

Environmental Product Declaration



In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

V-Rod Glass Fiber Reinforced Rebars



from

Pultrall Incorporated



Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products, version 1.11
PCR review was conducted by: Martin Erlandsson, IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se
Life Cycle Assessment (LCA)
LCA accountability: Pultrall Incorporated
LCA and EPD developer: Rob Sianchuk Consulting
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Thomas Gloria, Industrial Ecology Consultants LLC  Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

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

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Pultrall Incorporated

Contact: Xavier Seynave, Quality and Environment, xavier.seynave@pultrall.com

Description of the organisation: As a manufacturer of pultruded FRP products, Pultrall pioneered the use of its technology in the construction sector with the development and distribution of V-Rod bars. Used as concrete reinforcement for structural and non-structural applications, V-Rod bars is the preferred choice for premium, corrosive-resistant reinforcement all across the world.

Product-related or management system-related certifications: ISO 9001- and 14001-certificates.

Name and location of production site(s): Pultrall Incorporated
700 9e Rue Nord Street North
Thetford-Mines, Quebec
G6G 6Z5



Product information

Product name: V-Rod glass fiber reinforced rebars

Product identification: Glass fiber reinforced polymer rebar for the internal reinforcement of concrete structures.

UN CPC code: 36

Geographical scope: Global.

Product description: The V-Rod products considered in this study are construction products specified in structural and non-structural construction works listed below:

- Transport - Bridges, restraints, aprons
- Tunnels - Diaphragm walls
- Buildings - Multilevel parking lots, balconies and MRI equipment rooms
- Electromagnetic - MRI rooms, automated tolls and electrical substations
- Marine facilities - Quays, seawalls and breakwaters
- Water treatment - Concrete structures
- Industrial applications - Aluminum smelters
- Civil engineering - Retaining walls
- Architecture - Architectural/decorative concrete structures
- Mining - Anchors and struts



Product information

Declared unit: 1 kg of V Rod products listed below, including packaging. The specifications and conversions for different bar types, minimum tensile modulus and size are provided below.

- V-Rod vinylester straight and bent bars – used for structural applications
 - Specifications
 - CSA S807 – Specification for fiber-reinforced polymers
 - CSA S807 requirements for D1 bars by keeping at least 80% of their initial tensile strength
 - ASTM 7957 – Solid round glass fiber reinforced polymer bars for concrete reinforcement
 - MTO SSP 999S02 – Glass fiber reinforced polymer reinforcing bar
 - FDOT 932-3 – Fiber reinforced polymer (FRP) reinforcing bars
 - ACI 440.6R – Specification for carbon and glass FRP materials for concrete reinforcement
- V-Rod polyester straight and bent bars – used for non-structural and temporary applications
 - Specifications
 - ICC certification – AC 521

Reference service life: The RSL is understood as the period of time until V-Rod rebars are replaced or restored. If properly installed as reinforcing in concrete construction works, the service lifetime of V-Rod is equal to the lifetime of the construction works it is installed in, and thus 50 years is the default RSL. V-Rod products can reach over 100 years' service life.

Table 1 Specification and conversion to declared units for V-Rod polyester straight and bent bars.

V Rod Product	Minimum Tensile modulus in GPa	Bar Sizes and linear mass in g/m												
		6M	7M	8M	9M	10M	11M	12M	13M	14M	15M	16M	17M	18M
V-Rod polyester (straight)	40	57.7	68.0	93.0	111.6	146.8	160.9	193.3	225.2	258.9	294.0	333.0	383.3	418.0
V-Rod polyester (bent)	40	64.0	-	-	-	147.3	-	254.5	-	-	401.8	-	-	-

Table 2 Specification and conversion to declared units for V-Rod vinylester straight and bent bars.

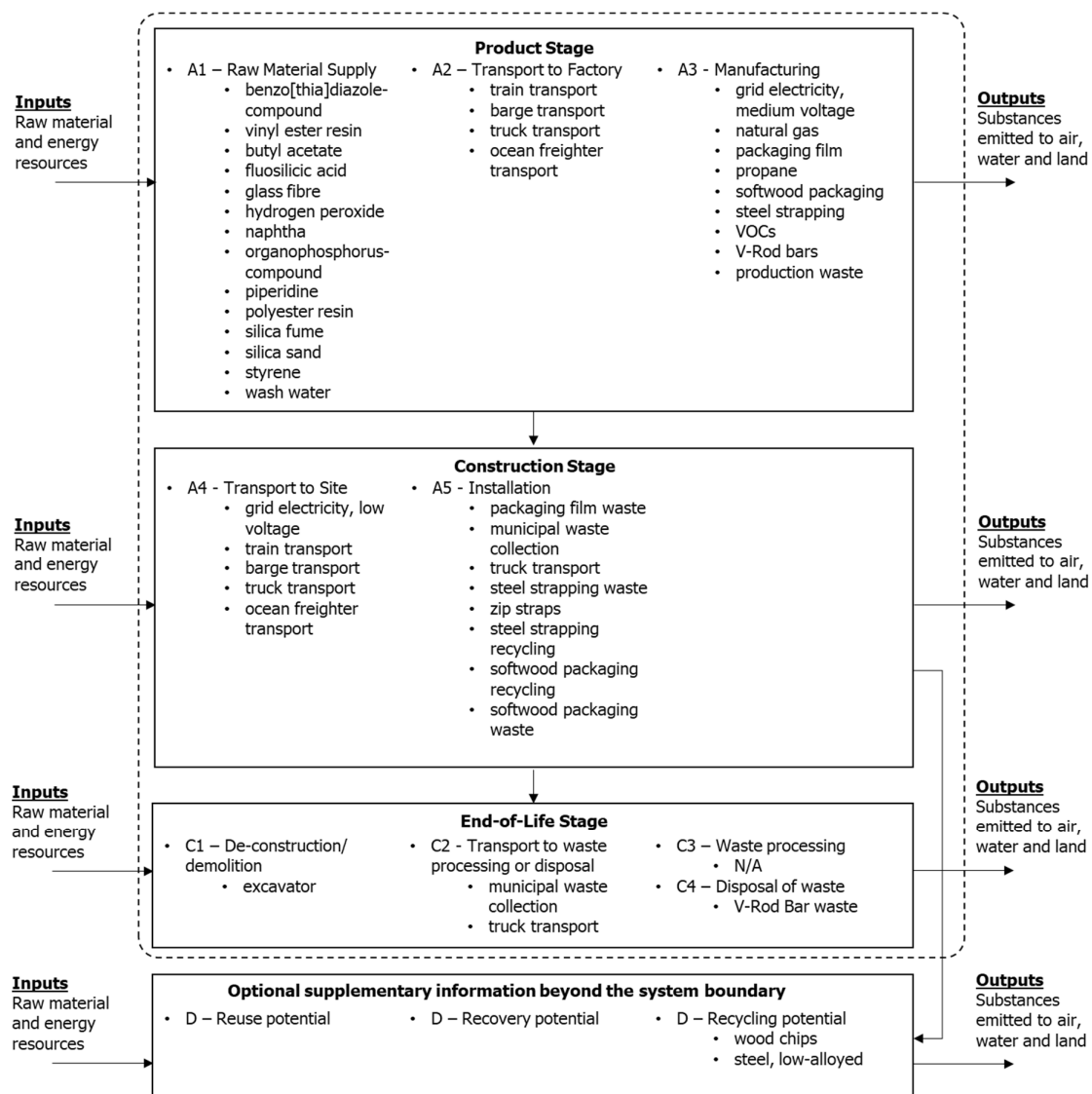
V Rod Product	Minimum Tensile modulus in GPa	Bar Sizes and linear mass in g/m									
		6M	10M	12M	15M	20M	22M	25M	30M	32M	38M
		(#2)	(#3)	(#4)	(#5)	(#6)	(#7)	(#8)	(#9)	(#10)	(#12)
V-Rod vinylester (straight)	60	78.0	179.8	311.7	489.1	694.0	914.7	1168.5	1,425.0	1846.0	2573.2
	50	77.0	166.9	285.4	420.8	612.9	823.4	1075.0	1,420.0	1726.2	2,425.0
	46	73.4	147.2	252.4	400.4	572.0	768.9	998.7	1287.9	1543.3	-
V-Rod vinylester (bent)	50	-	167.0	292.0	443.0	651.0	897.0	1,136.0	-	-	-

Time representativeness: 12-month manufacturing period spanning January to December 2021.

Database(s) and LCA software used: ecoinvent 3.8 (EN15804 add-on by GreenDelta) and openLCA 1.11.0.

Description of system boundaries: Cradle-to-gate (A1-A3) with options, modules C1 to C4, module D and optional module A4 and A5.

System diagram: The processes that were included within the system boundary of this study are summarized below with a flow diagram showing foreground product and waste flows by information module.



Scenarios and additional technical information:

A4 - Transport to site

- Transportation from the production gate to the construction site

Transport mode	Fuel Type	Distance (km)
Combination truck	Diesel	500
Train	Diesel	840
Ocean Freighter	Heavy fuel oil	7585

- Storage of products, including the provision of heating, cooling, humidity control, etc. – Storage of products at warehouse in North Carolina, consuming 0.07kWh of grid electricity for climate control per kg V Rod rebar warehoused.
- Wastage of construction products during transport (additional production processes to compensate for the loss of wastage of products) – No wastage.

A5 - Installation in the construction works

- Storage of products, including the provision of heating, cooling, humidity control, etc. – Stored on-site for an average of 3 weeks in open air. No energy or additional products/packaging used on-site for climate control.
- Wastage of construction products during installation (additional production processes to compensate for the loss of wastage of products) – No wastage.
- Waste processing of the waste from product packaging and product wastage during the construction processes up to the end-of-waste state or disposal of final residues – 100% landfilled for packaging film, 80% landfilled and 20% recycled for softwood packaging, and 45% landfilled, 52% recycled and 3% incinerated for steel strapping.
- Installation of the product into the building including manufacture and transportation of ancillary materials and any energy or water required for installation or operation of the construction site, and on-site operations to the product – Manual installation with 5g of nylon zip straps per kg V Rod rebar.

C1 - De-construction/demolition

- Deconstruction, including dismantling or demolition, of the product from the building, including initial on-site sorting of the materials – Operation of excavator in demolition, consuming 0.16L diesel per m3 V Rod rebar.

C2 - Transport to waste processing or disposal

- Transportation of the discarded product as part of the waste processing, e.g. to a recycling site and transportation of waste e.g. to final disposal

Transport mode	Fuel Type	Distance (km)
Municipal waste collection truck	Diesel	20
Freight truck	Diesel	50

C4 - Disposal

- Waste disposal including physical pre-treatment and management of the disposal site – 100% collected with mixed construction waste, disposed as inert waste.

D - Optional supplementary information beyond the system boundary

- Potential benefits and loads from reuse, recovery, recycling – Estimate quality and net output flow of recycled softwood packaging and steel strapping substitute for wood chips and steel, low-alloyed of the same amount and quality, assuming no material losses between the point of end-of-waste state and point of substitution, and using current average technologies and practice.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	*ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	Canada, USA, Global	Global	Canada, USA, Global	Global									Global				Global
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	>10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Not Declared

Content information

Product components	V-Rod polyester (straight)	V-Rod polyester (bent)	V-Rod vinylester (straight)	V-Rod vinylester (bent)	Post-consumer material, weight-%	Renewable material, weight-%
	Weight, kg	Weight, kg	Weight, kg	Weight, kg		
Polyester resin	1.37E-01	1.67E-01	0.00E+00	0.00E+00	0%	0%
Vinylester resin	0.00E+00	0.00E+00	1.39E-01	1.97E-01	0%	0%
Additive	1.40E-03	1.48E-02	1.78E-03	8.96E-03	0%	0%
Hardener/Catalyst	1.51E-03	1.19E-03	1.59E-03	1.70E-03	0%	0%
Glass fiber	7.64E-01	7.06E-01	7.62E-01	6.82E-01	0%	0%
Silica sand	9.46E-02	1.10E-01	9.46E-02	1.10E-01	0%	0%
TOTAL	1.00E+00	1.00E+00	1.00E+00	1.00E+00	0%	0%
Packaging materials	Weight, kg	Weight, kg	Weight, kg	Weight, kg	Average Weight-% (versus the product)	
Packaging film	2.79E-04	2.75E-04	2.79E-04	2.75E-04	0.03%	
Steel strapping	6.72E-04	6.61E-04	6.72E-04	6.61E-04	0.07%	
Softwood packaging	1.36E-02	1.34E-02	1.36E-02	1.34E-02	1.35%	
TOTAL	1.46E-02	1.43E-02	1.46E-02	1.43E-02	1.45%	

Dangerous substances from the Candidate List of Substances of Very High Concern (SVHC) - This product does not contain any substances in the Candidate List of SVHC which exceeds the limits for registration with the European Chemicals Agency (i.e. in amounts greater than 0.1% of the weight of the product).

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit of V-Rod polyester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	2.99E+00	2.93E-01	2.50E-02	3.31E+00	2.05E-01	4.96E-02	2.78E-04	3.08E-02	0.00E+00	5.80E-03	-5.20E-04
GWP-biogenic	kg CO ₂ eq.	2.39E-02	3.64E-04	-4.36E-02	-1.93E-02	4.37E-04	1.51E-03	1.90E-07	1.95E-04	0.00E+00	1.21E-04	1.23E-03
GWP-luluc	kg CO ₂ eq.	3.03E-03	5.43E-05	2.57E-05	3.11E-03	6.63E-05	2.36E-06	9.68E-09	4.93E-04	0.00E+00	2.63E-06	-7.73E-07
GWP-total	kg CO ₂ eq.	3.02E+00	2.93E-01	-1.86E-02	3.30E+00	2.05E-01	5.12E-02	2.78E-04	3.15E-02	0.00E+00	5.92E-03	7.10E-04
ODP	kg CFC 11 eq.	1.99E-07	5.69E-08	6.46E-10	2.56E-07	3.15E-08	1.25E-10	6.19E-11	6.10E-09	0.00E+00	9.72E-10	-2.33E-11
AP	mol H ⁺ eq.	1.92E-02	7.52E-03	3.78E-05	2.68E-02	3.26E-03	1.84E-04	2.99E-06	1.85E-04	0.00E+00	5.15E-05	-2.22E-06
EP-freshwater	kg PO ₄ ³⁻ eq.	2.10E-03	6.81E-05	5.56E-06	2.18E-03	1.33E-04	3.36E-06	6.25E-09	2.00E-06	0.00E+00	2.14E-06	-6.84E-07
EP-freshwater	kg P eq.	6.86E-04	2.22E-05	1.81E-06	7.10E-04	4.33E-05	1.09E-06	2.04E-09	6.50E-07	0.00E+00	6.96E-07	-2.23E-07
EP-marine	kg N eq.	3.90E-03	1.94E-03	1.18E-05	5.85E-03	9.03E-04	5.19E-05	1.35E-06	7.75E-05	0.00E+00	2.12E-05	-7.19E-07
EP-terrestrial	mol N eq.	4.02E-02	2.15E-02	1.24E-04	6.18E-02	9.92E-03	4.24E-04	1.47E-05	8.24E-04	0.00E+00	2.30E-04	-4.24E-06
POCP	kg NMVOC eq.	1.20E-02	5.54E-03	9.37E-04	1.85E-02	2.60E-03	1.43E-04	3.99E-06	2.83E-04	0.00E+00	6.28E-05	-1.53E-06
ADP-minerals&metals*	kg Sb eq.	2.90E-04	2.00E-07	1.55E-08	2.90E-04	3.97E-07	3.31E-07	1.34E-11	1.40E-09	0.00E+00	3.13E-09	-4.95E-10
ADP-fossil*	MJ	1.66E+01	5.49E-01	4.14E-02	1.72E+01	8.10E-01	6.90E-02	4.50E-05	4.21E-01	0.00E+00	1.63E-02	-5.01E-03
WDP	m ³	1.14E+00	1.30E-02	2.71E-03	1.16E+00	2.08E-02	1.48E-02	3.73E-06	-1.08E-01	0.00E+00	6.03E-04	-4.00E-04
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption											

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory indicators according to Construction Products PCR

Results per declared unit of V-Rod polyester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	3.02E+00	2.93E-01	-1.86E-02	3.30E+00	2.05E-01	5.12E-02	2.78E-04	3.15E-02	0.00E+00	5.92E-03	7.10E-04
Acronyms	GWP-GHG = Global warming potential – Greenhouse gas											

Potential environmental impact – additional voluntary indicators characterized with TRACI 2.1

Results per declared unit of V-Rod polyester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP	kg CO ₂ eq.	2.89E+00	2.90E-01	8.51E-03	3.19E+00	2.02E-01	4.77E-02	2.75E-04	3.10E-02	0.00E+00	5.73E-03	-5.10E-04
ODP	kg CFC-11 eq.	2.14E-07	6.00E-08	6.97E-10	2.74E-07	3.36E-08	1.32E-10	6.51E-11	6.42E-09	0.00E+00	1.03E-09	-2.67E-11
EP	kg N eq.	6.73E-03	4.68E-04	1.63E-05	7.22E-03	4.69E-04	3.44E-05	2.53E-07	2.42E-05	0.00E+00	1.17E-05	-2.26E-06
AP	kg SO ₂ eq.	1.63E-02	6.44E-03	3.33E-05	2.28E-02	2.82E-03	1.54E-04	2.75E-06	1.67E-04	0.00E+00	4.69E-05	-1.87E-06
POCP	kg O ₃ eq.	2.32E-01	1.23E-01	1.45E-02	3.69E-01	5.69E-02	2.40E-03	8.57E-05	4.78E-03	0.00E+00	1.34E-03	-2.35E-05
Acronyms	GWP = Global warming potential, ODP = Depletion potential of the stratospheric ozone layer, EP = Eutrophication potential, AP = Acidification potential, POCP = Photochemical oxidant creation potential.											

Use of resources

Results per declared unit of V-Rod polyester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2.99E+00	2.93E-01	2.50E-02	3.31E+00	2.05E-01	4.96E-02	2.78E-04	3.08E-02	0.00E+00	5.80E-03	-5.20E-04
PERM	MJ	2.39E-02	3.64E-04	-4.36E-02	-1.93E-02	4.37E-04	1.51E-03	1.90E-07	1.95E-04	0.00E+00	1.21E-04	1.23E-03
PERT	MJ	3.03E-03	5.43E-05	2.57E-05	3.11E-03	6.63E-05	2.36E-06	9.68E-09	4.93E-04	0.00E+00	2.63E-06	-7.73E-07
PENRE	MJ	3.02E+00	2.93E-01	-1.86E-02	3.30E+00	2.05E-01	5.12E-02	2.78E-04	3.15E-02	0.00E+00	5.92E-03	7.10E-04
PENRM	MJ	1.99E-07	5.69E-08	6.46E-10	2.56E-07	3.15E-08	1.25E-10	6.19E-11	6.10E-09	0.00E+00	9.72E-10	-2.33E-11
PENRT	MJ	1.92E-02	7.52E-03	3.78E-05	2.68E-02	3.26E-03	1.84E-04	2.99E-06	1.85E-04	0.00E+00	5.15E-05	-2.22E-06
SM	kg	2.10E-03	6.81E-05	5.56E-06	2.18E-03	1.33E-04	3.36E-06	6.25E-09	2.00E-06	0.00E+00	2.14E-06	-6.84E-07
RSF	MJ	6.86E-04	2.22E-05	1.81E-06	7.10E-04	4.33E-05	1.09E-06	2.04E-09	6.50E-07	0.00E+00	6.96E-07	-2.23E-07
NRSF	MJ	3.90E-03	1.94E-03	1.18E-05	5.85E-03	9.03E-04	5.19E-05	1.35E-06	7.75E-05	0.00E+00	2.12E-05	-7.19E-07
FW	m ³	4.02E-02	2.15E-02	1.24E-04	6.18E-02	9.92E-03	4.24E-04	1.47E-05	8.24E-04	0.00E+00	2.30E-04	-4.24E-06
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water											

Waste production and output flows

Waste production

Results per declared unit of V-Rod polyester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.61E+00	1.76E-02	6.87E-03	1.63E+00	4.12E-02	1.45E-03	3.06E-06	6.60E-03	0.00E+00	1.63E-03	-4.10E-04
Non-hazardous waste disposed	kg	3.26E-01	3.87E-03	5.15E-01	8.45E-01	2.97E-02	1.44E-03	1.44E-06	0.00E+00	0.00E+00	2.56E-04	-1.40E-02
Radioactive waste disposed	kg	1.93E+00	2.15E-02	5.22E-01	2.48E+00	7.08E-02	2.90E-03	4.50E-06	6.60E-03	0.00E+00	1.89E-03	-1.44E-02

Output flows

Results per declared unit of V-Rod polyester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	2.22E-02	9.34E-04	2.60E-04	2.34E-02	2.13E-03	1.46E-05	1.59E-07	0.00E+00	0.00E+00	6.05E-05	-2.48E-05
Materials for energy recovery	kg	9.30E-04	4.89E-04	2.85E-04	1.70E-03	5.93E-04	1.21E-06	1.10E-07	0.00E+00	0.00E+00	2.33E-05	-1.39E-05
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Information on biogenic carbon content

Results per declared unit of V-Rod polyester (straight)		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	6.82E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit of V-Rod polyester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	3.10E+00	2.33E-01	6.48E-01	3.98E+00	2.05E-01	4.96E-02	2.39E-04	3.13E-02	0.00E+00	5.66E-03	-4.50E-04
GWP-biogenic	kg CO ₂ eq.	2.79E-02	3.65E-04	-4.72E-02	-1.90E-02	4.43E-04	4.87E-04	1.67E-07	2.50E-05	0.00E+00	1.20E-04	-6.10E-06
GWP-luluc	kg CO ₂ eq.	3.02E-03	6.48E-05	4.48E-05	3.13E-03	6.64E-05	2.32E-06	8.56E-09	2.19E-06	0.00E+00	2.51E-06	-6.50E-07
GWP-total	kg CO ₂ eq.	3.13E+00	2.33E-01	6.01E-01	3.96E+00	2.05E-01	5.01E-02	2.39E-04	3.14E-02	0.00E+00	5.78E-03	-4.50E-04
ODP	kg CFC 11 eq.	2.14E-07	4.34E-08	2.09E-07	4.66E-07	3.15E-08	1.25E-10	5.31E-11	7.01E-09	0.00E+00	9.65E-10	-2.35E-11
AP	mol H ⁺ eq.	1.92E-02	5.26E-03	1.77E-03	2.62E-02	3.25E-03	1.84E-04	2.57E-06	1.92E-04	0.00E+00	5.10E-05	-2.23E-06
EP-freshwater	kg PO ₄ ³⁻ eq.	2.11E-03	7.02E-05	3.20E-05	2.21E-03	1.33E-04	3.36E-06	5.33E-09	1.42E-06	0.00E+00	1.97E-06	-6.88E-07
EP-freshwater	kg P eq.	6.88E-04	2.29E-05	1.04E-05	7.21E-04	4.33E-05	1.09E-06	1.74E-09	4.63E-07	0.00E+00	6.43E-07	-2.24E-07
EP-marine	kg N eq.	3.81E-03	1.40E-03	2.90E-04	5.51E-03	9.03E-04	5.19E-05	1.15E-06	7.71E-05	0.00E+00	2.11E-05	-7.23E-07
EP-terrestrial	mol N eq.	3.98E-02	1.55E-02	3.15E-03	5.84E-02	9.91E-03	4.24E-04	1.26E-05	8.46E-04	0.00E+00	2.29E-04	-4.26E-06
POCP	kg NMVOC eq.	1.21E-02	4.02E-03	2.35E-03	1.85E-02	2.59E-03	1.43E-04	3.42E-06	2.85E-04	0.00E+00	6.23E-05	-1.54E-06
ADP-minerals&metals*	kg Sb eq.	2.74E-04	2.15E-07	4.11E-08	2.74E-04	3.96E-07	3.31E-07	1.12E-11	2.66E-09	0.00E+00	2.62E-09	-4.98E-10
ADP-fossil*	MJ	1.68E+01	5.64E-01	1.28E-01	1.75E+01	8.09E-01	6.90E-02	3.84E-05	1.08E-02	0.00E+00	1.50E-02	-5.04E-03
WDP	m ³	1.27E+00	1.41E-02	6.83E-03	1.29E+00	2.07E-02	1.48E-02	3.18E-06	5.81E-04	0.00E+00	5.55E-04	-4.00E-04
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption											

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory indicators according to Construction Products PCR

Results per declared unit of V-Rod polyester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	3.13E+00	2.33E-01	6.01E-01	3.96E+00	2.05E-01	5.12E-02	2.39E-04	3.14E-02	0.00E+00	5.78E-03	7.10E-04
Acronyms	GWP-GHG = Global warming potential – Greenhouse gas											

Potential environmental impact – additional voluntary indicators characterized with TRACI 2.1

Results per declared unit of V-Rod polyester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP	kg CO ₂ eq.	2.99E+00	2.30E-01	5.98E-01	3.82E+00	2.01E-01	4.77E-02	2.36E-04	3.11E-02	0.00E+00	5.60E-03	-5.10E-04
ODP	kg CFC-11 eq.	2.29E-07	4.58E-08	2.17E-07	4.92E-07	3.35E-08	1.31E-10	5.59E-11	7.38E-09	0.00E+00	1.02E-09	-2.69E-11
EP	kg N eq.	6.88E-03	3.93E-04	1.18E-04	7.39E-03	4.68E-04	3.44E-05	2.17E-07	2.17E-05	0.00E+00	1.13E-05	-2.27E-06
AP	kg SO ₂ eq.	1.63E-02	4.52E-03	1.47E-03	2.23E-02	2.82E-03	1.54E-04	2.36E-06	1.73E-04	0.00E+00	4.65E-05	-1.88E-06
POCP	kg O ₃ eq.	2.29E-01	8.90E-02	3.81E-02	3.56E-01	5.69E-02	2.40E-03	7.35E-05	4.91E-03	0.00E+00	1.33E-03	-2.36E-05
Acronyms	GWP = Global warming potential, ODP = Depletion potential of the stratospheric ozone layer, EP = Eutrophication potential, AP = Acidification potential, POCP = Photochemical oxidant creation potential.											

Use of resources

Results per declared unit of V-Rod polyester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.59E+00	2.24E-02	1.20E-02	1.63E+00	4.11E-02	1.45E-03	2.61E-06	7.67E-04	0.00E+00	1.55E-03	-4.10E-04
PERM	MJ	3.49E-01	4.10E-03	5.63E-01	9.16E-01	2.96E-02	1.44E-03	1.20E-06	2.07E-04	0.00E+00	2.43E-04	-1.40E-02
PERT	MJ	1.94E+00	2.65E-02	5.75E-01	2.54E+00	7.07E-02	2.89E-03	3.81E-06	9.74E-04	0.00E+00	1.79E-03	-1.44E-02
PENRE	MJ	1.81E+01	5.72E-01	1.31E-01	1.88E+01	9.58E-01	1.09E-01	3.96E-05	1.11E-02	0.00E+00	1.56E-02	-5.04E-03
PENRM	MJ	3.10E+01	2.67E+00	1.02E+01	4.39E+01	2.12E+00	5.14E-01	3.19E-03	4.17E-01	0.00E+00	6.15E-02	-2.02E-03
PENRT	MJ	4.90E+01	3.24E+00	1.04E+01	6.27E+01	3.08E+00	6.23E-01	3.23E-03	4.28E-01	0.00E+00	7.71E-02	-7.06E-03
SM	kg	3.77E-02	1.89E-03	1.16E-03	4.08E-02	2.92E-03	9.13E-06	6.43E-07	5.52E-05	0.00E+00	1.30E-04	-3.40E-04
RSF	MJ	1.10E-02	2.99E-04	8.07E-05	1.14E-02	8.78E-04	1.51E-06	2.00E-08	1.02E-05	0.00E+00	2.04E-05	-1.59E-06
NRSF	MJ	5.64E-02	4.59E-04	1.98E-04	5.71E-02	5.31E-04	2.79E-06	7.21E-08	1.60E-05	0.00E+00	2.86E-05	-3.77E-05
FW	m ³	3.78E-02	3.40E-04	1.63E-04	3.83E-02	4.93E-04	3.44E-04	7.50E-08	1.38E-05	0.00E+00	1.96E-05	-9.38E-06
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water											

Waste production and output flows

Waste production

Results per declared unit of V-Rod polyester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	3.54E+00	1.14E-01	4.88E-02	3.70E+00	2.16E-01	1.28E-03	8.07E-06	2.19E-03	0.00E+00	3.21E-03	-1.06E-03
Non-hazardous waste disposed	kg	1.73E-01	1.42E-01	1.31E-01	4.46E-01	1.11E-01	1.28E-02	8.78E-07	8.34E-03	0.00E+00	1.01E+00	-1.20E-04
Radioactive waste disposed	kg	3.68E-04	3.98E-06	1.30E-06	3.73E-04	7.37E-05	2.20E-08	5.05E-10	1.49E-07	0.00E+00	2.82E-07	0.00E+00

Output flows

Results per declared unit of V-Rod polyester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	2.27E-02	1.13E-03	8.45E-04	2.47E-02	2.12E-03	1.40E-05	1.34E-07	3.82E-05	0.00E+00	4.76E-05	-2.49E-05
Materials for energy recovery	kg	8.84E-04	5.64E-04	7.61E-04	2.21E-03	5.82E-04	1.01E-06	9.20E-08	1.92E-05	0.00E+00	1.05E-05	-1.40E-05
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Information on biogenic carbon content

Results per declared unit of V-Rod polyester (bent)		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	6.70E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit of V-Rod vinylester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	2.79E+00	3.02E-01	2.27E-02	3.12E+00	2.05E-01	4.96E-02	2.35E-04	3.14E-02	0.00E+00	5.66E-03	-5.20E-04
GWP-biogenic	kg CO ₂ eq.	1.42E-02	4.30E-04	-4.36E-02	-2.90E-02	4.51E-04	1.51E-03	1.64E-07	2.54E-05	0.00E+00	1.21E-04	1.23E-03
GWP-luluc	kg CO ₂ eq.	2.96E-03	6.99E-05	2.40E-05	3.06E-03	6.60E-05	2.35E-06	8.13E-09	2.15E-06	0.00E+00	2.50E-06	-7.73E-07
GWP-total	kg CO ₂ eq.	2.81E+00	3.03E-01	-2.09E-02	3.09E+00	2.05E-01	5.12E-02	2.35E-04	3.14E-02	0.00E+00	5.78E-03	7.10E-04
ODP	kg CFC 11 eq.	1.68E-07	5.76E-08	6.04E-10	2.26E-07	3.15E-08	1.25E-10	5.23E-11	7.01E-09	0.00E+00	9.65E-10	-2.33E-11
AP	mol H ⁺ eq.	1.90E-02	7.45E-03	3.65E-05	2.64E-02	3.26E-03	1.84E-04	2.53E-06	1.92E-04	0.00E+00	5.10E-05	-2.22E-06
EP-freshwater	kg PO ₄ ³⁻ eq.	2.09E-03	7.64E-05	5.47E-06	2.18E-03	1.33E-04	3.36E-06	5.27E-09	1.42E-06	0.00E+00	1.97E-06	-6.84E-07
EP-freshwater	kg P eq.	6.82E-04	2.49E-05	1.78E-06	7.09E-04	4.33E-05	1.09E-06	1.72E-09	4.63E-07	0.00E+00	6.43E-07	-2.23E-07
EP-marine	kg N eq.	3.83E-03	1.95E-03	1.14E-05	5.80E-03	9.03E-04	5.19E-05	1.14E-06	7.72E-05	0.00E+00	2.11E-05	-7.19E-07
EP-terrestrial	mol N eq.	3.96E-02	2.16E-02	1.19E-04	6.14E-02	9.91E-03	4.24E-04	1.25E-05	8.46E-04	0.00E+00	2.29E-04	-4.24E-06
POCP	kg NMVOC eq.	1.18E-02	5.57E-03	8.44E-04	1.82E-02	2.60E-03	1.43E-04	3.37E-06	2.85E-04	0.00E+00	6.23E-05	-1.53E-06
ADP-minerals&metals*	kg Sb eq.	2.90E-04	2.33E-07	1.53E-08	2.90E-04	3.96E-07	3.31E-07	1.12E-11	2.67E-09	0.00E+00	2.61E-09	-4.95E-10
ADP-fossil*	MJ	1.65E+01	6.14E-01	4.06E-02	1.72E+01	8.09E-01	6.90E-02	3.80E-05	1.08E-02	0.00E+00	1.50E-02	-5.01E-03
WDP	m ³	9.42E-01	1.54E-02	2.58E-03	9.60E-01	2.07E-02	1.48E-02	3.15E-06	5.83E-04	0.00E+00	5.55E-04	-4.00E-04
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption											

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory indicators according to Construction Products PCR

Results per declared unit of V-Rod vinylester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	2.81E+00	3.03E-01	-2.09E-02	3.09E+00	2.05E-01	5.12E-02	2.35E-04	3.14E-02	0.00E+00	5.78E-03	7.10E-04
Acronyms	GWP-GHG = Global warming potential – Greenhouse gas											

Potential environmental impact – additional voluntary indicators characterized with TRACI 2.1

Results per declared unit of V-Rod vinylester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP	kg CO ₂ eq.	2.68E+00	3.00E-01	7.93E-03	2.99E+00	2.01E-01	4.77E-02	2.33E-04	3.11E-02	0.00E+00	5.60E-03	-5.10E-04
ODP	kg CFC-11 eq.	1.83E-07	6.08E-08	6.53E-10	2.45E-07	3.35E-08	1.31E-10	5.51E-11	7.38E-09	0.00E+00	1.02E-09	-2.67E-11
EP	kg N eq.	6.13E-03	4.91E-04	1.60E-05	6.64E-03	4.68E-04	3.44E-05	2.14E-07	2.17E-05	0.00E+00	1.13E-05	-2.26E-06
AP	kg SO ₂ eq.	1.61E-02	6.39E-03	3.22E-05	2.25E-02	2.82E-03	1.54E-04	2.33E-06	1.73E-04	0.00E+00	4.65E-05	-1.87E-06
POCP	kg O ₃ eq.	2.27E-01	1.24E-01	1.30E-02	3.64E-01	5.69E-02	2.40E-03	7.24E-05	4.91E-03	0.00E+00	1.33E-03	-2.35E-05
Acronyms	GWP = Global warming potential, ODP = Depletion potential of the stratospheric ozone layer, EP = Eutrophication potential, AP = Acidification potential, POCP = Photochemical oxidant creation potential.											

Use of resources

Results per declared unit of V-Rod vinylester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.58E+00	2.42E-02	6.30E-03	1.61E+00	4.11E-02	1.45E-03	2.58E-06	7.68E-04	0.00E+00	1.55E-03	-4.10E-04
PERM	MJ	2.41E-01	4.51E-03	5.15E-01	7.60E-01	2.95E-02	1.44E-03	1.17E-06	2.01E-04	0.00E+00	2.35E-04	-1.40E-02
PERT	MJ	1.82E+00	2.87E-02	5.21E-01	2.37E+00	7.06E-02	2.89E-03	3.75E-06	9.69E-04	0.00E+00	1.79E-03	-1.44E-02
PENRE	MJ	1.77E+01	6.23E-01	4.25E-02	1.84E+01	9.58E-01	1.09E-01	3.92E-05	1.11E-02	0.00E+00	1.56E-02	-5.01E-03
PENRM	MJ	2.86E+01	3.52E+00	8.08E-02	3.22E+01	2.12E+00	5.14E-01	3.14E-03	4.17E-01	0.00E+00	6.15E-02	-2.01E-03
PENRT	MJ	4.63E+01	4.15E+00	1.23E-01	5.06E+01	3.08E+00	6.23E-01	3.18E-03	4.28E-01	0.00E+00	7.71E-02	-7.03E-03
SM	kg	3.73E-02	2.05E-03	4.23E-04	3.98E-02	2.92E-03	9.14E-06	6.35E-07	5.55E-05	0.00E+00	1.30E-04	-3.40E-04
RSF	MJ	1.08E-02	3.23E-04	3.56E-05	1.11E-02	8.78E-04	1.51E-06	1.98E-08	1.02E-05	0.00E+00	2.04E-05	-1.58E-06
NRSF	MJ	3.07E-02	5.01E-04	9.70E-05	3.13E-02	5.30E-04	2.81E-06	7.10E-08	1.60E-05	0.00E+00	2.86E-05	-3.75E-05
FW	m ³	3.08E-02	3.69E-04	6.19E-05	3.13E-02	4.93E-04	3.44E-04	7.41E-08	1.38E-05	0.00E+00	1.96E-05	-9.32E-06
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water											

Waste production and output flows

Waste production

Results per declared unit of V-Rod vinylester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	3.51E+00	1.24E-01	8.24E-03	3.64E+00	2.16E-01	1.28E-03	7.99E-06	2.20E-03	0.00E+00	3.21E-03	-1.05E-03
Non-hazardous waste disposed	kg	2.02E-01	1.54E-01	1.05E-01	4.61E-01	1.11E-01	1.28E-02	8.66E-07	8.34E-03	0.00E+00	1.01E+00	-1.20E-04
Radioactive waste disposed	kg	3.63E-04	4.30E-06	6.78E-07	3.68E-04	7.37E-05	2.20E-08	4.99E-10	1.49E-07	0.00E+00	2.82E-07	0.00E+00

Output flows

Results per declared unit of V-Rod vinylester (straight)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	2.22E-02	1.24E-03	2.57E-04	2.37E-02	2.11E-03	1.44E-05	1.34E-07	3.84E-05	0.00E+00	4.76E-05	-2.48E-05
Materials for energy recovery	kg	8.44E-04	6.20E-04	2.83E-04	1.75E-03	5.81E-04	1.01E-06	9.20E-08	1.94E-05	0.00E+00	1.05E-05	-1.39E-05
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Information on biogenic carbon content

Results per declared unit of V-Rod vinylester (straight)		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	6.82E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit of V-Rod vinylester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	2.91E+00	3.28E-01	1.15E+00	4.38E+00	2.05E-01	4.96E-02	2.11E-04	3.14E-02	0.00E+00	5.66E-03	-5.20E-04
GWP-biogenic	kg CO ₂ eq.	1.53E-02	4.91E-04	-4.29E-02	-2.70E-02	4.32E-04	1.51E-03	1.45E-07	2.50E-05	0.00E+00	1.20E-04	1.23E-03
GWP-luluc	kg CO ₂ eq.	2.98E-03	9.27E-05	6.60E-05	3.13E-03	6.66E-05	2.36E-06	7.62E-09	2.20E-06	0.00E+00	2.51E-06	-7.73E-07
GWP-total	kg CO ₂ eq.	2.93E+00	3.29E-01	1.10E+00	4.36E+00	2.05E-01	5.12E-02	2.12E-04	3.14E-02	0.00E+00	5.78E-03	7.10E-04
ODP	kg CFC 11 eq.	1.84E-07	6.10E-08	3.77E-07	6.22E-07	3.15E-08	1.25E-10	4.70E-11	7.01E-09	0.00E+00	9.65E-10	-2.33E-11
AP	mol H ⁺ eq.	1.90E-02	7.77E-03	3.16E-03	2.99E-02	3.26E-03	1.84E-04	2.27E-06	1.92E-04	0.00E+00	5.10E-05	-2.22E-06
EP-freshwater	kg PO ₄ ³⁻ eq.	2.14E-03	8.79E-05	5.37E-05	2.28E-03	1.33E-04	3.36E-06	4.75E-09	1.42E-06	0.00E+00	1.97E-06	-6.84E-07
EP-freshwater	kg P eq.	6.96E-04	2.86E-05	1.75E-05	7.42E-04	4.33E-05	1.09E-06	1.55E-09	4.64E-07	0.00E+00	6.43E-07	-2.23E-07
EP-marine	kg N eq.	3.80E-03	2.07E-03	5.17E-04	6.38E-03	9.03E-04	5.19E-05	1.02E-06	7.72E-05	0.00E+00	2.11E-05	-7.19E-07
EP-terrestrial	mol N eq.	3.92E-02	2.29E-02	5.61E-03	6.77E-02	9.92E-03	4.24E-04	1.12E-05	8.46E-04	0.00E+00	2.29E-04	-4.24E-06
POCP	kg NMVOC eq.	1.20E-02	5.91E-03	3.06E-03	2.09E-02	2.60E-03	1.43E-04	3.03E-06	2.85E-04	0.00E+00	6.23E-05	-1.53E-06
ADP-minerals&metals*	kg Sb eq.	2.66E-04	2.80E-07	6.24E-08	2.66E-04	3.97E-07	3.31E-07	1.01E-11	2.69E-09	0.00E+00	2.65E-09	-4.95E-10
ADP-fossil*	MJ	1.71E+01	7.03E-01	1.99E-01	1.80E+01	8.10E-01	6.90E-02	3.41E-05	1.08E-02	0.00E+00	1.50E-02	-5.01E-03
WDP	m ³	1.07E+00	1.88E-02	1.08E-02	1.10E+00	2.08E-02	1.48E-02	2.84E-06	5.84E-04	0.00E+00	5.55E-04	-4.00E-04
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption											

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory indicators according to Construction Products PCR

Results per declared unit of V-Rod vinylester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	2.93E+00	3.29E-01	1.10E+00	4.36E+00	2.05E-01	5.12E-02	2.12E-04	3.14E-02	0.00E+00	5.78E-03	7.10E-04
Acronyms	GWP-GHG = Global warming potential – Greenhouse gas											

Potential environmental impact – additional voluntary indicators characterized with TRACI 2.1

Results per declared unit of V-Rod vinylester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP	kg CO ₂ eq.	2.79E+00	3.25E-01	1.08E+00	4.19E+00	2.02E-01	4.77E-02	2.09E-04	3.11E-02	0.00E+00	5.60E-03	-5.10E-04
ODP	kg CFC-11 eq.	2.00E-07	6.44E-08	3.92E-07	6.56E-07	3.36E-08	1.31E-10	4.95E-11	7.38E-09	0.00E+00	1.02E-09	-2.67E-11
EP	kg N eq.	6.38E-03	5.37E-04	2.01E-04	7.12E-03	4.68E-04	3.44E-05	1.93E-07	2.17E-05	0.00E+00	1.13E-05	-2.26E-06
AP	kg SO ₂ eq.	1.61E-02	6.67E-03	2.63E-03	2.54E-02	2.82E-03	1.54E-04	2.09E-06	1.73E-04	0.00E+00	4.65E-05	-1.87E-06
POCP	kg O ₃ eq.	2.24E-01	1.31E-01	5.06E-02	4.06E-01	5.69E-02	2.40E-03	6.51E-05	4.91E-03	0.00E+00	1.33E-03	-2.35E-05
Acronyms	GWP = Global warming potential, ODP = Depletion potential of the stratospheric ozone layer, EP = Eutrophication potential, AP = Acidification potential, POCP = Photochemical oxidant creation potential.											

Use of resources

Results per declared unit of V-Rod vinylester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.57E+00	3.36E-02	1.87E-02	1.62E+00	4.11E-02	1.45E-03	2.32E-06	7.69E-04	0.00E+00	1.55E-03	-4.10E-04
PERM	MJ	2.60E-01	5.92E-03	5.18E-01	7.83E-01	2.97E-02	1.44E-03	1.09E-06	2.07E-04	0.00E+00	2.45E-04	-1.40E-02
PERT	MJ	1.83E+00	3.95E-02	5.36E-01	2.41E+00	7.08E-02	2.89E-03	3.41E-06	9.76E-04	0.00E+00	1.80E-03	-1.44E-02
PENRE	MJ	1.85E+01	7.16E-01	2.04E-01	1.94E+01	9.89E-01	1.09E-01	3.54E-05	1.12E-02	0.00E+00	1.57E-02	-5.01E-03
PENRM	MJ	3.21E+01	3.78E+00	1.85E+01	5.44E+01	2.13E+00	5.14E-01	2.82E-03	4.17E-01	0.00E+00	6.15E-02	-2.01E-03
PENRT	MJ	5.06E+01	4.49E+00	1.87E+01	7.38E+01	3.11E+00	6.23E-01	2.86E-03	4.28E-01	0.00E+00	7.72E-02	-7.03E-03
SM	kg	3.87E-02	2.67E-03	1.77E-03	4.32E-02	2.93E-03	9.16E-06	5.71E-07	5.55E-05	0.00E+00	1.30E-04	-3.40E-04
RSF	MJ	1.17E-02	4.57E-04	1.19E-04	1.22E-02	8.79E-04	1.51E-06	1.78E-08	1.02E-05	0.00E+00	2.04E-05	-1.58E-06
NRSF	MJ	3.22E-02	6.40E-04	2.92E-04	3.31E-02	5.32E-04	2.82E-06	6.42E-08	1.60E-05	0.00E+00	2.86E-05	-3.75E-05
FW	m ³	3.30E-02	4.50E-04	2.56E-04	3.37E-02	4.94E-04	3.44E-04	6.68E-08	1.39E-05	0.00E+00	1.96E-05	-9.32E-06
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water											

Waste production and output flows

Waste production

Results per declared unit of V-Rod vinylester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	3.57E+00	1.42E-01	8.16E-02	3.79E+00	2.16E-01	1.28E-03	7.19E-06	2.20E-03	0.00E+00	3.21E-03	-1.05E-03
Non-hazardous waste disposed	kg	2.13E-01	1.55E-01	1.36E-01	5.03E-01	1.11E-01	1.28E-02	7.82E-07	8.34E-03	0.00E+00	1.01E+00	-1.20E-04
Radioactive waste disposed	kg	3.99E-04	6.73E-06	2.10E-06	4.08E-04	8.91E-05	2.53E-08	5.16E-10	1.72E-07	0.00E+00	3.24E-07	0.00E+00

Output flows

Results per declared unit of V-Rod vinylester (bent)												
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	2.36E-02	1.69E-03	1.33E-03	2.67E-02	2.12E-03	1.44E-05	1.20E-07	3.85E-05	0.00E+00	4.77E-05	-2.48E-05
Materials for energy recovery	kg	9.07E-04	8.29E-04	1.15E-03	2.89E-03	5.84E-04	1.01E-06	8.27E-08	1.94E-05	0.00E+00	1.05E-05	-1.39E-05
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Information on biogenic carbon content

Results per declared unit of V-Rod vinylester (bent)		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	6.70E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Differences versus previous versions

This is the first version of the V-Rod Glass Fiber Reinforced Rebars EPD.

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