

Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021, except those parts related to publish an EPD via a program operator, for:

Divinycell H

from

Diab Group AB

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Third party verifier	Martin Erlandsson, IVL

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



General information

Company information

Owner of the EPD: Diab Group AB

Contact: Per Hökfelt, VP Sustainability & QEHS

Description of the organization:

Diab is a global company that develops, manufactures, and sells core materials for sandwich composite structures used in for example leisure boats, wind turbine blades and components for aircraft, trains, industrial applications, and buildings. The core materials have a combination of characteristics such as low weight, high strength, insulation properties and chemical resistance.

The company has production units in Sweden, Italy, US, Lithuania, and China.

The market for core material is growing due to the underlying demand for energy efficiency, which is leading to a greater need for high-strength, lightweight solutions. Wind turbines, leisure boats and various applications requiring the combination of lightweight and high strength are the main application areas for the material.

Product-related or management system-related certifications: Diab is a world leader in high-performance composite core materials. Diab has developed composite core material development for over sixty years, supplying a wide range of markets including marine, wind energy, transport, aerospace and industry. Diab has ISO 9001- and 14001-certificates

Name and location of production site:

Diab produces PVC core materials at one location in Sweden and one location in China

Product information

Product name: IPN grades: Divinycell H, HP, HM, HCP, HT, MX and CY

Product identification: Divinycell IPN Grades (Interpenetrating Polymer Network)

Product description: Divinycell IPN is a mixture of thermoplastic PVC and thermoset polyurea and polyamide. The main products are available in sheets ranging from appr. 90 mm down to 0,5mm. Further it can be milled and grooved to various structures according to customer requests. The IPN core is used in various sandwich constructions.

UN CPC code: 363 (semi-manufactures of plastics)

Geographical scope: The production occurs in Sweden and China. Since the PVC core is used globally, the end-of-life scenario has been calculated with global data.

LCA information

Functional unit / declared unit: 1 kg lightweight Divinycell IPN core material block

Reference service life: Minimum 25 years

Time representativeness: Data representative for production year 2022.

Database and LCA software used: Ecoinvent 3.8 and SimaPro 9.3

Description of system boundaries:

A1: Extraction and processing of raw materials and Generation of electricity, steam and heat from primary energy resources

A2: Transports from suppliers to Diab and in between production units

A3: Manufacturing of the product at Diab and packaging materials used. The PVC is used in various sandwich constructions.

A5: Waste handling of packaging material

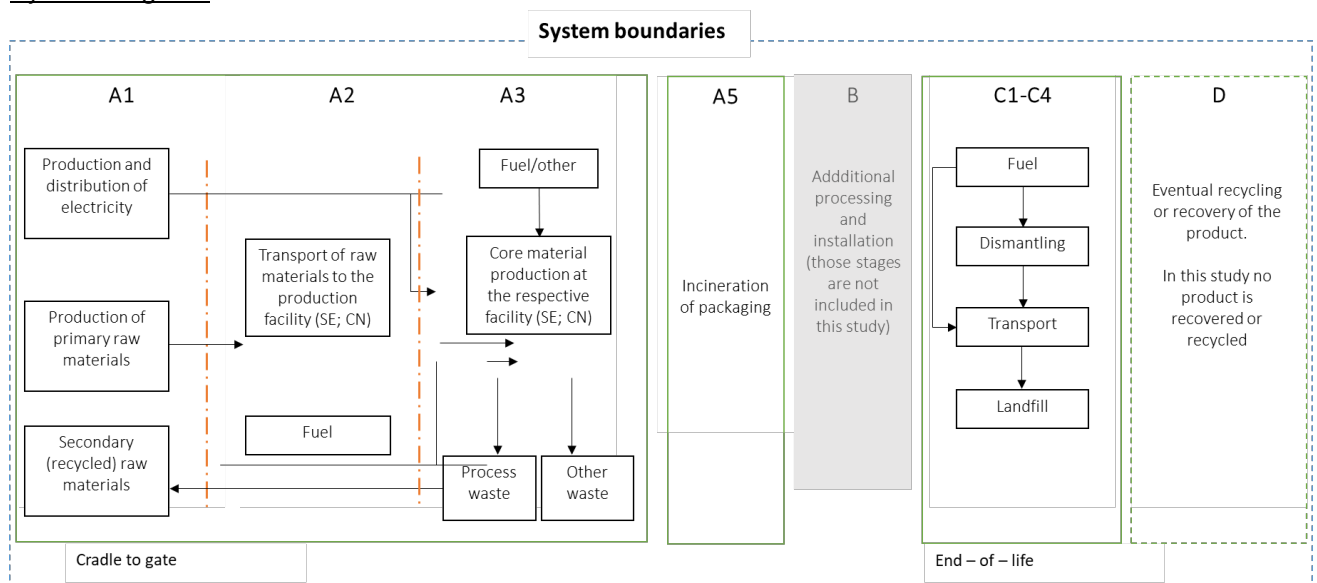
C1: The products are demolished and cut into manageable sizes before being sent off to landfill.

C2: Transportation of the material to landfill

C3: No reuse, recycling or recovery is considered.

C4: Currently, there is no reliable technology to separate the PES from the sandwich construction to be recycled. The PVC is therefore assumed to be landfilled.

System diagram:



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

	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	ND	ND	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	SE, CN, GLO	SE, CN, GLO	SE, CN, GLO	-	-	-	-	-	-	-	-	-	GLO	GLO	-	GLO	-
Specific data used	50 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	70 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Content information

Product components	%	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
PVC	< 50	0	
Anhydride	< 1	0	
AZDN	<1	0	
Isocyanate	< 50	0	
TOTAL	100	0	
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Cardboard	0,026	0,026	0,011
TOTAL	0,026		

Diab declares that the product does not contain substances from the candidate list of SVHC for Authorization in levels above 0.1% by weight

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A1-A3	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	5.65E+00	7.59E-02	2.63E-01	5.99E+00	8.60E-04	9.93E-01	3.32E-02	0.00E+00	1.05E-02	0.00E+00
GWP-biogenic	kg CO ₂ eq.	7.42E-02	-2.06E-04	3.28E-01	4.02E-01	4.07E-02	3.51E-04	2.83E-05	0.00E+00	1.07E-04	0.00E+00
GWP-luluc	kg CO ₂ eq.	3.75E-03	3.38E-05	1.61E-04	3.94E-03	2.91E-07	9.91E-05	1.31E-05	0.00E+00	1.07E-05	0.00E+00
GWP-total	kg CO ₂ eq.	5.73E+00	7.57E-02	5.91E-01	6.40E+00	4.16E-02	9.93E-01	3.33E-02	0.00E+00	1.06E-02	0.00E+00
ODP	kg CFC 11 eq.	4.52E-06	1.80E-08	4.09E-10	4.54E-06	7.09E-11	2.12E-07	7.69E-09	0.00E+00	3.20E-09	0.00E+00
AP	mol H ⁺ eq.	4.39E-02	4.20E-04	1.20E-09	4.43E-02	7.19E-06	1.03E-02	1.35E-04	0.00E+00	8.90E-05	0.00E+00
EP-freshwater	kg P eq.	1.69E-03	5.77E-06	1.29E-10	1.70E-03	1.02E-07	3.08E-05	2.14E-06	0.00E+00	3.05E-06	0.00E+00
EP-marine	kg N eq.	8.82E-03	1.26E-04	0.00E+00	8.95E-03	3.68E-06	4.57E-03	4.06E-05	0.00E+00	3.07E-05	0.00E+00
EP-terrestrial	mol N eq.	6.94E-02	1.38E-03	1.12E-10	7.08E-02	3.21E-05	5.01E-02	4.44E-04	0.00E+00	3.34E-04	0.00E+00
POCP	kg NMVOC eq.	2.22E-02	4.22E-04	6.39E-02	8.65E-02	7.90E-06	1.38E-02	1.36E-04	0.00E+00	9.66E-05	0.00E+00
ADP-minerals & metals*	kg Sb eq.	6.20E-05	2.38E-07	1.07E+00	1.07E+00	2.30E-09	5.11E-07	1.16E-07	0.00E+00	3.44E-08	0.00E+00
ADP-fossil*	MJ	1.02E+02	1.22E+00	1.66E+00	1.05E+02	5.87E-03	1.36E+01	5.03E-01	0.00E+00	2.47E-01	0.00E+00
WDP*	m ³	9.02E+01	4.59E-02	2.63E-01	9.05E+01	9.57E-04	2.13E-02	1.50E-03	0.00E+00	1.08E-02	0.00E+00
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 and voluntary indicators

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A1-A3	A5	C1	C2	C3	C4	D
GWP-GHG ¹	kg CO ₂ eq.	5.66E+00	7.60E-02	2.63E-01	6.00E+00	8.60E-04	9.93E-01	3.33E-02	0.00E+00	1.05E-02	0.00E+00

Use of resources

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A1-A3	A5	C1	C2	C3	C4	D
PERE	MJ	1.51E+01	2.51E-02	3.16E-01	1.55E+01	4.23E-02	7.66E-02	7.08E-03	0.00E+00	4.19E-03	0.00E+00
PERM	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
PERT	MJ	1.51E+01	2.51E-02	3.16E-01	1.55E+01	4.23E-02	7.66E-02	7.08E-03	0.00E+00	4.19E-03	0.00E+00
PENRE	MJ	1.09E+02	1.29E+00	1.66E+01	1.27E+02	7.96E+00	1.45E+01	5.34E-01	0.00E+00	2.63E-01	0.00E+00
PENRM	MJ	1.98E+01	0.00E+00	3.13E-01	2.01E+01	-3.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.29E+02	1.29E+00	1.69E+01	1.47E+02	7.65E+00	1.45E+01	5.34E-01	0.00E+00	2.63E-01	0.00E+00
SM	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
RSF	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
NRSF	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
FW	m ³	0.00E+00	0.00E+00	4.90E-03	4.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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; * Energy stored as material in the product and the packing material is direct balanced out and not reported (<5%).										

¹ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

Waste production and output flows

Waste production

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A1-A3	A5	C1	C2	C3	C4	D
Hazardous waste disposed	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
Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	5.03E-01	5.03E-01	2.58E-02	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00
Radioactive waste disposed	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

Output flows

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A1-A3	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
Material for recycling	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
Materials for energy recovery	kg	0.00E+00	0.00E+00	5.03E-01	5.03E-01	2.58E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	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
Exported energy, thermal	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

Information on biogenic carbon content

Results biogenic carbon content		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0,007*

* The inherent energy is assumed to be direct balanced out and therefore not reported as RPEM.

Differences versus previous versions

- Updating calculations according to the new standard EN 15804:2012+A2:2019
- Production site in Italy has been removed.

References

EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

General Programme Instructions of the International EPD® System. Version 4.0.

PCR 2019:14 Construction products (EN 15804:A2) (1.3.0)

Ecoinvent 3.8 database, <http://www.ecoinvent.org/>

LCA software SimaPro Analyst 9.3.0.3

Domhagen, M., (2023) LCA of divynycell PET, IPN and PES core materials, Methodology report for the development of EPDs.



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