

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Issue date	21.11.2022
Valid to	20.11.2027

CLIMAFLEX® naturefoam easy
NMC S.A.

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CLIMAFLEX®

naturefoam
easy



nmc

TECHNICAL
INSULATION

FLEXIBLE PIPE INSULATION MADE
OF RENEWABLE AND RECYCLED
RAW MATERIALS WITH A SELF-ADHESIVE
DOUBLE-SIDED CLOSING SYSTEM.

1. General Information

NMC S.A.

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-NMC-20220226-IBD1-EN

This declaration is based on the product category rules:

Insulating materials made of foam plastics, 01.2019
(PCR checked and approved by the SVR)

Issue date

21.11.2022

Valid to

20.11.2027

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CLIMAFLEX® naturefoam easy

Owner of the declaration

NMC S.A.
Gert-Noël Strasse
BE-4731 Eynatten

Declared product / declared unit

CLIMAFLEX® naturefoam easy

Scope:

Product line CLIMAFLEX® naturefoam easy Thermal insulation products for building equipment and industrial insulations made of polythene [BSJ1] foam (PEF) according to EN14313, describing the specific environmental performance of the product produced in Belgium at the site of Eynatten

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as EN 15804.

Verification

The standard EN 15804 serves as the core PCR

Independent verification of the declaration and data
according to ISO 14025:2011

internally externally

Vito D'Incognito
(Independent verifier)

2. Product

2.1 Product description/Product definition

CLIMAFLEX® naturefoam easy Polyethylene foams have many environmental benefits, having a low density (average 23 kg/m³), few raw materials are required for the manufacture of an article and the environmental impact of their transport is lower than similar articles of higher density performing the same function. The CLIMAFLEX® naturefoam easy does have a self adhesive strip. Furthermore, the CLIMAFLEX® naturefoam easy are recyclable with exception of the self-adhesive strip. For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) - Thermal Insulation products for building equipment and industrial installations. Factory made polyethylene foam (PEF) and the CE-marking cf. PCR. For the application and use the respective national provisions apply.

2.2 Application

The function of CLIMAFLEX® naturefoam easy is to ensure the insulation of heating and sanitary installations for a reference service life (RSL) of 50 years. This duration is based on the frequency of replacement of sanitary and heating piping in buildings. Although the insulation pipes are still effective after 50

years, it is assumed that when replacing the piping, the insulation CLIMAFLEX® naturefoam easy is not reused and is recycled. 50 years is the minimum Reference Service Life recommended for factory made thermal insulation products".

2.3 Technical Data

Constructional data

Performance data of the product in accordance with the Declaration of Performance with respect to its Essential Characteristics according to EN 14313 apply. Further data:

Name	Value	Unit
Gross density	23.3	kg/m ³
Thermal conductivity at 40°C	0.04	W/(mK)
Reaction To Fire Acc.to EN 13501-1 depending on the thickness	Bl-s1d0 ; Cl-s1d0	-
Max Service Temperature Acc. To EN 14707	100	°C
Min Service Temperature	0	°C
water absorption Acc. to EN 13472	WS005	-

traces quantities of water-soluble ions and pH-value Acc. to EN 13468	Cl < 15 – F < 4 - pH 6,8	-
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2.4 Delivery status

The CLIMAFLEX® naturefoam easy product is a closed-cell polyethylene foam insulation tube, containing recycled PE, designed for applications in heating and sanitary installations. The EPD will cover the whole CLIMAFLEX® naturefoam easy range. The insulating sleeves in the CLIMAFLEX® naturefoam easy range have a thickness ranging from 9 to 20mm and an inside diameter ranging from 15 to 102mm. These products are categorized according to thickness. The category of small thickness products includes the CLIMAFLEX® naturefoam easy 9 and 13mm products while the category of large thickness products includes CLIMAFLEX® naturefoam easy 20 and 25mm products. These two categories are also distinguished by their rating in fire reaction tests. For small thickness products (9 and 13mm) the fire classification is Euroclass B1 s1 d0 (Acc. to EN 13501-1) and for large thickness products (20mm) the fire rating is Euroclass Cl s1 d0 (Acc. to EN 13501-1).

2.5 Base materials/Ancillary materials

Base materials

CLIMAFLEX® naturefoam easy is a professional polyethylene-based closed-cell foam pipe insulation, containing recycled PE, for continuous energy saving and condensation control purposes. CLIMAFLEX® naturefoam easy provides solutions that follow all necessary guidelines and standards for any type of installation. The CLIMAFLEX® naturefoam easy is equipped with a double-sided self-adhesive means that installed pipes can be insulated twice as quickly as with traditional insulation products. The following table displays the different elements of the formulation for CLIMAFLEX® naturefoam easy. This is in accordance with the PCR Part B: Requirements on the EPD for Insulating materials made of foam plastics and ISO 14025.

This product contains substances listed in the candidate list (date: 08.07.2021) exceeding 0.1 percentage by mass: **No**.

This product contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B, which are not on the candidate list, exceeding 0.1 percentage by mass: **No**.

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): **No**.

Name	Value	Unit
LDPE	34.60	%
Flame retardant	4.3	%
LLDPE	17.50	%
Internally recycled PE	22.70	%
Pigment	3.30	%
Volume stabilizer	1.70	%
Blowing Agent	9.8	%
Hot melt	4.3	%
Pet Clear	1.8	%

PE, recycled PE and fillers are the main components of the product and are responsible for the

characteristics and performance of the product. The blowing agent causes the expansion during manufacturing. The flame retardant ensures the fire resistance and conformity with fire protection regulations (see section 2.13). According to the European Chemicals Regulation REACH manufacturers, importers and downstream users must register their chemicals and are responsible for their safe use. NMC S.A. uses exclusively verifiably registered and approved substances in its production. Products manufactured and put on the market by NMC do need to be registered. CLIMAFLEX® naturefoam easy do not contain Substances of Very High Concern (SVHC). Antimony trioxide and halogenated flame retardants are applied.

2.6 Manufacture

The manufacture of the CLIMAFLEX® naturefoam easy product consists of incorporating the ingredients of the formulation into an extruder, adding a foaming agent, mixing, heating and then extruding the mix through a die, during which time foaming takes place. The product is then cooled with water (municipal water), drying and the double-sided self-adhesive is applied as well as the release band. After that the product is cut to size before being packed and stored. Quality assurance : The manufacture is certified ISO 9001 for the quality management and the product is certified for CE marking according to CPR (CE Certificate of conformity N° 0749-CPR-BC1-571-4133-0001-01 and 0749-CPR-BC1-571-4133-0002-01)

2.7 Environment and health during manufacturing

During all manufacturing steps of NMC S.A. Belgium, the production follows all national guidelines and regulations. Solar panels are installed on the roof of the warehouse and in the field to reduce the requirement for grid electricity.

2.8 Product processing/Installation

CLIMAFLEX® naturefoam easy can be installed using basic tools (e.g. craft knives). No special tools, nor specific protection is necessary. When applying adhesives the information given in the relevant safety data sheets is to be heeded. Any glue and adhesive tapes used during the installation phase were not included in the LCA. Recommendations on how to use the product are described in the application manuals or videos. More details are listed on the Web Page www.nmc-insulation.com

2.9 Packaging

CLIMAFLEX® naturefoam easy products are packed in cardboard boxes and transported on reusable pallets. All packaging material can be recycled. The pallets used to transport the products are taken back or exchanged when the CLIMAFLEX® naturefoam easy is delivered, so the use of pallets is a closed loop economy.

2.10 Condition of use

During the use of the products for the purpose for which they are intended, there are no modifications unless one of the effects listed in extraordinary impacts occurs (see point 2.13).

2.11 Environment and health during use

There are no particular effects on environmental and health impacts during use related to the material composition of the product. The CLIMAFLEX® naturefoam easy products are used in a wide range of applications across the building sector. The PEF foams fulfil the German, Belgian and French regulations regarding the emission of VOC with emissions far below the most stringent limit values. The Eurofin Product Testing institute, at the request of the CEFEP (European group of PEF and FEF manufacturers) has made a wide range of tests for different PEF products from different manufacturers. The insulation of heating pipes with CLIMAFLEX® naturefoam easy allows a reduction energy dispersion and of course CO₂ emissions during the full service life of the installation. The quantification of this in-use benefit is not within the scope of this EPD, however, this could be calculated using an LCA for the complete pipe/insulation system, and has to be evaluated in the frame of the LCA from the complete heating installation. A software program available on NMC's website <http://cit.nmc-insulation.com/> allows for the calculation of the heat flow and insulation benefit under real use conditions.

2.12 Reference service life

The function of CLIMAFLEX® naturefoam is to ensure the insulation of heating and sanitary installations for a reference service life (RSL) of 50 years. This duration is based on the frequency of replacement of sanitary and heating piping in buildings. Although the insulation pipes are still effective after 50 years, it is assumed that when replacing the piping, the insulation (CLIMAFLEX® naturefoam) is recycled. 50 years is the minimum Reference Service Life recommended in EN16783 "PCR for factory made thermal insulation products".

2.13 Extraordinary effects

Fire

CLIMAFLEX® naturefoam easy is classified as a combustible insulation material. Due to its material structure, CLIMAFLEX® naturefoam easy does not contribute to an uncontrollable spread of fire under installation conditions typical on a building site. The

product is self-extinguishing reducing its contribution to any fire event. There is no possibility of the material self-igniting. CLIMAFLEX® naturefoam easy does not propagate the fire horizontally or vertically. The smoke development in case of fire is very low (class S1)

Fire protection

Name	Value
Building material class	BI/CI
Burning droplets	d0
Smoke gas development	s1

Water

CLIMAFLEX® naturefoam easy is a closed cell foam and obtains the best water absorption class WS005 according to the product standard.

Mechanical destruction

CLIMAFLEX® naturefoam easy is chemically inert and does not present any environmental or health risk if mechanically destructed. CLIMAFLEX® naturefoam easy is not UV resistant. The product is not recommended for outside applications without complementary UV protection

2.14 Re-use phase

In principle, if removed carefully, CLIMAFLEX® naturefoam easy can be reused on any other piping system of similar dimensions. Any material not suitable for reuse is fully recyclable

2.15 Disposal

The CLIMAFLEX® naturefoam easy is recyclable with exception of the self-adhesive strip and can be used as a substitute for virgin PE-LD granulates, with only minor additive additions. There is no chemical difference between recycled PE-LD and fossil fuel derived PE-LD, so using a mix of sources does not change the recyclability of the product.

2.16 Further information

Additional information about CLIMAFLEX® naturefoam easy can be found on the NMC web site www.nmc-insulation.com Here specification clauses, data sheets and application manuals can be found.

3. LCA: Calculation rules

3.1 Declared Unit

3.1 Declared Unit The declared unit for insulating materials made of foam plastic is 1 m³. The EPD will cover the whole CLIMAFLEX® naturefoam easy range. The insulating sleeves in the CLIMAFLEX® naturefoam easy range have a thickness ranging from 9 to 20 mm thick and from 15 to 102mm inside diameter The average reference density of CLIMAFLEX® naturefoam easy is 23.3 kg/m³.

Declared unit

Name	Value	Unit
Gross density	23.3	kg/m ³
Declared unit	1	m ³
Conversion factor from 1 m ³ to 1 linear meter	Value for 1 m divided section of the insulation pipe (m ²)	m

Gross Density volume for 1 kg	0.0429	m ³
Thermal Conductivity at 40°C	0.040	W/(mK)

Thermal Conductivity λ : 0.040 W/mK at (40°C) R-value- thickness- : 25 mm : +/- 3.5 (m²K/W) depending on the pipe diameter.

3.2 System boundary

The Data collection refers to the yearly production in 2021

Module A1 to A3:

The LCA calculation covers the production of the raw materials, transport of these to the plant, the mixing of raw materials according to the respective recipes, manufacturing of the foam product and packaging for dispatch. All production takes place exclusively in Eynatten, Belgium.

Module A4:

NMC's logistics department reported average figures for the distribution of NMC's products - depending on

the country the transport distance varies. In the table below shows, the biggest customers sorted by country as well as the volumes of CLIMAFLEX®naturefoam easy delivered. These customers represent 80% of sales volumes in 2021, with the remainder supplied to a large set of smaller customers.

Module A5:

Installation of CLIMAFLEX®naturefoam easy products is done by hand and requires no special equipment apart from a knife. The products can be placed end to end and the remaining pieces can be reused. Some glue or tape could be used for the installation, as the quantity of the product used depends on the final customer, he has to calculate the impact of what he used himself. The environmental impact of this type of accessory is not counted in this study. The calculations do not contain any installation waste. Cardboard as a packaging material is assumed to be recycled. As input material cardboard made of waste paper is considered. Thus, the environmental burden of packaging materials are considered already in A1-A3. The value of the environmental impact for A5 is declared as "0". The choice made is : the final user have to calculate the impact of A5 himself in function of his own case, by accounting for the extra amount of product needed during installation.

Module B1-B7:

Once installed the CLIMAFLEX®naturefoam easy product requires no maintenance and no repair. It will be dismantled when the sanitary pipe is replaced. For this reason, there are not expected to be any impacts in B1 to B7 assuming correct specification and installation. Step B1 is not considered in this LCA, although the insulation of the piping contributes to a significant reduction of CO₂ emissions from the heating or cooling equipment, this is not taken into account in this LCA. It should, however, be taken into account in the calculation of the environmental impacts of the complete heating and cooling systems or of the complete building.

Module C1:

As for the installation of the product, the disassembly is done manually and does not require any specific equipment. Disassembly is generally carried out at the same time as the replacement or removal of sanitary pipes. Consequently, there are no impacts associated with C1.

Module C2:

Transport at the end-of-life stage is modelled as a Euro Cargo 0-6 mix truck with diesel fuel. The average distance to either mechanical recycling, incineration or landfills is assumed to be 100 km

Module C3:

The scenario that has been retained for this Life Cycle Assessment is the 100% recycling scenario.

Module C4:

As CLIMAFLEX®naturefoam easy is fully recyclable, the legislation is pushing more in this direction and the overall pressure on plastic recycling is growing, the scenario with recycling is considered.

Module D:

The CLIMAFLEX®naturefoam easy is recyclable with exception of the self adhesive strip and can be used as a substitute for virgin PE-LD granulates, with only minor additive additions. There is no chemical difference between recycled PE and fossil fuel derived PE-LD, so using a mix of sources does not change the recyclability of the product.

3.3 Estimates and assumptions

The LCA calculation is conducted using the *Gabi ts - database*. Not all necessary LCIs are included in the database. Where data were missing or were unavailable or where suppliers were unable to provide complete information, proxy datasets have been used. The environmental burden for the production of pigments, flame retardants and volume stabilizers are approximated.

3.4 Cut-off criteria

Any glue and adhesive tapes used during the installation (A5) have not been included as quantification of these materials is uncertain and their use by the various installers is too diverse, adhesives and glues are not required in all/most cases, but may be used for some applications. In this study no others cut-off criteria have been applied and all elementary incoming processes as well as all energy and water inputs and waste outputs have been counted.

3.5 Background data

The software system for life cycle engineering *GaBi 10 developed by thinkstep AG* was used to perform this LCA. The *GaBi LCI database GaBi 10* provides the life cycle inventory data for several of the raw and process materials obtained from the background system. The most recent update of the database was in 2021.

3.6 Data quality

All the foreground data requiring such energy or raw material coming from production, were verified and cross-checked before being included in the model. Most of the life cycle inventories for the basic materials are available in the *GaBi 10 database*. For electrical and thermal energy Belgium specific grid mixes and Belgium specific supply for natural gas were considered.

3.7 Period under review

The production data for the year 2021 were used for the realization of this study

3.8 Allocation

There is no co-product or by-product generated during the production of NMC's products. Due to the lack of specific data per production line and product, the energy has been allocated per overall produced volume of insulation foam.

Production waste

Most of the production waste from the process (machine start, end of production, non-conforming products, etc.) is recycled internally in order to be reused in the manufacturing process. These impacts are accounted for in A1-A3.

Installation and End-of-Life waste

Installation of the foam products is done by hand and requires no special equipment apart from a knife. Installation off-cut is not considered in this calculations. Any glue and adhesive tapes used during the installation phase were not included in the LCA

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

4. LCA: Scenarios and additional technical information

Characteristic product properties Information on biogenic Carbon

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	0	kg C
Biogenic carbon content in accompanying packaging	5.91	kg C

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.043	l/100km
Transport distance	344.5	km
Capacity utilisation (including empty runs)	10	%
Gross density of products transported	23.3	kg/m ³

Reference service life

Name	Value	Unit
Reference service life	50	a

End of life (C1-C4)

Name	Value	Unit
Recycling	23.3	kg

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE		CONSTRUCTION PROCESS STAGE	USE STAGE						END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES				
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	ND	MNR	MNR	MNR	ND	ND	ND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m³ CLIMAFLEX® naturefoam easy

Core Indicator	Unit	A1-A3	A4	A5	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	67.06	1.45	0.00	0.14	1.82	0.00	-41.97
GWP-fossil	[kg CO ₂ -Eq.]	67.47	1.45	0.00	0.14	1.79	0.00	-41.61
GWP-biogenic	[kg CO ₂ -Eq.]	-0.51	-0.01	0.00	0.00	0.03	0.00	-0.36
GWP-luluc	[kg CO ₂ -Eq.]	0.11	0.01	0.00	0.00	0.00	0.00	-0.01
ODP	[kg CFC11-Eq.]	2.39E-8	8.22E-14	0.00E+0	1.39E-14	7.42E-11	0.00E+0	-2.55E-10
AP	[mol H ⁺ -Eq.]	2.14E-1	2.68E-2	0.00E+0	1.68E-4	2.57E-3	0.00E+0	-5.78E-2
EP-freshwater	[kg P-Eq.]	3.13E-4	2.94E-6	0.00E+0	5.06E-7	1.20E-5	0.00E+0	-7.80E-5
EP-marine	[kg N-Eq.]	3.91E-2	6.90E-3	0.00E+0	5.59E-5	1.02E-3	0.00E+0	-1.69E-2
EP-terrestrial	[mol N-Eq.]	4.17E-1	7.58E-2	0.00E+0	6.64E-4	1.04E-2	0.00E+0	-1.76E-1
POCP	[kg NMVOC-Eq.]	1.56E-1	1.94E-2	0.00E+0	1.69E-4	2.49E-3	0.00E+0	-5.52E-2
ADPE	[kg Sb-Eq.]	1.32E-1	1.00E-7	0.00E+0	1.43E-8	1.05E-6	0.00E+0	-1.06E-5
ADPF	[MJ]	2.05E+3	1.91E+1	0.00E+0	1.86E+0	5.39E+1	0.00E+0	-1.60E+3
WDP	[m ³ world-Eq deprived]	6.16E+0	9.68E-3	0.00E+0	1.58E-3	1.30E-1	0.00E+0	-7.10E-1

Caption GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m³ CLIMAFLEX® naturefoam easy

Indicator	Unit	A1-A3	A4	A5	C2	C3	C4	D
PERE	[MJ]	269.65	0.76	0.00	0.13	33.22	0.00	-120.13
PERM	[MJ]	0.00	ND	ND	ND	ND	ND	ND
PERT	[MJ]	269.65	0.76	0.00	0.13	33.22	0.00	-120.13
PENRE	[MJ]	1271.63	19.14	0.00	1.87	53.92	0.00	-1605.33
PENRM	[MJ]	794.34	ND	ND	ND	ND	ND	ND
PENRT	[MJ]	2065.97	19.14	0.00	1.87	53.92	0.00	-1605.33
SM	[kg]	14.72	ND	ND	ND	ND	ND	ND
RSF	[MJ]	0.00	ND	ND	ND	ND	ND	ND
NRSF	[MJ]	0.00	ND	ND	ND	ND	ND	ND
FW	[m ³]	0.39	0.00	0.00	0.02	0.00	0.00	-0.19

Caption 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m³ CLIMAFLEX® naturefoam easy

Indicator	Unit	A1-A3	A4	A5	C2	C3	C4	D
HWD	[kg]	2.60E-4	7.03E-11	0.00E+0	9.87E-12	5.70E-9	0.00E+0	-1.50E-7
NHWD	[kg]	2.46E+0	1.75E-3	0.00E+0	3.04E-4	7.14E-2	0.00E+0	-4.43E-1
RWD	[kg]	6.98E-2	2.03E-5	0.00E+0	3.46E-6	1.25E-2	0.00E+0	-1.34E-2
CRU	[kg]	0.00	ND	ND	ND	ND	ND	ND
MFR	[kg]	0.00	ND	14.72	ND	23.30	ND	ND
MER	[kg]	0.00	ND	ND	ND	ND	ND	ND
EEE	[MJ]	0.00	ND	ND	ND	ND	ND	ND
EET	[MJ]	0.00	ND	ND	ND	ND	ND	ND

Caption HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m³ CLIMAFLEX® naturefoam easy

Indicator	Unit	A1-A3	A4	A5	C2	C3	C4	D
PM	[Disease Incidence]	8.66E-6	4.39E-7	0.00E+0	1.28E-9	2.05E-8	0.00E+0	-4.35E-7
IRP	[kBq U235-Eq]	6.25E+0	3.00E-3	0.00E+0	5.23E-4	8.73E-1	0.00E+0	-1.33E+0
ETP-fw	[CTUe]	1.14E+3	2.48E+1	0.00E+0	1.32E+0	2.09E+1	0.00E+0	-7.63E+2
HTP-c	[CTUh]	2.98E-8	4.17E-10	0.00E+0	2.72E-11	5.17E-10	0.00E+0	-1.88E-8
HTP-nc	[CTUh]	2.18E-6	1.56E-8	0.00E+0	1.49E-9	1.60E-8	0.00E+0	-8.75E-7
SQP	[·]	2.01E+2	4.45E+0	0.00E+0	7.87E-1	3.38E+1	0.00E+0	-8.19E+1
Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index							

6. LCA: Interpretation

The use of internal recycled material in CLIMAFLEX® naturefoam easy reduces the need for raw materials and avoids wasting resources. CLIMAFLEX® naturefoam easy has a very low density, which means that little raw material is needed for high insulation efficiency, which results in significant energy savings. In addition, CLIMAFLEX® naturefoam easy is largely made of low-density polyethylene, so it is fully recyclable and can be recycled when it reaches the end of its life. As there is a variation in density between the different references of the CLIMAFLEX® naturefoam easy range, a sensitivity analysis has been performed. The results of the LCA are given for 1m³ of product calculated with an average weighted foam density of 23,3 kg/m³. For the lowest density, the impacts are lowered by 5,6 % and for the highest density the impacts should be majored by 11,6 %. Most references are very close to the average density, but all impact factors can be recalculated based on the product's density. When we analyse the complete life cycle, we see that the most impacting part for all environmental impact factors is the production module and more particularly the raw materials part. The transport stage (A4-A5) has a significant impact on some factors because part of the CLIMAFLEX® naturefoam easy is sent by ship to New Zealand. With regard to global warming for the complete life cycle, more than 95% comes from the production module 2,8% from transport to the places of installation and 2,8% comes from the end of life. A more in-depth analysis of the production module A1 to A3 shows that the production of raw materials and their transport account for almost 96% of the impact Global Warming

Potential. As the CLIMAFLEX® naturefoam easy foam is fully recyclable; the choice for the end of life was that of 100% recycling. This avoids the use of new raw materials and or the exploitation of renewable or non-renewable resources. The end of life in 100% landfill has a slight impact, especially from the point of view of climate change. However, the 100% incineration scenario has the greatest impact because during incineration there is a significant release of carbon dioxide. The insulation with CLIMAFLEX® naturefoam easy of the sanitary and heating piping contributes to a significant reduction of CO₂ emissions from the heating or cooling equipment, this is not considered in this LCA. It should, however, be taken into account in the calculation of environmental impacts of the complete heating and cooling systems or of the complete building. Software that can be accessed via the following link <http://cit.nmcinsulation.eu> gives the possibility to calculate the heat flow of insulated pipe in real use conditions. One way to continue to reduce the environmental impact of the CLIMAFLEX® naturefoam easy would be to continue to diversify our energy sources by switching more and more to renewable energies. To this end, after having greatly increased the number of photovoltaic panels, NMC will acquire a cogeneration system. Looking for more eco-responsible suppliers must also be put in place, as well as finding raw materials manufactured locally to avoid long-distance transport as much as possible. An analysis of the plant's carbon footprint, which is currently being carried out, should enable NMC to identify areas for improvement and find solutions to achieve the goal of zero carbon.

7. Requisite evidence

7.1. VOC emissions

Eurofins Product Testing A/S has tested a wide range and variety of typical PEF (Polyethylene foam) products marketed in the EU from CEFEP (European Group of PEF/FEF manufacturers) Based on the loading factor 0.05m²/m³ (determined after consideration of the real- life applications of PEF products (in living rooms) and recommendations by the experts of the test institute) all results were found to be

clearly below the limit values. For all samples below 100mg/m³ TVOC after 28 days. Certificates are available on request.

7.2 Leaching

According to EN 13468 the content of water-soluble chloride ions for CLIMAFLEX® naturefoam easy is <15mg/kg

8. References

EN 1602

EN 1602: 2013: Thermal insulating products for building applications - Determination of the apparent density

EN ISO 8497 EN ISO 8497: Thermal insulation - Determination of steady-state thermal transmission properties of thermal insulation for circular pipes

ISO 9001

ISO 9001: 2015: Quality management systems.

EN 13468

EN 13468 : Thermal insulating products for building equipment and industrial installations - Determination of trace quantities of water-soluble chloride, fluoride, silicate, and sodium ions and pH.

EN 13472

EN 13472 : Thermal insulating products for building equipment and industrial installations - Determination of short term water absorption by partial immersion of preformed pipe insulation

EN 13501-1

EN 13501-1:2007+A1: 2013 Fire classification of construction products and building elements - Classification using test data from reaction to fire tests

ISO 14001

ISO 14001: 2015 Environmental management systems.

EN ISO 14025

EN ISO 14025: 2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 14040

ISO 14040: Environmental management — Life cycle assessment — Principles and framework

ISO 14044

ISO 14044: Environmental management — Life cycle assessment — Requirements and guidelines

EN 14707

EN 14707: 2012: Thermal insulating products for building equipment and industrial installations. Determination of maximum service temperature for preformed pipe insulation

EN 15804

EN 15804: 2012-04 + A1 2014: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

CEN/TR 15941

CEN/TR 15941: Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data

CEN TS 16516

CEN TS 16516: AgBB, ISO 16000-3, /ISO 16000-6, /ISO16000-9/, /ISO 16000-11/ Construction products - Assessment of release of dangerous substances. Determination of emissions into indoor air

EN 16783

EN 16783: 2017 Thermal insulation products - Product category rules (PCR) for factory made and in-situ

formed products for preparing environmental product declarations.

Candidate list substances of very high concern

SVCH: date: 08.07.2021) exceeding 0.1 percentage by mass.

CEFEP

CEFEP: European group of PEF and FEF manufacturers

Eurostat

European Statistics: Recovery rates for packaging waste Paper and cardboard packaging for the European Union 27 countries 2014

<http://ec.europa.eu/eurostat/home>

Eurofins

Eurofins: Eurofins Scientific is a group of international life sciences companies which provide a unique range of analytical testing services to clients across multiple industries, <http://www.eurofins.com>

Gabi ts

GaBi 10 GaBi Software-System and Database for Life Cycle Engineering Copyright © 1992-2021 Sphera Solutions GmbH Version: 10.5.0.78 DB Schema 8007

Institut Bauen und Umwelt

Institut Bauen und Umwelt e.V., Berlin(pub.): General Instructions for the EPD Programme of Institut Bauen und Umwelt e.V., Version 2.0 2021.

Product Category Rules for Building-Related Products and Services

Institute Construction and Environment e.V. (IBU) Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report Version 1.7

PCR Guidance-Texts for Building-Related Products and Services

From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU) Part B: Requirements on the EPD for Insulating materials made of foam plastics Version 1.6 (Template) Version 1.2 (PCR specific).

REACH According the European Chemicals Regulation REACH**Sphera**

Sphera Solutions GmbH. GaBi 10 LCI documentation. GaBi Databases (sphera.com) Stuttgart

The literature referred to in the Environmental Product Declaration must be listed in full.

Standards already fully quoted in the EPD do not need to be listed here again.

The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced

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