ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	**JACKON Insulation GmbH**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-JAI-20150249-IBC1-EN
Issue date	15.09.2015
Valid to	14.09.2020

JACKODUR Plus - Extruded Polystyrene (XPS)
with HFO 1234ze and alternative flame retardant

JACKON Insulation GmbH

Institut Bauen und Umwelt e.V.

www.bau-umwelt.com / https://epd-online.com

1. General Information

JACKON Insulation GmbH	XPS insulation panel JACKODUR Plus
Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the Declaration** JACKON Insulation GmbH Carl-Benz-Str. 8 33803 Steinhagen Germany
Declaration number EPD-JAI-20150249-IBC1-EN	**Declared product / Declared unit** JACKODUR Plus (extruded polystyrene foam) boards produced by JACKON Insulation GmbH. The EPD applies to 1 m^2 of 100 mm thick XPS board, i.e. 0.1 m^3, with an average density of 38.4 kg/m^3.
This Declaration is based on the Product Category Rules: Insulating materials made of foam plastics, 07.2014 (PCR tested and approved by the SVR)	**Scope:** JACKON Insulation as data provider produces the extruded polystyrene foam boards JACKODUR Plus containing HFO 1234ze as blowing agent and alternative flame retardant. The data have been provided by one factory in Arendsee/Germany for the year 2014. 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.
Issue date 15.09.2015	**Verification** The CEN Norm /EN 15804/ serves as the core PCR Independent verification of the declaration according to /ISO 14025/ ☐ internally ☒ externally
Valid to 14.09.2020	
Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)	
Dr. Burkhart Lehmann (Managing Director IBU)	Prof. Dr. Birgit Grahl (Independent verifier appointed by SVR)

2. Product

2.1 Product description

JACKODUR Plus is an extruded polystyrene foam (XPS) produced according to /EN 13164/ and available in board shape with a density range from 30 to 50 kg/m^3, 38.4 kg/m^3 in average (measured). It has specifically low values of thermal conductivity by using HFO1234 ze as blowing agent.
The boards can be delivered in various compressive strength values from 300 to 700 kPa. To meet the need of various applications the boards are produced with different surfaces: with the extrusion skin, planed, grooved or with thermal embossing. JACKODUR Plus boards are supplied with different edge treatments such as butt edge, ship lap and tongue and groove.
The EPD is related to an unlaminated product only; lamination and additional product treatment are not considered.

2.2 Application

The variety of the performance properties of JACKODUR Plus make it suitable for use in a large number of applications such as: perimeter insulation, inverted roof insulation , insulation of pitched roofs, floor insulation including insulation of highly loaded industrial floors, insulation of thermal bridges for exterior walls, External Thermal Insulation Composite Systems (ETICS), insulation of cavity walls, agricultural building ceiling insulation, prefabricated elements e.g. building sandwich panels, insulation for building equipment and industrial installations (pipe sections, …).

2.3 Technical Data

Acoustic properties are not relevant for JACKODUR Plus.

Constructional data

Name	Value	Unit
Gross density	30 - 50	kg/m^3
Calculation value for thermal conductivity acc. to /EN 12667/ and /EN 13164/ Annex C	0.025 - 0.027	W/(mK)
Water vapour diffusion resistance factor acc. to /EN 12086/	50 - 250	-
Water absorption after diffusion acc. to /EN 12088/	3 - 5	Vol.-%
Deformation under compressive load and temperature acc. to /EN 1605/	≤ 5	%
Compressive stress or strength at 10% deflection acc. to /EN 826/	300 - 700	kPa

Compressive modulus of elasticity acc. to /EN 826/	10000 - 40000	kPa
Tensile strength perpendicular to faces acc. to /EN 1607/	100 - 400	kPa
Compressive creep/long-term compressive strength acc. to /EN 1606/	< 250	kPa
Freeze-thaw resistance acc. to /EN 12091/	≤ 1	Vol.-%
Dimensional stability acc. to /EN 1604/	≤ 5	%

2.4 Placing on the market / Application rules

For the placing on the market in the EU/EFTA (with the exception of Switzerland) the Regulation No 305/2011 applies. The products need a Declaration of Performance taking into consideration /EN 13164:2012+A1:2015 Thermal insulation products for buildings - Factory made extruded polystyrene foam (XPS) products - Specification/ and the CE marking. For the application and use the respective national provisions apply.
JACKODUR Plus is additionally approved for use in specific applications under mandatory or voluntary agreement or certification schemes at the national level. This product is controlled and certified by Notified Bodies, e.g. MPA Dortmund.

2.5 Delivery status

Length: 1000-3000 mm; Width: 600-1200 mm; Thickness: 20-320 mm For the LCA a thickness of 100 mm was considered.

2.6 Base materials / Ancillary materials

JACKODUR Plus is mostly made of polystyrene (90 to 95% by weight in final product – CAS 9003-53-6), blown with fluorinated olefin (HFO1234ze), carbon dioxide (CAS 124-38-9) and halogen-free co-blowing agents altogether up to 8.5% by weight in relation to the material input. The blowing agents are partly emitted during the production process. The emissions are considered in module A1-A3.

Basic material	Mass portion
Polystyrene	90 – 91 %
Blowing agents	8,5 %
HFO 1234ze	*~ 70 %*
CO_2, and Co-blowing agents	*~ 30 %*
Flame retardant	1 - 2 %
Additives (e. g. pigments)	< 0,5 %

The alternative flame retardant is used to enable the foam to meet fire performance standards. The foam no longer contains Hexabromocyclododecane (HBCD; CAS
25637-99-4) nor any other /REACH/ SVHC. Other additives are used, e. g. color pigments and processing aids in minor quantity, less than 0.5%. Polystyrene is produced from oil and gas. Therefore it is linked to the availability of these raw materials. Polystyrene is transported by road.

2.7 Manufacture

JACKODUR Plus is produced by a continuous extrusion process using electricity as the main power source: polystyrene granules are melted in an extruder and a blowing agent is injected into the extruder under high pressure.
The drop in pressure at the exit die causes the polystyrene to foam into a board with homogeneous and closed cell structure.
Then the boards' edges are trimmed, and the product is cut to dimensions. The smooth foam skin resulting from the extrusion process remains on the boards or is removed mechanically for particular board types to achieve better adhesive strength in combination with e. g. concrete, mortar, or construction adhesives. Some boards receive special surface patterns or grooves.
JACKODUR Plus foams off-grade material or scrap from production is recycled in the production process of XPS.
The manufacturing plant in Arendsee/Germany is certified according to /ISO 9001/ and /ISO 50001/

2.8 Environment and health during manufacturing

No further health protection measures beyond the regulated measures for manufacturing firms are necessary during all production steps. The manufacturing plant in Arendsee/Germany is certified according to /ISO 14001/.

2.9 Product processing/Installation

Handling recommendations for JACKODUR Plus can be found in product and application literature, brochures and data sheets provided directly by suppliers or available from the internet. There are no special required instructions regarding personal precautions and environmental protection during the product handling and installation.

2.10 Packaging

The polyethylene-based packaging film is recyclable and actually recycled in those countries having a return system.

2.11 Condition of use

Usually maintenance will not be required, if JACKODUR Plus is installed according to handling installation requirements (see: Installation description, www.jackon-insulation.com/services/ verarbeitungshinweise/).

2.12 Environment and health during use

JACKODUR Plus is in most applications not in direct contact with the environment nor with the indoor air. There is no significant release of substances from the product as installed during its service life, as confirmed by the best possible ratings obtained in existing VOC emission schemes; e. g. /AgBB/.

2.13 Reference service life

The durability of JACKODUR Plus is normally at least as long as the lifetime of the building in which it is used. This is explained by the superior mechanical and water resistance properties of these products.

2.14 Extraordinary effects

Fire

JACKODUR Plus achieves the fire classification Euroclass E according to /EN 13501-1/. If the contact with the external flame stops, neither further burning nor smouldering can be observed. Ignition of the foam

can only be observed after longer small flame exposures.

Fire performance

Name	Value
Building material class	E

Water

Water pick-up by capillarity does generally not occur with XPS foams due to their closed cell structure. The thermal insulation performance of JACKODUR Plus is practically not affected by exposure to water or water vapour.

Mechanical destruction

Not relevant for JACKODUR Plus that have superior mechanical properties.

2.15 Re-use phase

In order to maximize the potential to re-use JACKODUR Plus boards, one must avoid that it is damaged or glued. Instead separation layers between the insulation and the concrete should be used or mechanical fixation should be applied.
In the inverted roof application JACKODUR Plus is installed loose laid and therefore can be easily removed and reused on another roof. For existing conventional flat-roofs JACKODUR Plus can stay in place when for example the existing roof construction is thermally upgraded as a Plus-roof. Recovered JACKODUR Plus from mechanically fixed applications can be reused for insulation of basement walls and foundations.
Due to the high calorific value of polystyrene, energy embedded in JACKODUR Plus can be recovered in municipal waste incinerators equipped with energy recovery units for steam and electricity generation and district heating.

2.16 Disposal

JACKODUR Plus that cannot be easily retrieved from the building is usually landfilled. The material is assigned to the waste category: 17 06 04 insulation materials other than those mentioned in 17 06 01 (insulation materials containing asbestos) and 17 06 03 (other insulation materials consisting of or containing dangerous substances).

2.17 Further information

Additional information can be found at the web page www.jackon-insulation.com.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m² with a thickness of 100 mm, e. g. 0.1 m³.
Corresponding conversion factors are listed in the table below.

Declared unit

Name	Value	Unit
Declared unit with thickness 100 mm	1	m^2
Conversion factor to 1 kg	0.26	-
Gross density	38.4	kg/m^3
Declared unit	0.1	m^3

JACKODUR Plus is available in several densities and thicknesses. For a product with a density or thickness different from the reference density of 38.4 kg/m^3 and 100 mm thickness, the environmental impacts may be calculated using the following equation:

$$I_{adap} = I_{ref} \times \frac{\rho_{adap}}{\rho_{ref}} \times \frac{d_{adap}}{d_{ref}}$$

Iadap – adapted LCIA indicator or LCI parameter
Iref – LCIA indicator or LCI parameter for reference density of 38.4 kg/m^3
ρradap – adapted density
ρref – reference density 38.4 kg/m^3
dadap – adapted board thickness
dref – thickness of reference board (100 mm)

Exceptions are impact categories, which are not mainly driven by raw material consumption respective mass. That applies to acidification potential and ozone depletion potential. These two categories do not correlate directly with the mass of the product and cannot be evaluated that way.

3.2 System boundary

Type of EPD: cradle-to-gate (A1 - A3) – with options
The following modules are considered in the Life Cycle Assessment:

- Raw material supply (A1),
- Transport to manufacturer (A2),
- Manufacturing (A3),
- Transport to construction site (A4)
- Transport to disposal (EoL) (C2),
- Disposal (C4) with two scenarios (landfill (sc. 1) and thermal treatment (sc. 2)
- Reuse, recovery or recycling potential (D) with two scenarios - beyond system boundary.

3.3 Estimates and assumptions

The environmental profile of the flame retardant is based on valid estimations, based on literature data, basically /Ullmanns/.

3.4 Cut-off criteria

In the assessment, all available data from the production process are considered, i.e. all raw materials used, utilised electric power consumption using best available LCI datasets.
The amount of pigments, which underruns a ratio of 0.5 mass-%, is included in the declared mass of polystyrene.

3.5 Background data

Background data is taken from the GaBi software /GaBi 2014/, see www.gabi-software.com/databases. Additionally a life cycle inventory (LCI) of an existing study on behalf of Honeywell, covering the impacts of the manufacturing process of HFO1234ze blowing agent, has been used. The LCI is based on the ecoinvent database v2-2 (2010). The producing Honeywell facility is located in US. The study has been carried out in 2014.

3.6 Data quality

The foreground data, mainly the raw material and energy consumption during the production process is measured data.
Most of the necessary life cycle inventories are available in the GaBi database. The last update of the database was 2014.

3.7 Period under review

The foreground data collected by JACKON Insulation are based on the yearly production amount and extrapolations of measurements on specific machines and plants. The production data refer to an average of the year 2014 in the JACKON plant Arendsee/Germany.

3.8 Allocation

There are no co-products generated during the XPS-production. Allocations in the foreground system are done for waste respective recycling materials only.

Allocation for waste materials:
Post-industrial XPS waste from extrusion lines gets directly reused in the process.
In the End of Life scenario all applied incineration processes are displayed via a partial stream consideration for the combustion process, according to the specific composition of the incinerated material.

For the waste incineration plant an R1-value of < 0.6 is assumed.

Environmental burden of the incineration of the product in the EoL-scenario are assigned to the system (C4); resulting benefits for thermal and electrical energy are declared in module D.
Benefits are given according European average data for electrical and thermal energy generated from natural gas.

Allocation for upstream data
For all refinery products, allocation by mass and net calorific value has been applied. The manufacturing route of every refinery product is modelled and the product-specific effort associated with their production is calculated.
For other materials' inventory used in the production process calculation the most suitable allocation rules are applied. Information on single LCIs is documented on http://database-documentation.gabi-software.com/support/gabi/.

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

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).
The values refer to the declared unit of 1 m² XPS.

Transport to the building site (A4)

Name	Value	Unit
Payload of truck	5	t
Litres of fuel diesel with maximum load	0.018	l/100km
Transport distance	500	km
Capacity utilisation (including empty runs)	70	%
Gross density of products transported	38.4	kg/m³
Capacity utilisation volume factor	0.29	-

End of life (C1-C4; C2 and C4)

For the End of Life stage two different scenarios are considered. One scenario with 100% landfill (sc. 1) and one scenario with 100% incineration (sc. 2) are calculated. The incineration of XPS results in benefits, beyond the system boundary, for thermal energy and electricity under European conditions.

Name	Value	Unit
Collected separately XPS	3.84	kg
Collected as mixed construction waste	0	kg
Reuse	0	kg
Recycling	0	kg
Landfilling Scenario 1	3.84	kg
Energy recovery Scenario 2	3.84	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Module D includes the benefits beyond system boundaries of the incineration process C4 (incineration of XPS boards). A waste incineration plant with R1-value < 0.6 is assumed.

5. LCA: Results

The following tables display the environmental relevant results according to /EN 15804/ for 1 m² XPS board. The two EoL scenarios are represented in modules C4 and D. C4/1 and D1 reflect the landfilling of XPS, C4/2 and D2 shows the environmental results in case of thermal treatment of XPS-boards.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² Jackodur Plus XPS board with thickness of 100 mm

Parameter	Unit	A1-A3	A4	C2	C4/1	C4/2	D/1	D/2
GWP	[kg CO_2-Eq.]	13.00	0.65	0.09	0.28	12.70	0.00	-6.07
ODP	[kg CFC11-Eq.]	6.34E-7	2.65E-12	3.89E-13	1.19E-11	3.32E-11	0.00E+0	-2.07E-9
AP	[kg SO_2-Eq.]	8.63E-2	1.80E-3	2.64E-4	8.13E-4	7.80E-4	0.00E+0	-1.61E-2
EP	[kg $(PO_4)^{3-}$-Eq.]	4.48E-3	4.46E-4	6.57E-5	7.57E-4	1.55E-4	0.00E+0	-1.09E-3
POCP	[kg ethene-Eq.]	1.01E-2	-5.20E-4	-7.65E-5	1.01E-4	9.22E-5	0.00E+0	-1.32E-3
ADPE	[kg Sb-Eq.]	2.33E-5	2.53E-8	3.72E-9	5.37E-8	1.71E-7	0.00E+0	-6.10E-7
ADPF	[MJ]	339.00	8.87	1.31	4.00	1.40	0.00	-85.20

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

RESULTS OF THE LCA - RESOURCE USE: 1 m² Jackodur Plus XPS board with thickness of 100 mm

Parameter	Unit	A1-A3	A4	C2	C4/1	C4/2	D/1	D/2
PERE	[MJ]	12.20	IND	IND	IND	IND	IND	IND
PERM	[MJ]	0.00	IND	IND	IND	IND	IND	IND
PERT	[MJ]	12.20	0.50	0.07	0.24	0.16	0.00	-10.40
PENRE	[MJ]	203.00	IND	IND	IND	IND	IND	IND
PENRM	[MJ]	154.00	IND	IND	IND	IND	IND	IND
PENRT	[MJ]	357.00	8.90	1.31	4.18	1.63	0.00	-104.00
SM	[kg]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	[m^3]	5.44E-2	8.72E-4	1.28E-4	1.15E-5	2.46E-2	0.00E+0	-2.10E-2

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 – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² Jackodur Plus XPS board with thickness of 100 mm

Parameter	Unit	A1-A3	A4	C2	C4/1	C4/2	D/1	D/2
HWD	[kg]	3.56E-5	4.22E-6	6.21E-7	7.81E-7	5.00E-6	0.00E+0	-2.98E-5
NHWD	[kg]	5.49E-2	1.27E-3	1.86E-4	3.83E+0	8.79E-2	0.00E+0	-3.09E-2
RWD	[kg]	5.76E-3	1.22E-5	1.79E-6	6.87E-5	9.48E-5	0.00E+0	-7.41E-3
CRU	[kg]	0.00	0.00	0.00	0.00	0.00	IND	IND
MFR	[kg]	0.00	0.00	0.00	0.00	0.00	IND	IND
MER	[kg]	0.00	0.00	0.00	0.00	0.00	IND	IND
EEE	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	20.50
EET	[MJ]	0.00	0.00	0.00	0.00	0.00	0.00	49.00

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; EEE = Exported thermal energy

6. LCA: Interpretation

Regarding the production of Jackodur Plus, polystyrene dominates the impact categories global warming potential (GWP), resource depletion fossil (ADPF) and the corresponding primary energy non renewable (PENRT) with 57%, 75% and 73% contribution in regard to the procution stage. Figure 6-1 illustrates the contributing stages and materials for the impact category GWP.

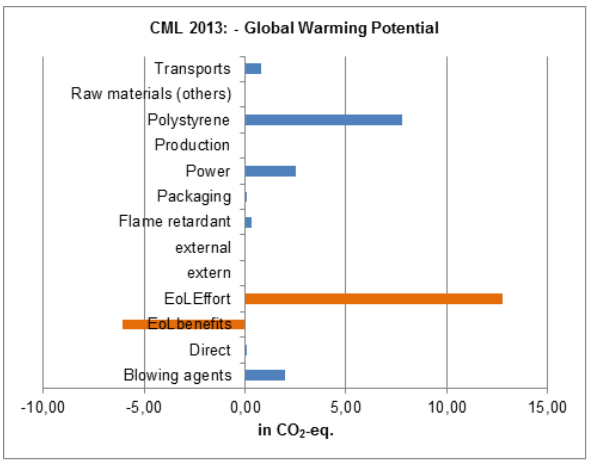

Figure 6-1: Global warming potential of 1 m² Jackodur Plus (Life cycle; EoL scenario 2)

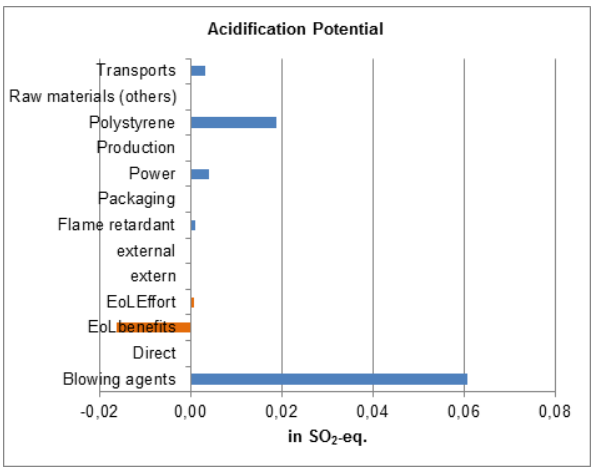

Figure 6-2: Acidification potential of 1 m² Jackodur Plus (LC; scenario 2)

The direct emissions are reasonable marginal regarding GWP, due to the fact that CO_2 as blowing agent is used only in a small amount (0.7% of raw material input) and the co-blowing agent acetone has from the scientific perspective no influence on GWP. Moreover the mainly used halogenated blowing agent has a low GWP factor (<1; /IPCC 2013; pg. 732/) and the emission factor of HFO is low because of its high molecule size.

In opposite resource depletion elements (ADPE), acidification (AP) and ozone depletion potential (ODP) are mainly driven by the production of blowing agents, primarily HFO1234ze, with shares of 78%, 69% and 91%, although this is only used in a small amount in the XPS product with 5.9% of the raw material input. The high contribution of HFO is in parts unexpected and strongly related to the provided Life cycle inventory (LCI) and the used Ecoinvent background data.
Figure 6-2 shows the high dominance of blowing agent for the acidification potential.

The summer smog potential (POCP) is less related to raw materials. The direct emissions during production generate half of the impact in this category (85% from acetone, 15% from HFO). In addition polystyrene is relevant for POCP with one third contribution, the production of blowing agents with another 25%. Transport processes and flame retardant production are of low relevance within the considered indicators.
Regarding the whole life cycle (LC) with inclusion of the End of Life scenarios, the results differ in a high range between these two scenarios: landfill and incineration with energy recovery. Landfill has low impacts on most of the categories.
The energy recovery from thermal treatment of the used XPS-boards generates a relevant amount of energy. In relation to the XPS production, the incineration process generates about 25% of the needed primary energy. Methodologically this energy can be used in a next product system. The credits thus cannot be added to the needed primary energy for the production of XPS.
Relevant influence of incineration with energy use is also shown for the impact category GWP with 33% impact share, caused by CO_2 emissions during incineration in Figure 6-1 (orange barks).
In opposite to GWP in case of the acidification potential the benefits are higher than the effort for thermal treatment during disposal (EoL). Calculative the acidification is 21% lowered, as visualized in Figure 6-2.
It has to be considered, that environmental impacts during the use phase are not included.

7. Requisite evidence

7.1 VOC Emissions

XPS products can be used indoor however they are generally not exposed to the indoor air but covered by a finishing element or system.
JACKODUR Plus can be used indoor however it is generally not exposed to the indoor air but covered by a finishing element or system.
The emissions of JACKODUR Plus have been tested by TÜV Rheinland, Germany in March 2015. The emission testing meets the requirements of the AgBB/DIBt method.
JACKODUR Plus complies with the requirements of DIBt (October 2008) and AgBB (May 2010) for the use in the indoor environment.

VOC Emissions

Name	Value	Unit
TVOC (C6 - C16)	0 - 1000	µg/m³
Sum SVOC (C16 - C22)	0 - 100	µg/m³
R (dimensionless)	0 - 1	-
VOC without NIK	0 - 100	µg/m³
Carcinogenic Substances	not detected	µg/m³

7.2 Leaching performance

Leaching behaviour is not regulated for extruded polystyrene foam products.

8. References

Institut Bauen und Umwelt
Institut Bauen und Umwelt e.V., Berlin(pub.): Generation of Environmental Product Declarations (EPDs);

General principles
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www.bau-umwelt.de

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

EN 15804
EN 15804:2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

AgBB
German Committee for Health-Related Evaluation of Building Products, Berlin

DIBt
German Institute for Construction Technology, Berlin
www.dibt.de

TÜV Rheinland, Germany
Global provider of technical, safety, and certification services; headquarter Cologne, Germany
www.tuv.com

PCR 2013, Part A
PCR - Part A: Calculation rules for the Life Cycle Assessment and Requirements on the Background Report, Version 1.2, Institut Bauen und Umwelt e.V., 2013
www.bau-umwelt.com

PCR 2013, Part B
Product category rules for construction products Part B: Requirements of the EPD for foam plastic insulation materials, version 1.6, 2014
www.bau-umwelt.de

IPCC 2013
Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), Cambidge University Press, Cambridge, United Kingdom and New York, NY, USA

ISO 9001
Quality management systems - Requirements

ISO 50001
Energy management systems – Requirements with guidance for use

ISO 14001
Environmental management systems - Requirements with guidance for use

EN 1604
EN 1604:2013-05: Thermal insulating products for building applications – Determination of dimensional stability under specified temperature and humidity conditions

EN 1605
EN 1605:2013-05: Thermal insulating products for building applications – Determination of deformation under specified compressive load and temperature conditions

EN 1606
2013-05: Thermal insulating products for building applications – Determination of compressive creep

EN 1607
2013-05 Thermal insulating products for building applications – Determination of tensile strength perpendicular to face

EN 12086
2013-06: Thermal insulation products for building applications – Determination of water vapour transmission properties

EN 12088
2013-06: Thermal insulation products for building applications – Determination of long-term water absorption by diffusion

EN 12091
2013-06: Thermal insulation products for building applications – Determination of freeze-thaw resistance

EN 826
2013-05: Thermal insulation products for building applications – Determination of compression behaviour

EN 13501-1
2010-01: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

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