Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

TERMOROLL A+
TERMOPAN A+
thickness 50 mm

from

EUROFIBRE SPA – VENEZIA

Product category rules (PCR): PCR 2019:14 (v1.0) CPC 371, c-PCR 005 (v1.0)

Ambito geografico: The performances are calculated with reference to the plant of Marcon–Venice. The market is International.

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-02212
Publication date:	2020-09-03
Valid until:	2025-09-02

Programme Informations

Programme:

The International EPD® System

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Product category rules (PCR): PCR 2019:14 Construction products and construction services (v1.0 of 20/12/2019) CPC 371, c-PCR 005 Thermal insulation product (v 1.0 of 20/12/2019)

PCR review was conducted by:

The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

[X] EPD process certification [ ] EPD verification

Third party verifier: *CSQA Certificazioni srl, Via San Gaetano 74, Thiene (VI)*

In case of accredited certification bodies:

Accredited by: *ACCREDIA*

Procedure for follow-up of data during EPD validity involves third party verifier:

[X] Yes [ ] No

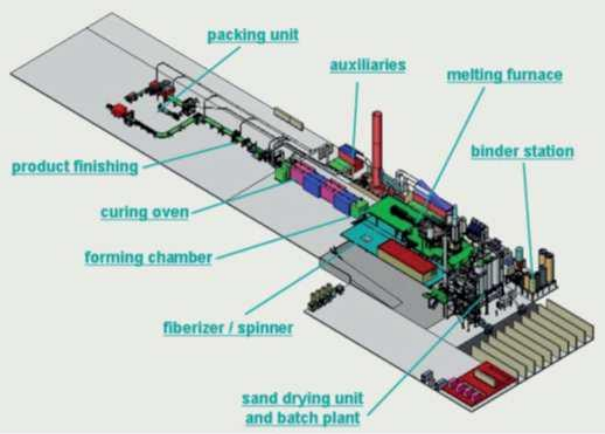
The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804..

Company Informations

EPD Owner:
EUROFIBRE SPA – via Venier 41 – Marcon Venezia
Representative:
Cristina Fregolent tecnico.commerciale@eurofibre.it
Technical support:
Dipartimento di Ingegneria Industriale, Università degli Studi di Padova, Via Marzolo 9, Padova

Description of the organization:
Eurofibre Spa is located in the industrial area of the Municipality of Marcon (VE). The company is located near the Provincial Road 40 (Via Mattei) and the A4 Venice-Trieste. Since its foundation in 1981, in the Marcon Venezia plant, Eurofibre has constantly implemented its own technology necessary to produce glass wool insulations to meet the increasingly complex and stringent needs of the building and industrial market. Eurofibre is synonymous of innovation, production and commercial flexibility for high-tech solutions offered in multiple segments of thermal, acoustic and fire insulation market. To date, Eurofibre has developed different types of glass wool, distinguished by traditional brands TERMOVER® and EUROVER®, and from innovatives EUROVER EVO®, EUROVER 2000®, TERMOVER AG, TERMOVER NG and TERMOVER A+. The productions are structured on a wide range of thicknesses (from 6 to 250 mm) and a variety of customized coverings and packaging, according to the customers' needs. The set of industrial activities, facilitated by the strategic geographical position, has allowed Eurofibre to develop a constant presence in the European market as well as in the national one. The need to meet the quality standards of the different national and international markets, in addition to the need to constantly demonstrate compliance with the regulations relating to environmental and safety aspects related to industrial production, made it necessary to implement an Integrated Quality System (ISO 9001), Environment (ISO 14001) and Safety (ISO 45001).

Name and location of plant:
EUROFIBRE SPA – via Venier 41 – Marcon Venezia



Product Informations

Product name:

TERMOROLL A+ 50 mm

Product description:
Roll in Termover® glass wool with organic binder totally formaldehyde free, unfaced, with density 16,5 kg/m^3, thermal conductivity 0,035 W/(mK), thickness 50 mm, weight 0,83 kg/m^2, resistance 1,43 m^{2}K/W.

Peoduct name:

TERMOPAN A+ 50 mm

Product description:
Board in Termover® glass wool with organic binder totally formaldehyde free, unfaced, with density 16,5 kg/m^3, thermal conductivity 0,035 W/(mK), thickness 50 mm, weight 0,83 kg/m^2, resistance 1,43 m^{2}K/W.

The Eurofibre's glass wool is compliant with the Note Q of (CE) Regulation n. 1272/2008 of the European Parliament and of the Council concerning the classification, labeling and packaging of substances and blends

UN CPC code:
371

Geographical scope:
Italy

LCA Informations

Declared unit:
1 m^2 of thermal insulation product with specific R_D value ready for market distribution and usable according to the applications provided in Annex A of the Standard EN 16783:2017.
Resistance: 1,43 m^{2}K/W for both products.

Applications:
WTR WZ WI WTH VR DAD for TERMOROLL A+ 50 mm.
WTR WZ WI WTH for TERMOPAN A+ 50 mm.

Time representativeness:
The primary data cover the period January 2019 - December 2019.

Database and software used:
Database Ecoinvent 3.5; Software SimaPro versione 9.0.

System boundaries and process units excluded:
The system boundaries include the mandatory modules A1, A2, A3, C1, C2, C3, C4 and D provided by the Standard EN 15804 (CEN, 2019), as shown in the following table according to an application of type "*from cradle to gate with module C1-C4 and module D*". It is emphasized that the construction, maintenance and disposal of the infrastructures, intended as building, and the occupation of industrial land were not considered, since it is considered that their contribution to the environmental impact relative to the declared is negligible. Consumption of oils for machine maintenance and water treatment are included. It should also be noted that the distribution, use and disposal phases of the product after use are not included in the study.

The following table shows the scenarios adopted for the modeling of modules C1, C2, C3, C4 and D.

MODULE	SCENARIO
C1	The impacts assoiated with the demolition are assumed to be negligible.
C2	The end-of-life product is sent to disposal with the CER code of chapter 17. The landfill disposal at a distance of 50 km is taken as a scenario. The means of transport is represented by the following dataset Transport, freight lorry, 16-32 EUR 4.
C3	The product after the demolition activities is not recovered. This module therefore contains only the benefits and impacts due to the recycling and energy recovery of product packaging materials.
C4	After demolition, the product is disposed in the landfills, the dataset used is Inert waste for final disposal CH treatment of inert waste, inert waste material landfill. This choice is dictated by the fact that the waste is classified with the CER code of chapter 17.
D	This module contains the potential impacts and benefits associated with the recycling of the product aimed at the production of new glass wool in the event that waste management takes place in an optimal way. The calculated value is excluded from the sum of the total impacts.

The parameter chosen for the initial inclusion of input and output elements is based on the definition of a cut-off level of 1%, in terms of mass, energy and environmental relevance. This means that a process has been neglected if it is responsible for less than 1% of the total mass, primary energy and total impact. However all the processes for which the data are available have been taken into consideration, even if with a contribution of less than 1%.

The method chosen to assess the potential environmental impacts of the product covered by this study is provided by the standard EN 15804 (CEN, 2019).

Modeling of electrical energy (Module A3): The modeling of electricity consumption in Module A3 was carried out using the Italian national residual mix (using as a source of data from the latest AIB report (AIB, 2019)). The breakdown of the energy sources used is given. The emission factor obtained is equal to 645 gCO_2eq/kWh.

FONTE	RESIDUAL MIX 2018
Renewables Unspecified	0,23%
Solar	4,10%
Wind	1,37%
Hydro&Marine	2,45%
Geothermal	0,17%
Biomass	0,08%
Nuclear	11,48%
Fossil Unspecified	4,98%
Lignite	6,25%
Hard Coal	14,64%
Gas	52,74%
Oil	1,51%
TOTALE	100,00%

Product Stage			Construction Stage		Use stage							End of life stage				Benefits beyond system boundaries
Raw Materials Supply	Transport	Manufacturing	Transport to site	On site processes	Use	Maintence	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/Demolition	Transport	Waste processing	Disposal	Reuse/Recovery/Recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

ND=Non declared

Content Declaration

The product does not contain substances included in the "Candidate list of substances of very high concern (SVHC) for authorization" in percentage higher than 0,1%[1].

Recycled material:

Origin of the recycled material (pre-consumer or post-consumer) in the product: The batch materials, the binders and the oils used do not contain recycled material.

Packaging:

Distribution: TERMOROLL A⁺ 50 mm is packed with havana paper, glue, polyethylene, polyethylene per multi-pack, adhesive labels, stretch film, caps and loaded on pallet to be sent to customers. Polyethylene is composed of 54% recycled material, multi-pack polyethylene from 60% recycled material and havana paper from 100% recycled material.

TERMOPAN A⁺ 50 mm is packed with polyethylene bags, polyethylene per multi-pack, adhesive labels, stretch film, caps and loaded on pallet to be sent to customers. Polyethylene bags are composed of 54% recycled material, multi-pack polyethylene from 60% recycled material.

1. http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp

Environmental Performances
Potential environmental impact

The values for the product TERMOROLL A+ 50 mm are given

PARAMETER	UNIT	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Global Warming Potential total	kg CO_2 eq	1,23E+0	5,04E-2	3,38E-1	0,00E+0	7,72E-3	4,43E-3	9,17E-3	-4,40E-1	1,64E+0
Global Warming Potential fossil	kg CO_2 eq	1,22E+0	5,04E-2	3,37E-1	0,00E+0	7,72E-3	4,54E-3	5,08E-3	-4,33E-1	1,62E+0
Global Warming Potential biogenic	kg CO_2 eq	6,54E-2	1,82E-5	-5,12E-2	0,00E+0	1,58E-6	2,01E-2	5,09E-3	-8,37E-3	3,94E-2
Global Warming Potential land use and land use change	kg CO_2 eq	2,59E-4	1,40E-5	1,81E-4	0,00E+0	2,27E-6	-6,04E-5	7,27E-7	-9,32E-4	3,97E-4
Depletion potential of the stratospheric ozone layer	kg CFC_{11} eq	3,16E-7	1,20E-8	1,60E-8	0,00E+0	1,80E-9	-1,21E-9	1,86E-9	-8,81E-8	3,47E-7
Acidification potential, Accumulated Exceedence	mol H^+ eq	1,15E-2	2,94E-4	2,03E-3	0,00E+0	3,97E-5	-1,37E-4	3,78E-5	-6,00E-3	1,38E-2
Eutrophication potential, fraction of nutrients reaching freshwater end compartment	kg P eq	4,62E-4	4,20E-6	2,37E-4	0,00E+0	6,29E-7	-4,58E-6	3,33E-7	-2,42E-4	7,00E-4
Eutrophication potential, fraction of nutrients reaching marine end compartment	kg N eq	1,11E-3	7,78E-5	5,23E-4	0,00E+0	1,34E-5	-1,06E-5	2,59E-5	-5,66E-4	1,74E-3
Eutrophication potential, Accumulated Exceedence	mol N eq	2,87E-2	8,62E-4	7,42E-3	0,00E+0	1,47E-4	-3,93E-4	1,51E-4	-2,30E-2	3,69E-2
Formation potential of tropospheric ozone	kg NMVOC eq	3,40E-3	2,60E-4	1,63E-3	0,00E+0	4,16E-5	-4,48E-5	4,48E-5	-2,03E-3	5,34E-3
Abiotic depletion potential for non fossil resources*	kg Sb eq	1,48E-6	1,01E-7	3,25E-7	0,00E+0	2,33E-8	4,27E-9	4,16E-9	-3,71E-6	1,94E-6
Abiotic depletion for fossil sources potential*	MJ	3,12E+1	7,98E-1	3,60E+0	0,00E+0	1,20E-1	-3,19E-1	1,25E-1	-9,31E+0	3,56E+1
Water (user) deprivation potential, deprivation-weighted water consumption*	m^3 world eq. depriv.	3,78E-1	5,66E-3	3,26E-1	0,00E+0	8,14E-4	-1,85E-2	7,69E-4	-4,65E-1	6,93E-1

*The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

For the **Climate Change** impact category a value of 1.64E+00 kg CO_2 eq is obtained. This impact is mainly due to the electricity group (6.08E-01 kg CO_2 eq; 37.08%) and to the methane and diesel group (3.70E-01 kg CO_2 eq; 22.59%). The dressing, oils and coatings group also contributes to the impact (2.19E-01 kg CO_2 eq; 13.37%). In particular, the acrylic resin (for dressings and glue) impacts for 13.15%. Another contribution is made by the machining group in the line (2.16E-01 kg CO_2 eq; 13.17%) especially for emissions during processing. The impacts of this category are ainly due to the emission of carbon dioxide (85.08%) and, to a lesser extent, methane (24.37%).

For the impact category **Climate Change (fossil)** a value of 1.62E+00 kg CO_2 eq is obtained. This impact is mainly due to the electricity group (5.98E-01 kg CO_2 eq; 36.88%) and to the methane and diesel group (5.98E-01 kg CO_2 eq; 36.88%). The dressing, oil and coating group also contributes significantly to the impact (2.18E-01 kg CO_2 eq; 13.47%). In particular, the acrylic resin (for dressings and glue) impacts for 13.24%. Another contribution is made by the machining group in the line (2.15E-01 kg CO_2 eq; 13.26%) especially for emissions during processing. The impacts of this category are mainly due to the emission of carbon dioxide (86.05%) and, to a lesser extent, methane (12.67%).

For the impact category **Climate Change (biogenic)** a value of 3.94E-02 kg CO_2 eq is obtained. This impact is mainly due to electricity consumption (6.04E-02 kg CO_2 eq). The group benefits from recovery and recycling also contributes significantly to the impact (1.31E-02 kg CO_2 eq; 33.35%). Other significant contributions are given by the waste treatment group (6.95E-03 kg CO_2 eq; 17.65%) and by the disposal group (5.09E-03 kg CO_2 eq; 12.93%). Impacts in this category are mainly due to the emission of carbon dioxide and, to a lesser extent, methane into the air. The acrylic resin is impacted by 4.21%. The packaging group contributes to the reduction of this type of impact with a negative contribution of -5.57E-02 kg CO_2 eq. This is due to the use of wooden pallets as packaging.

For the impact category **Climate Change (land use and transformation)** a value of 3.97E-04 kg CO_2 eq is obtained. This impact is mainly due to the resins and oil group (1.55E-04 kg CO_2 eq; 39.05). In particular, the acrylic resin impacts for 38.39%. The packaging group also contributes significantly to the impact (1.51E-04 kg CO_2 eq; 38.01%). In particular, the paper impacts for 21,02%. Another significant contribution is made by the use of electricity (3.97E-05 kg CO_2 eq; 10.00%), methane and disel (3.83E-05 kg CO_2 eq; 9.63%). The impacts of this category are mainly due to the emission of carbon dioxide (99.68%). The impact is reduced by the group benefits from recovery and recycling with a negative contribution of -7.30E-05 kg CO_2 eq. This is mainly due to the paper to be disposed of.

For the impact category **Ozone depletion** a value of 3.47E-07 kg CFC_{11} eq is obtained. This impact is mainly due to the use of methane and diesel ((2.13E-07 kg CFC_{11} eq; 61.55%) and electricity (7.41E-08 kg CFC_{11} eq; 21.38%). The acrylic resin impacts 6.55%. The impacts of this category are mainly due to the air emission of Halon 1211 (76.21%) and to a lesser extent Halon 1301 (18.41%), CFC-114 (2.90%) and HCFC-22 (1.34%).

For the **Acidification** impact category a value of 1.38E-02 mol H^+ eq is obtained. This impact is mainly due to the use of electricity (7.27E-03 mol H^+ eq; 52.85%) and to oils and resins group (3.00E-03 mol H^+ eq; 21.80%). In particular, the acrylic resin impacted for 21.60%. Another contribution is given by the machining group in the line (1.41E-03 mol H^+ eq; 10.23%). The impacts of this category are mainly due to the emission of sulphur dioxide (45.37%), ammonia (34.39%) and nitrogen oxides (19.94%) to air.

For the impact category **Eutrophication (aquatic, freshwater)** a value of 7.00E-04 kg P eq is obtained. This impact is mainly due to the use of electricity (3.25E-04 kg P eq; 46.39%%). Other contributions are given by the waste and impact group of the plant (2.00E-04 kg P eq; 28.63%) and by the oils and resins group (1.16E-04 kg P eq; 16.54%). In particular, the acrylic resin impacts 16.34%. The impacts of this category are mainly due to the release of phosphates into water (99.93%).

For the impact category **Eutrophication (aquatic, marine)** a value of 1.74E-03 kg N eq is obtained. This impact is mainly due to the use of electricity (6.29E-04 kg N eq; 36.11%). Other contributions are given by the machining group in the line (4.06E-04 kg N eq; 23.33%) and by the oils and coatings groups (2.41E-04 kg N eq; 13.82%). In particular, the acrylic resin impacts 13.60%. The impacts of this category are mainly due to the emission of nitrogen oxides (82.79%) and ammonia (8.27%) in air and, to a lesser extent, to the release of nitrates into water (7.51%).

For the impact category **Eutrophication (terrestrial)** a value of 3.69E-02 mol N eq is obtained. This impact is mainly due to the use of electricity (2.32E-02 mol N eq; 62.76%). Another significant one is given by the machining group in the line (5.97E-03 mol N eq; 16.20%). The acrylic resin impacts for 7.57%. The impacts of this category are mainly due to the emission of ammonia (57.20%) and nitrogen oxides (42.80%) to air.

For the impact category **Photochemical ozone formation** a value of 5.34E-03 kg NMVOC eq is obtained. This impact is mainly due to the use of electricity (1.43E-03 kg NMVOC eq; 26.87%). Other contributions are given by the machining group in the line (1.12E-03 kg NMVOC eq; 20.91%), and by the oils and resins group (8.98E-04 kg NMVOC eq; 16.82%). In particular, the acrylic resin impacts for 15.47%. The use of methane and diesel also contributes significantly to the impact (8.72E-04 kg NMVOC eq; 16.33%). The impacts of this category are mainly due to the emission of nitrogen oxides (69.44%), NMVOC of unspecified origin (15.69%) and sulphur dioxide (7.24%) to air.

For the impact category **Abiotic Depletion Potential (mineral and metals)** a value of 1.94E-06 kg Sb eq is obtained. This impact is mainly due to the oils and binders group (1.18E-06 kg Sb eq; 61.10%). In particular, the acrylic resin impacts 59.51%. Another significant contribution is made by the waste and impact group of the plant (2.18E-07 kg Sb eq; 11.27%). The impacts of this category are mainly due to the use of raw materials as metals, in particular cadmium (14.69%).

For the impact category **Abiotic Depletion Potential (fossil)** a value of 3.56E+01 MJ is obtained. This impact is mainly due to the use of methane and diesel (1.64E+01 MJ; 46.22%) and electricity (1.05E+01 MJ; 29.56%). Another contribution is made by the group of oils and binders (3.91E+00 MJ; 10.99%). In particular, the acrylic resin is coated for 10.48%. The impacts of this category are mainly due to the use of raw materials such as natural gas (62.59%), coal (16.00%), and oil (12.13%).

For the impact category **Water use** a value of 6.93E-01 m^3 is obtained. This impact is mainly due to the machining group in the line (2.56E-01 m^3; 36.88%), especially for the consumption of water and oxygen and to the group of oils and binders (2.29E-01 m^3; 33.01%). In particular, the acrylic resin impacts for 32.73%. Another significant contribution is the use of electricity (1.10E-01 m^3; 15.92%).

The indicators Potential incidence of disease due to PM emissions (PM), Potential Human exposure efficiency relative to U235 (IRP), Potential Comparative Toxic Unit for Ecosystems (ETP-fw), Potential Comparative Toxic Unit for humans (HTP-c), Potential Comparative Toxic Unit for humans (HTP-nc) and Potential soil quality index (SQP) are not declared (ND) in this document.

Use of resources

PARAMETER	UNIT	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Use of renewable primary energy excluding resources used as raw materials	MJ	3,87E-1	6,58E-3	3,05E-1	0,00E+0	8,61E-4	-9,62E-4	1,20E-3	-2,00E-1	6,99E-1
Use of renewable primary energy resources used as raw materials	MJ	3,26E-1	2,33E-3	1,02E+0	0,00E+0	3,98E-4	-2,69E-1	4,89E-4	-2,78E-1	1,08E+0
Total use of renewable primary energy	MJ	7,12E-1	8,91E-3	1,32E+0	0,00E+0	1,26E-3	-2,70E-1	1,69E-3	-4,78E-1	1,78E+0
Use of non-renewable primary energy excluding resources used as raw materials	MJ	3,12E+1	7,98E-1	2,75E+0	0,00E+0	1,20E-1	-3,19E-1	1,25E-1	-9,31E+0	3,47E+1
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+0	0,00E+0	8,52E-1	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	8,52E-1
Total use of non-renewable primary energy	MJ	3,12E+1	7,98E-1	3,60E+0	0,00E+0	1,20E-1	-3,19E-1	1,25E-1	-9,31E+0	3,55E+1
Secondary material	kg	0,00E+0	0,00E+0	2,36E-2	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	2,36E-2
Renewable secondary fuels	MJ	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Non-renewable secondary fuels	MJ	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Net use of fresh water	m^3	9,33E-3	1,53E-4	7,95E-3	0,00E+0	2,17E-5	-4,12E-4	1,46E-4	-1,03E-2	1,72E-2

Waste production and outflows
Waste production

PARAMETER	UNIT	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Hazardous waste disposed	kg	5,39E-5	4,70E-7	1,21E-3	0,00E+0	7,54E-8	-2,40E-7	4,58E-8	-8,95E-6	1,26E-3
Non-hazardous waste disposed	kg	1,32E-1	5,18E-2	2,71E-1	0,00E+0	5,63E-3	8,18E-4	8,52E-1	7,28E-1	1,31E+0
Radioactive waste disposed	kg	5,05E-5	5,41E-6	8,88E-6	0,00E+0	8,08E-7	-3,80E-7	8,48E-7	-1,50E-5	6,60E-5

Outflows

PARAMETER	UNIT	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Components for reuse	kg	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Material for recycling	kg	0,00E+0	0,00E+0	7,26E-3	0,00E+0	0,00E+0	2,31E-2	0,00E+0	0,00E+0	3,04E-2
Materials for energy recovery	kg	0,00E+0	0,00E+0	3,39E-4	0,00E+0	0,00E+0	1,20E-2	0,00E+0	0,00E+0	1,23E-2
Exported energy	MJ	0,00E+0	0,00E+0	1,72E-3	0,00E+0	0,00E+0	6,98E-2	0,00E+0	0,00E+0	7,15E-2

Environmental Performances
Potential environmental impact

The values for the product **TERMOPAN A⁺ 50 mm** are given

PARAMETER	UNIT	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Global Warming Potential total	kg CO_2 eq	1,29E+0	5,34E-2	3,71E-1	0,00E+0	7,91E-3	6,38E-3	7,20E-3	-4,40E-1	1,74E+0
Global Warming Potential fossil	kg CO_2 eq	1,28E+0	5,34E-2	3,70E-1	0,00E+0	7,91E-3	6,52E-3	5,87E-3	-4,33E-1	1,72E+0
Global Warming Potential biogenic	kg CO_2 eq	6,72E-2	1,92E-5	-6,38E-2	0,00E+0	1,62E-6	1,37E-2	1,67E-3	-8,37E-3	1,88E-2
Global Warming Potential land use and land use change	kg CO_2 eq	2,87E-4	1,48E-5	1,39E-4	0,00E+0	2,33E-6	-7,32E-6	7,38E-7	-9,32E-4	4,36E-4
Depletion potential of the stratospheric ozone layer	kg CFC_{11} eq	3,29E-7	1,27E-8	1,63E-8	0,00E+0	1,84E-9	-1,73E-9	1,89E-9	-8,81E-8	3,60E-7
Acidification potential, Accumulated Exceedence	mol H^+ eq	1,22E-2	3,11E-4	2,16E-3	0,00E+0	4,07E-5	-2,00E-4	3,84E-5	-6,00E-3	1,45E-2
Eutrophication potential, fraction of nutrients reaching freshwater end compartment	kg P eq	4,89E-4	4,46E-6	2,46E-4	0,00E+0	6,44E-7	-6,74E-6	3,45E-7	-2,42E-4	7,33E-4
Eutrophication potential, fraction of nutrients reaching marine end compartment	kg N eq	1,17E-3	8,28E-5	5,53E-4	0,00E+0	1,37E-5	-1,54E-5	2,71E-5	-5,66E-4	1,83E-3
Eutrophication potential, Accumulated Exceedence	mol N eq	2,98E-2	9,17E-4	7,73E-3	0,00E+0	1,51E-4	-5,83E-4	1,54E-4	-2,30E-2	3,81E-2
Formation potential of tropospheric ozone	kg NMVOC eq	3,61E-3	2,76E-4	1,77E-3	0,00E+0	4,27E-5	-5,86E-5	4,48E-5	-2,03E-3	5,69E-3
Abiotic depletion potential for non fossil resources*	kg Sb eq	1,67E-6	1,08E-7	3,15E-7	0,00E+0	2,39E-8	3,37E-9	4,28E-9	-3,71E-6	2,13E-6
Abiotic depletion for fossil sources potential*	MJ	3,26E+1	8,45E-1	4,43E+0	0,00E+0	1,22E-1	-5,08E-1	1,27E-1	-9,31E+0	3,77E+1
Water (user) deprivation potential, deprivation-weighted water consumption*	m^3 world eq. depriv.	4,19E-1	6,00E-3	3,35E-1	0,00E+0	8,34E-4	-6,23E-3	8,79E-4	-4,65E-1	7,55E-1

*The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

For the **Climate Change** impact category a value of 1.74E+00 kg CO_2 eq is obtained. This impact is mainly due to the electricity group (6.22E-01 kg CO_2 eq; 35.82%) and to the methane and diesel group (3.81E-01 kg CO_2 eq; 21.93%). The primers and oil group also contributes to the impact (2.54E-01 kg CO_2 eq; 14.63%). In particular, the acrylic resin (for dressings and glue) impacts for 14.41%. Other contributions are given by processing in the line (2.24E-01 eq; 12.91%) especially for emissions during processing. The impacts of this category are mainly due to the emission of carbon dioxide (85.29%) and, to a lesser extent, methane (12.55%).

For the impact category **Climate Change (fossil)** a value of 1.72E+00 kg CO_2 eq is obtained. This impact is mainly due to the electricity group (6.11E-01 kg CO_2 eq; 35.55%) and to the methane and diesel group (3.80E-01 kg CO_2 eq; 22.12%). The primer and oil group also contributes to the impact (2.53E-01 kg CO_2 eq; 14.71%). In particular, the acrylic resin (for dressings and glue) impacts for 14.49%. Other contributions are given by processing in the line (2.23E-01 eq; 12.97%) especially for emissions during processing. The impacts of this category are mainly due to the emission of carbon dioxide (86.10%) and, to a lesser extent, methane (12.67%).

For the impact category **Climate Change (biogenic)** a value of 1.88E-02 kg CO_2 eq is obtained. This impact is mainly due to electricity consumption (6.18E-02 kg CO_2 eq). Other contributions are given by the waste treatment group (8.77E-03 kg CO_2 eq; 46.77%), by the processing group in the line (5.92E-03 kg CO_2 eq) and by the benefit and recovery group from recycling (4.90E-03 kg CO_2 eq). This is mainly due to the wood that will have to be disposed of. The vitrifiable group (3.24E-03 kg CO_2 eq) and the primer group and oils (1.92E-03 kg CO_2 eq) also contribute to the impact. In particular, the acrylic resin impacts 10.25%. Impacts in this category are mainly due to the emission of carbon dioxide and, to a lesser extent, methane into the air. The packaging group contributes to the reduction of this type of impact with a negative contribution of -6.65E-02 kg CO_2 eq. This is due to the use of wooden pallets as packaging.

For the impact category **Climate Change (land use and transformation)** a value of 4.36E-04 kg CO_2 eq is obtained. This impact is mainly due to the coating and oil group (1.80E-04 kg CO_2 eq; 41.22%). In particular, the acrylic resin is 40.60% coated. The packaging group also contributes to the impact (9.62E-05 kg CO_2 eq; 22.05%). In particular, the pallet impacts 7.61%. Another contribution is the use of electricity (4.06E-05 kg CO_2 eq; 9.32%) and methane and diesel (3.94E-05 kg CO_2 eq; 9.04%). The impacts of this category are mainly due to the emission of carbon dioxide into the air (99.68%).

For the impact category **Ozone depletion** a value of 3.60E-07 kg CFC_{11} eq is obtained. This impact is mainly due to the use of methane and diesel (2.21E-07 kg CFC_{11} eq; 61.31%) and electricity (7.58E-08 kg CFC_{11} eq; 21.04%). The acrylic resin impacts 7.31%. The impacts of this category are mainly due to the air emission of Halon 1211 (75.72%) and, to a lesser extent, of Halon 1301 (18.80%), CFC-114 (3.02%) and HCFC-22 (1.33%).

For the **Acidification** impact category a value of 1.45E-02 mol H^+ eq is obtained. This impact is mainly due to the use of electricity (7.43E-03 mol H^+ eq; 51.18%) and to the primer and oils group (3.48E-03 mol H^+ eq; 23.94%). In particular, the acrylic resin impacts 23.74%. The impacts of this category are mainly due to the emission of sulphur dioxide (46.63%), ammonia (33.14%) and nitrogen oxides (19.93%) to air.

For the impact category **Eutrophication (aquatic, freshwater)** a value of 7.33E-04 kg P eq is obtained. This impact is mainly due to the use of electricity (1.34E-04 kg P eq; 45.27%). Other contributions are given by the waste and impact group of the plant (2.06E-04 kg P eq; 28.13%) and by the packaging and oils group (1.34E-04 kg P eq; 18.29%). In particular, the acrylic resin impacts for 18.10%. The impacts of this category are mainly due to the release of phosphates into water (99.97%).

For the impact category **Eutrophication (aquatic, marine)** a value of 1.83E-03 kg N eq is obtained. This impact is mainly due to the use of electricity (6,43E-04 kg N eq; 35.07%). Other contributions are given by the machining group in the line (4.22E-04 kg N eq; 22.99%) and by the primers and oils group (2.79E-04 kg N eq; 15.21%). In particular, the acrylic resin impacts for 15.00%. The use of methane and diesel also contributes to the impact (1.85E-04 kg N eq; 10.08%). The impacts of this category are mainly due to the emission of nitrogen oxides (83.02%) and ammonia (8.00%) in air and, to a lesser extent, to the release of nitrates into water (7.35%).

For the impact category **Eutrophication (terrestrial)** a value of 3.81E-02 mol N eq is obtained. This impact is mainly due to the use of electricity (2.37E-02 mol N eq; 62.08%). Another contribution is made by the machining group in the line (6.20E-03 mol N eq; 16.26%). The acrylic resin is 8.50% coated. The impacts of this category are mainly due to the emission of ammonia (56.29%) and nitrogen oxides (43.71%) to air.

For the impact category **Photochemical ozone formation** a value of 5.69E-03 kg NMVOC eq is obtained. This impact is mainly due to the use of electricity (1.47E-03 kg NMVOC eq; 25.78%). Other contributions are given by the machining group in the line (1.16E-03 kg NMVOC eq; 20.37%) and by the primers and oils group (1.03E-03 kg NMVOC eq; 18.17%). In particular, the acrylic resin impacts for 16.85%. The use of methane and diesel also contributes to the impact (9.01E-04 kg NMVOC eq; 15.84%). The impacts of this category are mainly due to the emission of nitrogen oxides (68.81%), NMVOC of unspecified origin (16.14%) and sulphur dioxide (7.38%) to air.

For the impact category **Abiotic Depletion Potential (mineral and metals)** a value of 2.13E-06 kg Sb eq is obtained. This impact is mainly due to the primers and oils group (1.37E-06 kg Sb eq; 64.38%). In particular, the acrylic resin is coated for 62.88%. Another contribution is made by the waste and impact group of the plant (1.98E-07 kg Sb eq; 9.31%). The impacts of this category are mainly due to the use of raw materials such as metals, in particular camium (14.49%), but also chromium, copper, gold, lead, molybdenum, silver, tin and zinc.

For the impact category **Abiotic Depletion Potential (fossil)** a value of 3.77E+01 MJ is obtained. This impact is mainly due to the use of methane and diesel (1.70E+01 MJ; 45.11%) and electricity (1.07E+01 MJ; 28.53%). Another contribution is made by the primers and oils group (4.51E+00 MJ; 11.99%). In particular, the acrylic resin is coated for 11.48%. The impacts of this category are mainly due to the use of raw materials such as natural gas (62.57%), coal (15.78%), and oil (13.06%).

For the impact category **Water use** a value of 7.55E-01 m^3 is obtained. This impact is mainly due to the primers and oil group (2.65E-01 m^3; 35.15%). In particular, the acrylic resin impacts for 34.88%. Other contributions are given by the machining group in the line (2.65E-01 m^3; 35.04%) mainly for water and oxygen consumption and by the electric power group (1.13E-01 m^3; 14.94%).

The indicators Potential incidence of disease due to PM emissions (PM), Potential Human exposure efficiency relative to U235 (IRP), Potential Comparative Toxic Unit for Ecosystems (ETP-fw), Potential Comparative Toxic Unit for humans (HTP-c), Potential Comparative Toxic Unit for humans (HTP-nc) and Potential soil quality index (SQP) are not declared (ND) in this document.

Use of resources

PARAMETER	UNIT	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Use of renewable primary energy excluding resources used as raw materials	MJ	4,15E-1	6,96E-3	3,20E-1	0,00E+0	8,82E-4	4,87E-3	1,21E-3	-9,62E-3	7,40E-1
Use of renewable primary energy resources used as raw materials	MJ	3,55E-1	2,47E-3	9,65E-1	0,00E+0	4,08E-4	7,25E-3	4,95E-4	-9,09E-2	1,24E+0
Total use of renewable primary energy	MJ	7,70E-1	9,44E-3	1,29E+0	0,00E+0	1,29E-3	1,21E-2	1,70E-3	-1,01E-1	1,98E+0
Use of non-renewable primary energy excluding resources used as raw materials	MJ	3,26E+1	8,45E-1	3,20E+0	0,00E+0	1,22E-1	6,53E-2	1,27E-1	-5,73E-1	3,64E+1
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+0	0,00E+0	1,24E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	1,24E+0
Total use of non-renewable primary energy	MJ	3,26E+1	8,45E-1	4,43E+0	0,00E+0	1,22E-1	6,53E-2	1,27E-1	-5,73E-1	3,77E+1
Secondary material	kg	0,00E+0	0,00E+0	4,03E-2	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	1,60E-2
Renewable secondary fuels	MJ	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Non-renewable secondary fuels	MJ	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Net use of fresh water	m^3	1,03E-2	1,62E-4	8,19E-3	0,00E+0	2,23E-5	3,83E-5	1,48E-4	-1,71E-4	1,87E-2

Waste production and outflows
Waste production

PARAMETER	UNIT	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Hazardous waste disposed	kg	5,59E-5	4,99E-7	1,50E-3	0,00E+0	7,73E-8	1,23E-7	4,75E-8	-6,74E-7	1,56E-3
Non-hazardous waste disposed	kg	1,50E-1	5,49E-2	3,01E-1	0,00E+0	5,77E-3	2,15E-3	8,62E-1	-6,36E-4	1,38E+0
Radioactive waste disposed	kg	5,33E-5	5,73E-6	9,47E-6	0,00E+0	8,28E-7	3,57E-7	8,63E-7	-9,42E-7	6,96E-5

Outflows

PARAMETER	UNIT	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Components for reuse	kg	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Material for recycling	kg	0,00E+0	0,00E+0	1,26E-2	0,00E+0	0,00E+0	2,03E-2	0,00E+0	0,00E+0	3,29E-2
Materials for energy recovery	kg	0,00E+0	0,00E+0	5,60E-4	0,00E+0	0,00E+0	1,70E-2	0,00E+0	0,00E+0	1,75E-2
Exported energy	MJ	0,00E+0	0,00E+0	2,43E-3	0,00E+0	0,00E+0	1,03E-1	0,00E+0	0,00E+0	1,06E-1

Informations on biogenic carbon content

Both products do not contain biogenic carbon, while the content in the packaging is 2.06E-02 kgC/UF for the TERMOROLL A+ 50 mm and 1.62E-02 kgC/UF for the TERMOPAN A+ 50 mm.

Additional Informations

The grey energy, understood as the energetic consumptions for the production of the raw materials and their transport, let alone for the processes of distribution and disposal of the finished product is equal to 2.89E+01 MJ for the TERMOROLL A+ 50 mm product and 3.11E+01 MJ for the TERMOPAN A+ 50 mm product.

Indoor air emissions

The following are the results extrapolated from VOC Emission test report Indoor Air Comfort Gold of March, 8th 2019 per il TERMOROLL A+ 50 mm (test report n. 392-2019-00025401_A_EN).

TERMOROLL A+ 50 mm
VOC Emission Chamber Test Parameters

PARAMETER	VALUE	PARAMETER	VALUE
Chamber volume, V[L]	119	Preconditioning period	-
Air Change rate, n[h^{-1}]	0.5	Test period	04/02/2019 - 04/03/2019
Relative humidity of supply air, RH [%]	50 ± 3	Area specific ventilation rate, q [m/h or $m^3/m^2/h$]	0.5
Temperature of supply air, T [°C]	23 ± 1	Loading factor [m^2/m^3]	1.0
		Test scenario	Wall

TERMOROLL A+ 50 mm
VOC Emission Test Results after 3 Days

	CAS No.	Retention time [min]	ID - Cat	Specific Conc. [µg/m³]	Toluene eq. [µg/m³]	Specific SER [µg/(m²•h)]	R_D	R_B
VOC with NIK/LCI None determined								
VOC without NIK/LCI 2-Propenoic acid *								
Sum of VOC without NIK/LCI				< 5	< 5	< 3		
VVOC compounds None determined								
TVVOC				< 5	< 5	< 3		
SVOC compounds None determined								
TSVOC				< 5	< 5	< 3		
Carcinogens								
Total carcinogens				< 1	< 1	< 1		
Aldehydes								
Formaldehyde	50-00-0		1	< 3		< 2		
Acetaldehyde	75-07-0		1	16		8.0	0.013	0.013
Propionaldehyde	123-38-6		1	< 3		< 2		
Butyraldehyde	123-72-8		1	< 3		< 2		
2-butenal	123-73-9		1	< 5		< 3		
Glutaraldehyde	111-30-8		1	< 5		< 3		
R-values							0.013	0.013
TVOC				<5	<5	<3		

TERMOROLL A+ 50 mm
VOC Emission Test Results after 28 Days

	CAS No.	Retention time [min]	ID - Cat	Specific Conc. [µg/m³]	Toluene eq. [µg/m³]	Specific SER [µg/(m²•h)]	R_D	R_B
VOC with NIK/LCI None determined								
VOC without NIK/LCI 2-Propenoic acid *								
Sum of VOC without NIK/LCI				< 5	< 5	< 3		
VVOC compounds None determined								
TVVOC				< 5	< 5	< 3		
SVOC compounds None determined								
TSVOC				< 5	< 5	< 3		
Carcinogens								
Total carcinogens				< 1	< 1	< 1		
CMR substances								
Benzene	71-43-2		1	< 1		< 1		
Trichloroethylene	79-01-6		1	< 1		< 1		
Dibutylphthalate (DBP)*	84-74-2		1	< 1		< 1		
Diethylhexylphthalate (DEHP)*	117-81-7		1	< 1		< 1		
Aldehydes								
Formaldehyde	50-00-0		1	< 3		< 2		
Acetaldehyde	75-07-0		1	8.4		4.2	0.0070	0.0070
Propionaldehyde	123-38-6		1	< 3		< 2		
Butyraldehyde	123-72-8		1	< 3		< 2		
2-butenal	123-73-9		1	< 5		< 3		
Glutaraldehyde	111-30-8		1	< 5		< 3		
R-values							0.0070	0.0070
TVOC				< 5	< 5	< 3		

Indoor air emissions

The following are the results extrapolated from VOC Emission test report Indoor Air Comfort Gold of May, 26th 2019 for the TERMOPAN A+ 50 mm (test report n. 392-2019-00163301_A_EN_03).

TERMOPAN A+ 50 mm
VOC Emission Chamber Test Parameters

PARAMETER	VALUE	PARAMETER	VALUE
Chamber volume, V[L]	119	Preconditioning period	-
Air Change rate, n[h^{-1}]	0.5	Test period	09/05/2019 - 06/06/2019
Relative humidity of supply air, RH [%]	50 ± 3	Area specific ventilation rate, q [m/h or $m^3/m^2/h$]	0.5
Temperature of supply air, T [°C]	23 ± 1	Loading factor [m^2/m^3]	1.0
		Test scenario	Wall

TERMOPAN A+ 50 mm
VOC Emission Test Results after 3 Days

	CAS No.	Retention time [min]	ID - Cat	Specific Conc. [µg/m³]	Toluene eq. [µg/m³]	Specific SER [µg/(m²•h)]	R_D	R_B
VOC with NIK/LCI None determined								
VOC without NIK/LCI 2-Propenoic acid *	79-10-7	3.02	2	50	50	25		
Sum of VOC without NIK/LCI				50	50	25		
VVOC compounds None determined								
TVVOC				< 5	< 5	< 3		
SVOC compounds None determined								
TSVOC				< 5	< 5	< 3		
Carcinogens								
Total carcinogens				< 1	< 1	< 1		
Aldehydes								
Formaldehyde	50-00-0		1	< 3		< 2		
Acetaldehyde	75-07-0		1	17		8.5	0.014	0.014
Propionaldehyde	123-38-6		1	< 3		< 2		
Butyraldehyde	123-72-8		1	< 3		< 2		
2-butenal	123-73-9		1	< 5		< 3		
Glutaraldehyde	111-30-8		1	< 5		< 3		
R-values							0.014	0.014
TVOC				50	50	25		

TERMOPAN A+ 50 mm
VOC Emission Test Results after 28 Days

	CAS No.	Retention time [min]	ID - Cat	Specific Conc. [µg/m³]	Toluene eq. [µg/m³]	Specific SER [µg/(m²•h)]	R_D	R_B
VOC with NIK/LCI None determined								
VOC without NIK/LCI 2-Propenoic acid *	79-10-7	2.82	2	5.5	5.5	2.7		
Sum of VOC without NIK/LCI				5.5	5.5	2.7		
VVOC compounds None determined								
TVVOC				< 5	< 5	< 3		
SVOC compounds None determined								
TSVOC				< 5	< 5	< 3		
Carcinogens								
Total carcinogens				< 1	< 1	< 1		
CMR substances								
Benzene	71-43-2		1	< 1		< 1		
Trichloroethylene	79-01-6		1	< 1		< 1		
Dibutylphthalate (DBP)*	84-74-2		1	< 1		< 1		
Diethylhexylphthalate (DEHP)*	117-81-7		1	< 1		< 1		
Aldehydes								
Formaldehyde	50-00-0		1	< 3		< 2		
Acetaldehyde	75-07-0		1	8.5		4.3	0.0071	0.0071
Propionaldehyde	123-38-6		1	< 3		< 2		
Butyraldehyde	123-72-8		1	< 3		< 2		
2-butenal	123-73-9		1	< 3		< 2		
Glutaraldehyde	111-30-8		1	< 3		< 2		
R-values							0.0071	0.0071
TVOC				5.5	5.5	2.7		

Type and data source

Choosing the data to be used for the LCA study, primary data collected from Eurofibre were endorsed through a measurement campaign carried out between January 2020 and May 2020 in the Marcon (Ve) plant. The primary data cover the period January 2019 - December 2019 and relate to:

- the transport of incoming materials for the production, as well as the auxiliary materials as e.g. the oxygen (distance covered, type of fuel, Euroclass of the vehicles, payload, percentage of vehicle load);
- waste produced (quantity and type) and raw materials used (quantity and type);
- the production process of insulation at Eurofibre (mass balance and energy consumption);
- internal transport and operating machines used at Eurofibre;
- the transport of the waste produced to the destination plant (distance covered, type of fuel, Euro class of the vehicles, vehicle load, percentage of vehicle load);
- diesel and methane consumption for heating;
- lighting and compressed air consumption.

In the event that primary data or models are not available for the calculation of such data, secondary data obtained by consulting internationally recognized databases have been used, favoring the use of the most up-to-date ones where possible. The secondary data in particular concern:

- the combustion processes of the vehicles: emissions, maintenance, use of the road network, fuel consumption (Ecoinvent data sets 3.5 version);
- operating machines: emissions (Ecoinvent 3.5 data sets);
- electricity: energy mix, distribution network, sulfur hexafloride emissions, losses (Ecoinvent data set 3.5);
- the production of the materials used (Ecoinvent 3.5 data sets).

The proxy data are less than 10% as required by the program rules.

Reference

- General Programme Instructions of the International EPD® System. Version 3.0
- Construction Products and construction services 2019:14 version 1.0 valid until 2024-12-20
- c-PCR 005 thermal insulation products (EN 16783:2017)
- European Residual Mixes. Results of the calculation of Residual Mixes for the calendar year 2018. AIB, 2019

Standard

- CEN, 2019, EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction works, European Committee for Standardization (CEN), Brussels
- CEN, 2016, PD CEN7TR 16970:2016 Sustainability of construction works – Guidance for the implementation of EN 15804. European Committee for Standardization (CEN), Brussels
- CEN, 2017, EN 16783:2017 Thermal insulation products – Product Category Rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations, European Committee for Standardization (CEN), Brussels
- ISO, 2006, ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework, International Organization for Standardization (ISO), Ginevra
- ISO 2017, ISO 14044:2017 Environmental management – Life cycle assessment – Requirements and guidelines, International Organization for Standardization (ISO), Ginevra

Internal Documents

- Eurofibre, 2019. Building products catalog (internal document)
- Eurofibre, 2020. Quality management of LCA Inventory data for the creation and updating of EPDs (internal procedure P08-11)
- Eurofibre, 2020 Life Cycle Assessment study of seven building insulations Third Party Report rev.2 05/06/2020

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