontent-na1.net/hubfs/19913970/Knowledge%20Base/Database/Fundamentals/dataqualityguideline_ecoinvent_3_20130506.pdf

Wilkinson, M. (2026, January 5). ecoinvent Version 3.12 - ecoinvent. Ecoinvent.
<https://ecoinvent.org/ecoinvent-v3-12/>