JACKON Insulation GmbH
Product sustainability fact sheet

Product information for the building certification scheme BREEAM® (Building Research Establishment's Environmental Assessment Method)

The intention of this document is to support the BREEAM certification process by provided building specific information.
Basis of this information is BREEAM technical manual (2014) [1]

JACKODUR Plus (XPS insulation board)

General Information

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Date of this document:	2016-02-16

Product information

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. 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.

Application

JACKODUR Plus is labeled with the CE-mark according to /EN 13164/. It 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.

[1] BREEAM UK New Construction non-domestic buildings technical manual 2014; Reference: SD5076 – Issue: 1.0; Date: 21/05/2014, www.breeam.org

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Technical data

Following table shows the constructional data of Jackodur Plus.

Name	Value	Unit
Gross density	30 - 50	kg/m³
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	%

Acoustic properties are not relevant for JACKODUR Plus.

Product declarations

Environmental product declaration

Number	EPD-JAI-20150249-IBC1-EN
Program operator	Institute Construction and Environment (IBU - Institut Bauen und Umwelt e.V.), Berlin, Germany; www.construction-environment.com
Author of the LCA	thinkstep, Leinfelden-Echterdingen, Germany

Management

Summary

This category encourages the adoption of sustainable management practices in connection with design, construction, commissioning, handover and aftercare activities to ensure that robust sustainability objectives are set and followed through into the operation of the building. Issues in this section focus on embedding sustainability actions through the key stages of design, procurement and initial occupation from the initial project brief stage to the appropriate provision of aftercare.

Category summary table for this BREEAM issue:

Issue ID	Issue name
Man 01	Project brief and design
Man 02	**Life cycle cost and service life planning**
Man 03	Responsible construction practices
Man 04	**Commissioning and handover**
Man 05	Aftercare

Man 02 Life cycle cost and service life planning

Aim of this issue

To deliver whole life value from investment and promote economic sustainability by recognising and encouraging the use and sharing of life cycle costing and service life planning to improve design, specification and through-life maintenance and operation.

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Product information for the declared product within this issue:

Specific information	Evidence (quality)
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.
Cleaning and maintenance	not relevant
Use stage	Usually maintenance will not be required, if JACKODUR Plus is installed according to handling installation requirements
End of life stage	Two scenarios analysed in LCA: 100% Incineration with energy recovery, 100% Landfill

Man 04 Commissioning and handover

Aim of this issue
To encourage a properly planned handover and commissioning process that reflects the needs of the building occupants.

Product information for the declared product within this issue:

Product specific information for the Building User Guide (BUG)	
Installation instruction:	Please follow the installation instructions: http://www.jackon-insulation.com/en/services/installation-instructions/
Maintenance instruction:	not relevant

Building User Guide (BUG):
Dedicated building/site specific guidance for the non-technical building user. The purpose of the guide is to help building users access, understand and operate the building efficiently and in a manner in keeping with the original design intent. A Building User Guide will provide easily accessible and understandable information relevant to the following stakeholders:

- The building's staff (or where relevant residents)
- The non-technical facilities management team/building manager
- Other building users, e.g. visitors/community users

Health and Wellbeing

Summary
This category encourages the increased comfort, health and safety of building occupants, visitors and others within the vicinity. Issues in this section aim to enhance the quality of life in buildings by recognising those that encourage a healthy and safe internal and external environment for occupants.

Category summary table for this BREEAM issue

Issue ID	Issue name
Hea 01	Visual comfort
Hea 02	**Indoor air quality**
Hea 03	Safe containment in laboratories
Hea 04	**Thermal comfort**
Hea 05	Acoustic performance
Hea 06	Safety and security

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Hea 02 Indoor air quality

Aim of this issue
To recognise and encourage a healthy internal environment through the specification and installation of appropriate ventilation, equipment and finishes.

Product information for the declared product within this issue:

Part: Minimising sources of air pollution

Specific information	evidence (quality)
TVOC (C6 – C16)	0 µg/m³
Sum SVOC (C16 – C22)	0 µg/m³
VOC (without NIK)	0 µg/m³
Carcinogenic Substances	Not detected

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, Test report No. 21230643001. 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.

Hea 04 Thermal comfort

Aim of this issue
To ensure that appropriate thermal comfort levels are achieved through design, and controls are selected to maintain a thermally comfortable environment for occupants within the building.

Product information for the declared product within this issue:

Specific information	Value and evidence (quality)
Thermal conductivity (W/mK)	0,027 W/(mK)

Energy

Summary
This category encourages the specification and design of energy efficient building solutions, systems and equipment that support the sustainable use of energy in the building and sustainable management in the building's operation. Issues in this section assess measures to improve the inherent energy efficiency of the building, encourage the reduction of carbon emissions and support efficient management throughout the operational phase of the building's life.

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Category summary table for this BREEAM issue

Issue ID	Issue name
Ene 01	**Reduction of energy use and carbon emissions**
Ene 02	Energy monitoring
Ene 03	External lighting
Ene 04	Low carbon design
Ene 05	Energy efficient cold storage
Ene 06	Energy efficient transportation systems
Ene 07	Energy efficient laboratory systems
Ene 08	Energy efficient equipment

Ene 01 Reduction of energy use and carbon emissions

Aim of this issue
To recognise and encourage buildings designed to minimise operational energy demand, primary energy consumption and CO_2 emissions.

See chapter HEA 04 for more information.

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Materials

Summary
This category encourages steps taken to reduce the impact of construction materials through design, construction, maintenance and repair. Issues in this section focus on the procurement of materials that are sourced in a responsible way and have a low embodied impact over their life including extraction, processing and manufacture and recycling.

Category summary table for this BREEAM issue

Issue ID	Issue name
Mat 01	**Life cycle impacts**
Mat 02	Hard landscaping and boundary protection
Mat 03	Responsible sourcing of materials
Mat 04	Insulation
Mat 05	Designing for durability and resilience
Mat 06	Material efficiency

Mat 01 Life cycle impacts

Aim of this issue
To recognise and encourage the use of construction materials with a low environmental impact (including embodied carbon) over the full life cycle of the building.

Product information for the declared product within this issue:

Description	Value
"Product specific" environmental profile certification available?	YES: Environmental product declaration (EPD) "JACKODUR Plus" (EPD-JAI-20150249-IBC1-EN)
Link to the EPD:	http://construction-environment.com/hp11212/EPD-Overview.htm → *search for product Jackodur plus*
Third party verification:	YES
EPD Program Operator	Institute Construction and Environment (IBU - Institut Bauen und Umwelt e.V.), Berlin, Germany; www.construction-environment.com
Author of the LCA:	thinkstep AG Hauptstraße 111-113, 70771 Leinfelden-Echterdingen, Germany
Used software and databases:	GaBi software-system and databases, LBP, University of Stuttgart and thinkstep AG, Leinfelden-Echterdingen, 2014 (http://documentation.gabi-software.com/)
System boundaries	cradle-to-gate with options (A1-A3, A4, C2, C4, D)
Declared unit	1 m², thickness of 100 mm (3.84 kg/m²)
PCR	PCR - Part B: Requirements on the EPD for Insulating materials made of foam plastics, Institut Bauen und Umwelt e.V., version 1.6, 2014-07-30
Green guide rating	Extruded polystyrene (XPS) (HFC blown) density 35 kg/m³ | 815320027 | E

Results of the LCA – ENVIRONMENTAL IMPACTS:
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.

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Declared life cycle stages (standard DIN EN 15804)	A1-A3 PRODUCT STAGE	A4-A5 CONSTRUCTION PROCESS STAGE		C1-C4 END OF LIFE STAGE		D BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	C2	C4/1	C4/2	D1	D2
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	3.32E-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:

Declared life cycle stages (standard DIN EN 15804)	A1-A3 PRODUCT STAGE	A4-A5 CONSTRUCTION PROCESS STAGE	C END OF LIFE STAGE			D BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1 - A3	A4	C2	C4/1	C4/2	D1	D2
PE total [MJ]	369.20	9.40	1.38	4.42	1.79	0.00	-114.40
PERE [MJ]	12.20	-	-	-	-	-	-
PERM [MJ]	0.00	-	-	-	-	-	-
PERT [MJ]	12.20	0.50	0.07	0.24	0.16	0.00	-10.40
PENRE [MJ]	203.00	-	-	-	-	-	-
PENRM [MJ]	154.00	-	-	-	-	-	-
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: **PE total** = Total use of primary energy resources (=PERT+PENRT); 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:

Declared life cycle stages (standard DIN EN 15804)	A1-A3 PRODUCT STAGE	A4-A5 CONSTRUCTION PROCESS STAGE		C END OF LIFE STAGE		D BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	C2	C4/1	C4/2	D1	D2
HWD [kg]	3.56E-5	4.22E-6	6.22E-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	-	-
MFR [kg]	0.00	0.00	0.00	0.00	0.00	-	-
MER [kg]	0.00	0.00	0.00	0.00	0.00	-	-
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; EE = Exported energy per energy carrier						

Mat 03 Responsible sourcing of materials

Aim of this issue
To recognise and encourage the specification and procurement of responsibly sourced materials for key building elements.

Product information for the declared product within this issue:

Responsible Sourcing Certification Scheme	Certification level / scope
EN ISO 14001	http://www.jackon-insulation.com/services/iso-zertifikat/

Responsible sourcing certification scheme point scores
A graded scale to reflect the rigour of the certification scheme used to demonstrate responsible sourcing, forming the basis for awarding credits in the BREEAM issue Mat 03. Refer to Guidance Note (TBC) available in the Resources section of the BREAM website for an up-to-date table of responsible sourcing certification schemes recognised by BRE Global Ltd for the purposes of a BREEAM assessment.

Detailed information Mat 03 Responsible sourcing of materials and http://www.breeam.org/page.jsp?id=617

Mat 04 Insulation

Aim of this issue
To recognise and encourage the use of thermal insulation which has a low embodied environmental impact relative to its thermal properties

Product information for the declared product within this issue:

Description	Value	Test Standard / Link
Thermal conductivity (W/mK)	0.027 W/(mK)	
Green Guide rating	see above (Mat 01)	
EPD available?	yes	
EPD No.	EPD-JAI-20150249-IBC1-EN	
Program operator	Institute Construction and Environment (IBU - Institut Bauen und Umwelt e.V.), Berlin, Germany; www.construction-environment.com	

Mat 05 Designing for durability and resilience

Aim of this issue
To recognise and encourage adequate protection of exposed elements of the building and landscape, therefore minimising the frequency of replacement and maximising materials optimisation.

Product information for the declared product within this issue:

Item	Description	Evidence (quality)
Durability improvement	The durability of JACKODUR Plus is normally at least as long as the lifetime of the building in which it is used.	

Mat 06 Material efficiency

Aim of this issue
To recognise and encourage measures to optimise material efficiency in order to minimise environmental impact of material use and waste.

Product information for the declared product within this issue:

Specific information	evidence (quality)
XXX	