

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 the specific:

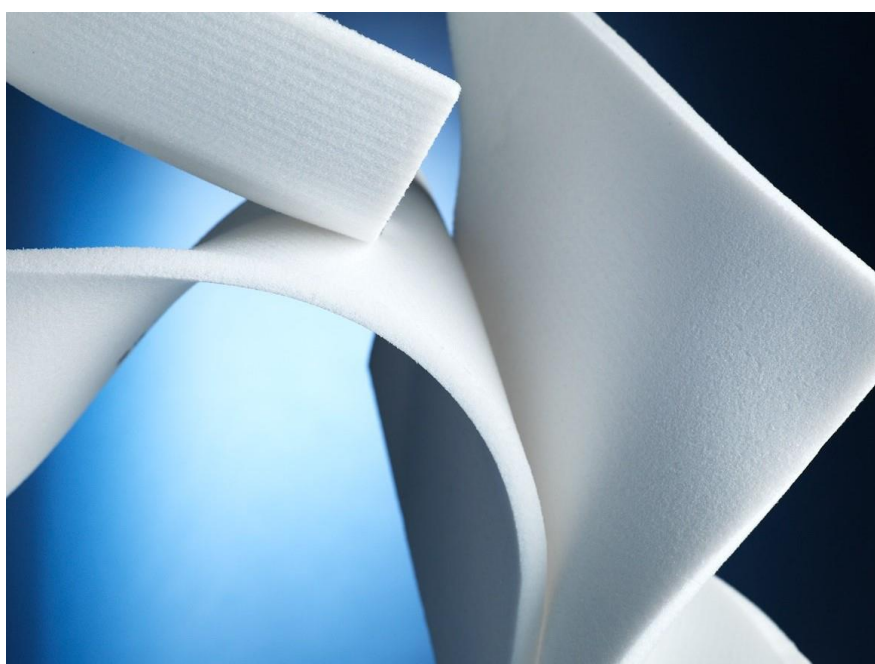
Divinycell F

from

Diab Group AB

Publication date	2023-11-24
Valid to	2028-11-24
EPD ID	Diab 23:003
Third party verifier:	Martin Erlandsson, IVL

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



General information

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Diab Group AB

Contact: Per Hökfelt, VP Sustainability & QEHS

Description of the organisation: Manufacturer of sandwich core materials for composites

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(s):

Diab produces PES core materials at one location in DeSoto, Texas, USA

Product information

Product name: Divinycell F

Product identification: Divinycell F is a PES foam, manufactured from the polymer Polyether sulfone (PES), which results in a thermoplastic foam.

Product description: Divinycell PES grade products are available in sheets from approximately 60mm down to 0,5 mm, further it can be milled and grooved to various structures according to the customer requests. PES is a core material series specifically developed for commercial aircraft interiors, seating and food trays. Divinycell PES has excellent FST (Fire, Smoke and Toxicity) properties and high-temperature processing capabilities.

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

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

LCA information

Functional unit / declared unit: 1 kg Divinycell PES grades

Reference service life: Minimum 25 years.

Time representativeness: Data representative for production year 2022.

Database(s) 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 PES is used in various sandwich constructions.

A5: Waste handling of packaging material

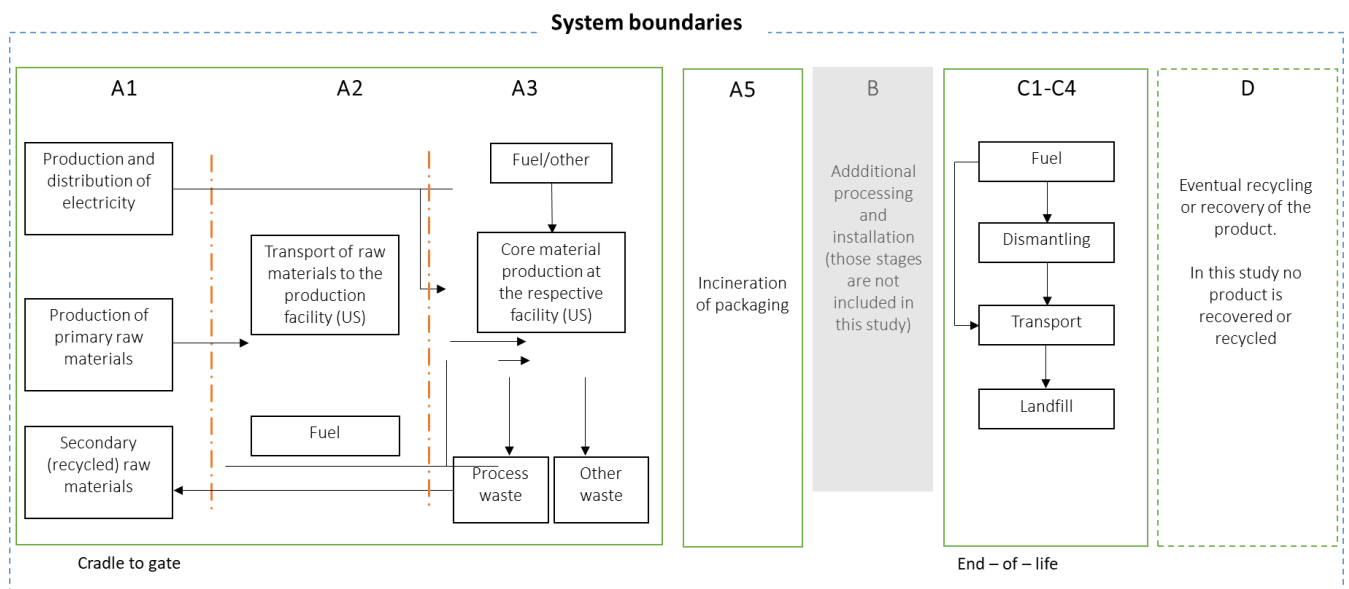
C1: The products are demolished and cut into manageable sizes before being sent off to landfill.

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 PES 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	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	US	US	US	-	GLO	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	18 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Content information

Product components	%	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
PES	< 100	0	0
Talc	< 1	0	0
Acetone	< 1	0	0
TOTAL	100		
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Cardboard	0,025	0,025	0,011
TOTAL	0,025		

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

Scenario and technical information

Additional information for module A5, Installation in the building. In the calculations for Divinitycell PES grades only handling of packaging material is included in the calculation.

Scenario information	Unit (expressed per functional unit or per declared unit)	
Ancillary materials for installation (specified by material)	kg	Not included in the calculations
Water use	m ³	Not included in the calculations
Other resources use	kg	Not included in the calculations
Quantitative description of energy type (regional mix) and consumption during the installation process	kWh or MJ	Not included in the calculations
Waste materials on the building site before waste processing, generated by the product's installation	kg	Cardboard: 0,025
Output materials as result of waste processing at the building site e.g. of collection for recycling for energy recovery, disposal	kg	Not included in the calculations
Direct emissions to ambient air, soil and water	kg	Not applicable

Additional information for module C, End-of-life.

In the end-of-life stage the product is separated from the construction and thereafter sent to landfill. Presently, there exists no methodology to separate the constituent materials and recycle the components separately. There is, however, ongoing research in the area. The assumption that all material is going to landfill is a conservative approach considering that polymers possess the potential for energy recovery. However, landfill remains the most likely scenario at the moment.

End-of-life (C1-C4)	Unit (per declared unit)	Weight
Collection processes specified by type	kg collected separately	1
	kg collected with mixed construction waste	0
Recovery system specified by type	kg for re-use	0
	kg for recycling	0
	kg for energy recovery	0
Disposal specified by type	kg product or material for final deposition	1
Assumptions for scenario development e.g. transportation	km	50

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.	9,24E+00	2,27E-01	1,02E-02	9,48E+00	8,33E-04	9,93E-01	3,32E-02	0,00E+00	1,05E-02	0,00E+00
GWP-biogenic	kg CO ₂ eq.	2,10E-02	1,27E-04	5,30E-06	2,12E-02	3,95E-02	3,51E-04	2,83E-05	0,00E+00	1,07E-04	0,00E+00
GWP-luluc	kg CO ₂ eq.	6,07E-03	1,13E-04	2,49E-06	6,19E-03	2,82E-07	9,91E-05	1,31E-05	0,00E+00	1,07E-05	0,00E+00
GWP-total	kg CO ₂ eq.	9,27E+00	2,27E-01	1,02E-02	9,50E+00	4,03E-02	9,93E-01	3,33E-02	0,00E+00	1,06E-02	0,00E+00
ODP	kg CFC 11 eq.	1,26E-06	5,06E-08	2,90E-09	1,32E-06	6,87E-11	2,12E-07	7,69E-09	0,00E+00	3,20E-09	0,00E+00
AP	mol H ⁺ eq.	3,81E-02	3,37E-03	5,68E-05	4,16E-02	6,97E-06	1,03E-02	1,35E-04	0,00E+00	8,90E-05	0,00E+00
EP-freshwater	kg P eq.	2,29E-03	1,16E-05	7,04E-07	2,31E-03	9,86E-08	3,08E-05	2,14E-06	0,00E+00	3,05E-06	0,00E+00
EP-marine	kg N eq.	7,41E-03	8,64E-04	2,06E-05	8,30E-03	3,56E-06	4,57E-03	4,06E-05	0,00E+00	3,07E-05	0,00E+00
EP-terrestrial	mol N eq.	7,23E-02	9,57E-03	2,25E-04	8,21E-02	3,11E-05	5,01E-02	4,44E-04	0,00E+00	3,34E-04	0,00E+00
POCP	kg NMVOC eq.	3,18E-02	2,60E-03	6,80E-05	3,45E-02	7,66E-06	1,38E-02	1,36E-04	0,00E+00	9,66E-05	0,00E+00
ADP-minerals & metals*	kg Sb eq.	7,64E-05	4,40E-07	2,59E-08	7,69E-05	2,23E-09	5,11E-07	1,16E-07	0,00E+00	3,44E-08	0,00E+00
ADP-fossil*	MJ	1,99E+02	3,29E+00	1,95E-01	2,03E+02	5,68E-03	1,36E+01	5,03E-01	0,00E+00	2,47E-01	0,00E+00
WDP*	m ³	6,54E+01	9,44E-03	1,86E-01	6,56E+01	9,27E-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.	9,27E+00	2,27E-01	1,02E-02	9,51E+00	4,03E-02	9,93E-01	3,33E-02	0,00E+00	1,06E-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	2.56E+01	3.53E-02	2.21E+00	2.78E+01	2.26E-04	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	2.56E+01	3.53E-02	2.21E+00	2.78E+01	2.26E-04	7.66E-02	7.08E-03	0.00E+00	4.19E-03	0.00E+00
PENRE	MJ	2.14E+02	3.49E+00	3.82E+00	2.22E+02	6.15E-03	1.45E+01	5.34E-01	0.00E+00	2.63E-01	0.00E+00
PENRM	MJ	4.17E+01	0.00E+00	3.75E-01	4.21E+01	-3.75E-01	0.00E+00	0.00E+00	0.00E+00	-4.17E+01	0.00E+00
PENRT	MJ	2.56E+02	3.49E+00	4.20E+00	2.64E+02	-3.69E-01	1.45E+01	5.34E-01	0.00E+00	-4.14E+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	0.00E+00	0.00E+00	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	5,38E-01	5,38E-01	2,50E-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	0,00E+00	0,00E+00	2,50E-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	0,0011*

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

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

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.



www.diabgroup.com