Statement of Verification

BREG EN EPD No.: 000166 Issue 01
ECO EPD Ref. No. 000544

This is to verify that the

Environmental Product Declaration

provided by:

Kingspan Limited

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

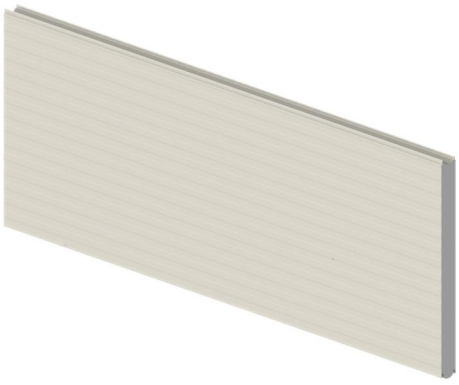
BRE Global Scheme Document SD207

This declaration is for:

BENCHMARK Quadcore Karrier insulated panel

Company Address

Greenfield Business Park No. 2
Holywell
Flintshire
CH8 7GJ



Kingspan Insulated Panels

Signed for BRE Global Ltd	Emma Baker Operator	18 July 2017 Date of this Issue
18 July 2017 Date of First Issue		17 July 2022 Expiry Date

BRE Global Verified EPD

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ECO PLATFORM EPD EN 15804 VERIFIED

Environmental Product Declaration

EPD Number: 000166

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Kingspan Limited Sherburn Facility St Hilda's Street Sherburn North Yorkshire YO17	BRE LINA v2.0.0
Declared/Functional Unit	**Applicability/Coverage**
1 square metre of BENCHMARK Quadcore Karrier insulated panel as used as a wall or roofing cladding panel	Manufacturer specific product
EPD Type	**Background database**
Cradle to Grave	ecoinvent

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Nigel Jones
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑		☑

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Sherburn Facility
St Hilda's Street
Sherburn
North Yorkshire
YO17 8PQ

Construction Product

Product Description

The BENCHMARK Quadcore Karrier panel system is an insulated composite wall panel to support site applied façade systems. It is manufactured with a QuadCore hybrid insulation core. The core insulation is HCFC, CFC, HFC free LPCB certified QuadCore hybrid insulation core.

Panel joints achieve an air tightness of 0.02m3/hr/m2 at 50Pa in accordance with BS EN 14509 (based on sealed panel joint performance) and are watertight to 1200Pa (class A) according to BS EN 14509.

Panels are manufactured from the highest quality materials using state-of-the-art production equipment to rigorous quality control standards, complying with BS EN ISO 9001 standard, ensuring long-term reliability and service life. The panels are also being manufactured under Environmental Management System Certification BS EN 14001.

Structural load/span tables have been calculated using the method described in BS EN 14509: 2013 – self-supporting double skin metal faced insulated panels. U Values are in accordance with BS EN 14509, calculated using Finite Element Analysis, and takes into account any thermal bridging through longitudinal joint.

Technical data sheet available at: http://www.kingspanbenchmark.com/Downloads/Data-Sheets

Technical Information

Property	Value, Unit
Core Thickness	100mm
Weight of panel	14.4kg/m^2
U Value	0.18 W/m^{2}K

Main Product Contents

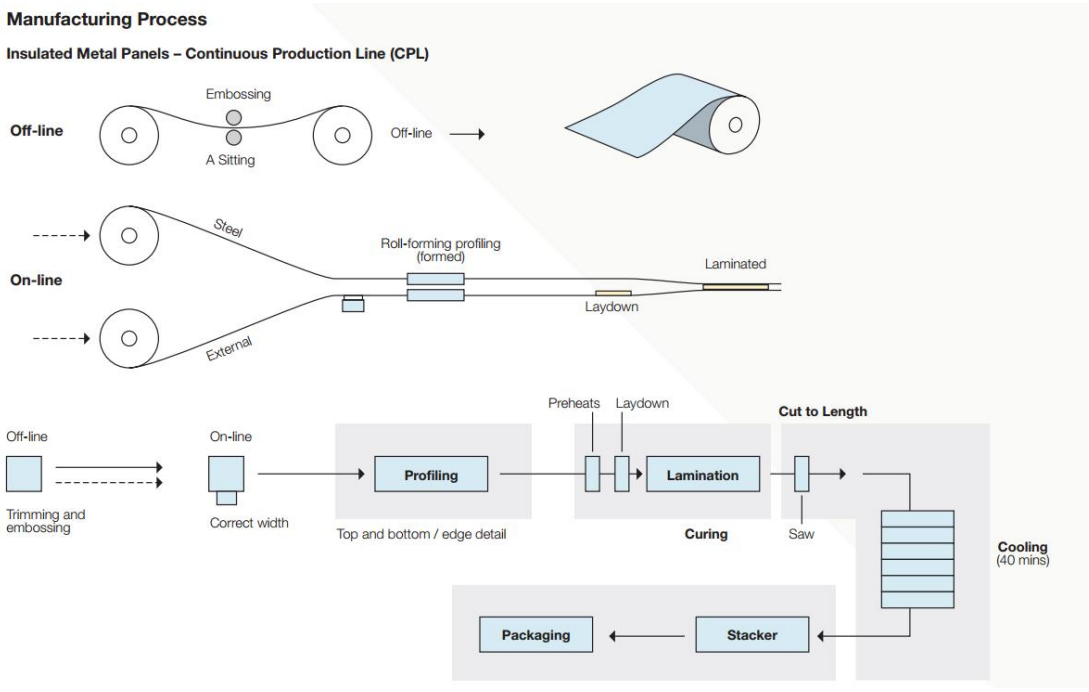
The values provided in the table below presents the average percentage of inputs.

Material/Chemical Input	%
Painted Steel	Up to 69.98
Insulation Foam	Up to 30.02

Manufacturing Process

The manufacturing of insulated panels starts with the de-coiling of the internal and external steel coils. The liners are rolled into the desired profiled pattern. The foam formulation is then sprayed on to the internal liner and rises to meet the external liner creating a chemical bond between the two liner sheets. Protective film this then placed on both liners to protect the paint coating. The panel is then cut to the desired length and stacked until it has fully cooled. The panel is then packed for distribution.

Process flow diagram



Construction Installation

The insulated panels are made to order specific to the building's requirements. Installation guides are available to assist the contractor with correct installation of the product and any ancillaries (http://www.kingspanpanels.co.uk/resource-centre/results/?LiteratureType=26;27;31;33;36)

Use Information

There are no emissions to the environment from the use of the installed product.

End of Life

At the end of the panel service life, it is recommended that the panels are sent to a reclamation facility where the steel can be separated from the foam and be recycled. The foam can be used for waste to energy. It is not recommended that the panels are sent to landfill.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1m^2 of BENCHMARK Quadcore Karrier insulated panel as used as a wall cladding panel over a 60-year study period.

System boundary

This is a cradle-to-grave EPD, therefore reporting all the life cycle stages (A1 to A3, A4, A5, B1-B7, C1-C4 plus module D) in accordance with EN 15804:2012+A1:2013.

Data sources, quality and allocation

The LCA study was carried out using BRE LINA v2.0. Manufacturer-specific data covering a production period of 1 year (1/01/15 – 31/12/15) derived from Kingspan Insulated Panels production process in Sherburn was used.

Kingspan Insulated Panels manufacturer other finished productions at the Sherburn site in addition to the BENCHMARK Quadcore Karrier insulated panel products. Therefore all the primary data, including utilities and emissions, have been appropriately allocated to the declared product.

Secondary data for all other upstream and downstream processes are as provided within BRE LINA. The background LCI datasets are based on ecoinvent database v3.2. The tool has been pre-verified to conform to the modelling requirements of EN 15804:2012+A1:2013.

Cut-off criteria

No inputs or outputs have been excluded. All raw materials, packaging materials and consumable item inputs and associated transport to the plant, process energy and water use, direct production waste, and emissions are included.

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	45.2	2.76E-06	0.27	0.0897	0.0417	3.61E-04	792
Construction process stage	Transport	A4	0.241	4.43E-08	8.05E-04	2.12E-04	1.40E-04	6.34E-07	3.64
	Construction	A5	2.21	2.18E-07	0.0139	0.00387	0.00195	8.23E-06	35.2
Use stage	Use	B1	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Maintenance	B2	5.86	7.42E-07	0.0367	0.0169	0.00615	4.06E-05	186
	Repair	B3	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Replacement	B4	48.9	3.19E-06	0.293	0.0958	0.0449	3.71E-04	850
	Refurbishment	B5	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR	MNR	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR	MNR	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	1.26	1.60E-07	0.00832	0.00201	0.00106	9.52E-07	18.8
	Transport	C2	0.241	4.43E-08	8.05E-04	2.12E-04	1.40E-04	6.34E-07	3.64
	Waste processing	C3	0.487	3.15E-08	0.00264	6.05E-04	1.50E-04	5.87E-07	7.49
	Disposal	C4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-9.76	-2.44E-07	-0.0299	-0.0125	-0.0188	2.38E-05	-85.6

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	55.6	0.0479	55.6	837	0	837
Construction process stage	Transport	A4	0.0483	1.80E-07	0.0483	3.61	0	3.61
	Construction	A5	1.98	9.62E-04	1.99	39	0	39
Use stage	Use	B1	MNR	MNR	MNR	MNR	MNR	MNR
	Maintenance	B2	4.89	5.23E-05	4.89	188	0	188
	Repair	B3	MNR	MNR	MNR	MNR	MNR	MNR
	Replacement	B4	58.5	0.0489	58.5	901	0	901
	Refurbishment	B5	MNR	MNR	MNR	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	0.856	1.58E-06	0.856	21.7	0	21.7
	Transport	C2	0.0483	1.80E-07	0.0483	3.61	0	3.61
	Waste processing	C3	0.648	1.17E-06	0.648	9.98	0	9.98
	Disposal	C4	0	0	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	2.27	7.49E-05	2.27	-87.8E	0.00	-87.8

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0	0	0	1.06
Construction process stage	Transport	A4	0	0	0	7.88E-04
	Construction	A5	0	0	0	0.0261
Use stage	Use	B1	MNR	MNR	MNR	MNR
	Maintenance	B2	0	0	0	0.153
	Repair	B3	MNR	MNR	MNR	MNR
	Replacement	B4	0	0	0	1.09
	Refurbishment	B5	MNR	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	0	0	0	0.00411
	Transport	C2	0	0	0	7.88E-04
	Waste processing	C3	0	0	0	0.00200
	Disposal	C4	0	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	-0.0604

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	5.78	2.56	0.00140
Construction process stage	Transport	A4	0.00152	0.170	2.51E-05
	Construction	A5	0.126	0.0763	1.66E-04
Use stage	Use	B1	MNR	MNR	MNR
	Maintenance	B2	0.160	0.892	2.27E-04
	Repair	B3	MNR	MNR	MNR
	Replacement	B4	5.92	2.82	0.00173
	Refurbishment	B5	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	0.00744	0.0197	1.37E-04
	Transport	C2	0.00152	0.170	2.51E-05
	Waste processing	C3	0.00114	0.0121	5.50E-05
	Disposal	C4	0	0	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-0.443	-0.222	4.09E-05

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0	0.109	0	0
Construction process stage	Transport	A4	0	0	0	0
	Construction	A5	0	0.290	0	0
Use stage	Use	B1	MNR	MNR	MNR	MNR
	Maintenance	B2	0	0	0	0
	Repair	B3	MNR	MNR	MNR	MNR
	Replacement	B4	0	14.8	0	0
	Refurbishment	B5	MNR	MNR	MNR	MNR
	Operational energy use	B6	MNR	MNR	MNR	MNR
	Operational water use	B7	MNR	MNR	MNR	MNR
End of life	Deconstruction, demolition	C1	0	0	0	0
	Transport	C2	0	0	0	0
	Waste processing	C3	0	0	0	0
	Disposal	C4	0	10.4	4.02	0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0	0	0	0

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Panel product manufactured at the Sherburn site is transport by road to construction sites across the UK. Distance will vary depending on where the project is located so a 100km distance has been assumed.		
	Lorry (Diesel)	kg/tkm	0.037
	Distance	km	100
	Capacity utilisation (incl. empty returns)	%	37
	Bulk density of transported products	kg/m^3	1.41
A5 – Installation in the building	The scenario assumes steel fixing (1 fixing per 1m^2 of panel with an average weight of 0.0221kg) and sealant for the installation (5mmx4mmx1000mm = 20cm3 x 1.6= 0.32g/m3). On-site wastage of the product during installation has been estimated at 2%. A conservative estimate has been made informed by installers for the energy required for installing the steel fixings and the diesel requirement for the crane used to install the panels.		
	Material wastage rate	%	2
	Fixings (steel)	kg	0.021
	Sealant	kg	0.00032
	Electricity (for drill)	kWh	1
	Diesel (for crane)	kWh	2
	Waste sent to recycling (steel)	%	72
	Waste sent to incineration (foam)	%	28
B1 – Use	Once installed, Quadcore insulated panels do not have any emissions associated with their use. Therefore, module B1 is not relevant to this product (MNR).		
B2 – Maintenance	An annual audit of the panels is recommended. If cleaning of the external surface is required the use of a non-harsh cleaning detergent is recommended. The cleaning agent can be sourced from any of the cleaners mentioned in the maintenance manual.		
	Cleaning cycle	Year	1
	Cleaning agent (detergent)	kg	0.202
	Mains water	m^3	0.01
	Mains water (discharged)	m^3	0.01
B3 – Repair	The insulated panels do not get repaired, but are replaced if found to be damaged. This information module is therefore not relevant, instead a replacement scenario has been modelled as escribed in information module B4 below.		

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
B4 – Replacement	This scenario uses an estimated product service life of 40 years, in line with the performance guarantee of the product. Based on this, there will be a product replacement once during a 60 year study period, i.e. at year 40. A conservative estimate has been made informed by installers for the energy required for the removal of the steel fixings and the diesel requirement for the crane used to remove the panels. Disposal of the replaced panels and removed fixing is included.		
	Electricity for drill (removal of fixing)	kWh	1
	Diesel (for crane)	kWh	2
	Waste sent to recycling (steel fixing)	kg	0.021
	Waste sent to recycling (steel)	kg	10.383
	Waste sent to incineration (foam)	kg	4.017
B5 – Refurbishment	This information module relies on the refurbishment of the building or parts of the building where the product has been installed. If this were to occur, the scenario relevant for the panel will be identical to that described in information module B4 above. Therefore this module is considered not relevant.		
Reference service life	Reference service life	Years	40
	A 40 year guarantee is given for the structural and thermal capacity of the product http://quadcore.kingspan.co.uk/pushing-the-envelope/		
B6 – Use of energy; B7 – Use of water	For Quadcore Insulated panels, no energy or water is required to 'operate' the product. Therefore, these modules are considered not relevant (MNR).		
C1 to C4 End of life,	For removal of the panels the scenario assumes the use of a crane (powered by diesel) to remove the panels and electricity for the drill (removal of fixings).		
	Diesel (for crane)	kWh	2
	Electricity (for drill)	kWh	1
	Transport to waste processing site - Lorry	kg/tkm	0.037
	Distance to waste processing site	km	100
	Capacity utilisation; to waste processing site	%	37
	Electricity to separate steel and insulation	kWh	0.81
	Waste sent to recycling (steel)	%	72
	Waste sent to incineration (foam)	%	28
Module D	It is envisaged that end of life panels can be disassembled (i.e. separated into the foam and the steel components), with the steel components being used as scrap steel input in the manufacture of steel in secondary steel production using the electric arc furnace (EAF) method. The manufacture of secondary steel using EAF method displaces the production of the equivalent quantity of primary steel using the blast furnace (BOF) method, and by implication the need for virgin iron ore. This benefit (avoided impacts) arising from the potential reuse of the steel components of end of life insulation panels has therefore been modelled and reported per quantity of scrap steel obtained from 1 m2 of panel in this EPD. The relationship between the quantity of secondary steel that can be obtained from 1 unit of scrap steel through the EAF method, and the avoided BOF process including the equivalent quantity of virgin iron ore that is therefore saved is described in a publication by Leroy et al. (2014).		

Summary, comments and additional information

Sustainability Policy

Incorporate the ethos of sustainability into the vision and values of the organisation;

1. Continually improve operational performance through the setting of long term objectives and targets related to sustainability and review progress regularly;
2. Comply with and aim to exceed applicable legal and policy requirements related to the environmental and social aspects of the organisation;
3. Optimise energy and raw material usage and prevent or minimise pollution and environmental damage;
4. Continually monitor sustainability performance and actively communicate progress, in the form of a regular published Sustainability Report, using the Global Reporting Initiative (GRI) guidelines;
5. Communicate and actively promote awareness and acceptance of our sustainability policy to everyone working for or on behalf of the organisation (including employees, shareholders, suppliers/sub-contractors and customers);
6. Ensure employees are given adequate training in sustainability issues and are fully involved in helping deliver the Sustainability Vision and Policy;
7. Implement a Code of Conduct and supporting Sustainability Guidelines for key suppliers and contractors and other interested parties to ensure they comply with the Kingspan Insulated Panels' Sustainability Policy.

Environmental Policy

1. Comply with all environmental legislation;
2. Commit to the continual improvement and minimisation of environmental impact in all areas of our activities in line with best practice principles;
3. Commit to conduct our business in a manner that will prevent pollution and demonstrate respect for the environment;
4. Fully cooperate with any government agencies in finding solutions to environmental problems, resulting from our activities;
5. Manage an effective environmental documentation system to comply with the requirements of ISO 14001;
6. Provide environmental training for all employees, promote individual and collective respect and responsibility for the environment;
7. Maintain company and departmental monitoring programmes to ensure compliance with our policy, objectives and targets programme in line with our 'Reduce, Reuse, Recycle' ethos.

References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A1:2013. London, BSI, 2013.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework. BS EN ISO 14040:2006. London, BSI, 2006.

BSI. Environmental management – Life cycle assessment – requirements and guidelines. BS EN ISO 14044:2006. London, BSI, 2006.

Leroy , C., et al., 2014, Tackling Recycling Aspects in EN15804, http://www.metalsustainability.eu/wp-content/uploads/2014/06/11-11-15-ModuleD-metals.pdf, last viewed 15 June 2017.

BSI Self-supporting double skin metal faced insulating panels. Factory made products – Specifications BS EN 14509:2013. London, BSI, 2013

BSI Quality management systems – Requirements. BS EN ISO 9001:2015. London, BSI, 2015

BSI Environmental management systems. Requirements with guidance for use. BS EN ISO 14001:2015. London, BSI, 2015