

# Environmental Product Declaration



In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

## i-Roof™

from

## Roofspace Solutions

**Roofspace  
Solutions**

Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
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*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)*



## General information

### Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
<b>Website:</b>	<a href="http://www.environdec.com">www.environdec.com</a>
<b>E-mail:</b>	<a href="mailto:info@environdec.com">info@environdec.com</a>

<b>Accountabilities for PCR, LCA and independent, third-party verification</b>
<b>Product Category Rules (PCR)</b>
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019: 14. Construction Products (EN 15804+A2 2019). Version 1.11. UN CPC 3870
PCR review was conducted by: The Technical Committee of the International EPD® System Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat <a href="http://www.environdec.com/contact">www.environdec.com/contact</a> .
<b>Third-party verification</b>
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:  <input checked="" type="checkbox"/> EPD verification by individual verifier  Third-party verifier: Andrew Norton, Renuables  Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier:  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

## Company information

Owner of the EPD: Saint Gobain Construction Products UK trading as Roofspace Solutions. Saint Gobain House, East Leake, Loughborough, Leicestershire, LE12 6JU, UK

Contact: Gareth Morris

Description of the organisation: Roofspace Solutions, a part of the Saint Gobain Off-Site Solutions division, are an industry leader in manufacture of pre-fabricated construction solutions. Products from Roofspace Solutions are designed to meet the increasing demand for improved quality and speed of delivery within the construction industry.

Product-related or management system-related certifications: Roofspace Solutions are STA Assure Gold members and have received gold membership from the Supply Chain Sustainability School.

Name and location of production site(s): The i-Roof product is manufactured at the Roofspace Solutions factory in Alcester, Warwickshire, UK.

## Product information

Product name: i-Roof™

Product description: i-Roof is a prefabricated roof solution meant for domestic buildings of 2.5 storeys that include a room-in-roof. i-Roof comprises the structural roof elements including cassettes, spandrel panels and floor, complete with insulation and plasterboard, but not including brickwork or tiles.

Manufacture of the product occurs at the Roofspace Solutions factory in its constituent parts, including all required roof, wall and floor elements, before being transported to the development location for on-site assembly.

UN CPC code: 3870 – prefabricated incomplete buildings

Geographical scope: The i-Roof is manufactured, sold and used within the UK.

Technical information:

- U-Values to BR443 of 0.16 W/m<sup>2</sup>K for the roof cassettes and 0.25 W/m<sup>2</sup>K for the spandrel panels
- Bespoke Psi values to BR497 available
- Q-Mark accredited
- NHBC approved

## Product composition

The table below provides a list of the materials that comprise an i-Roof as well as their quantity and conversion factors used where necessary.

Material	Quantity (kg)	Percentage (%)*	Unit used in the LCA	Conversion factor
Timber I-joists	438.5	19.18	m	2.75 kg/m
Softwood timber	813	35.56	m <sup>3</sup>	500 kg/m <sup>3</sup>
OSB	441.5	19.31	m <sup>3</sup>	640 kg/m <sup>3</sup>
Glue laminated timber	228.5	10	m <sup>3</sup>	650 kg/m <sup>3</sup>
Mineral wool insulation	193	8.44	kg	n/a
Plasterboard	81.5	3.57	kg	n/a
Metalwork	45	1.97	kg	n/a
Nails	25	1.09	kg	n/a
Membranes	10	0.44	kg	n/a
Cavity stop socks	10	0.44	kg	n/a
<b>TOTAL</b>	<b>2,286</b>	<b>100</b>		

\*Percentages may not total exactly 100% due to rounding.

## LCA information

Declared unit: 1 unit of i-Roof. The modelled unit is an average of the two most commonly manufactured variants of i-Roof. The span of this variant is approximately 9-9.5 m length and 4-4.5 m width.

Reference service life: The reference service life of i-Roof is as long as the building in which it is installed. The scenario selected for this EPD is 60 years.

Time representativeness: All primary data used in this EPD is representative of the year 2020. All secondary data comes from the Ecoinvent 3.6 database, released September 2019. The time representativeness is therefore appropriate.

Database(s) and LCA software used: The LCA model is built within OpenLCA version 1.10.3 software using data from the EuGeos version of the Ecoinvent 3.6 database.

Description of system boundaries: This EPD includes modules A1 to A5, C1 to C4 and D of EN 15804:2012 +A2:2019 for i-Roof sold and used in the UK. The use stage (modules B1-B7) is not considered in this EPD.

System diagram:



More information: More information on i-Roof can be found at <https://roofspacesolutions.co.uk/i-roof/>.

The energy used to manufacture i-Roof (included in module A3) is certified as being 100% renewable electricity.

Certain component materials included within i-Roof are assumed to be incinerated at their end-of-life. This incineration is assumed to take place within a waste to energy facility which generates electricity that displaces a proportionate quantity of grid electricity.

A1, Raw materials supply: As a 'system' product, i-Roof is a complex product made up of multiple components with each having its own supply chain. Ecoinvent data have been used to represent each of these components with the data modified where possible to better reflect the i-Roof supply chain.

A2, Transport: The various components are transported to the Roofspace Solutions site via road and sea. Transport distances are reflective of the actual supply chain and are taken from the components' final location of manufacture. Transport occurring further up the supply chain is included within raw materials supply.

A3, Manufacture: Manufacture of i-Roof consists of material cutting using specialised fixed plant and assembly of the various components using handheld tools and overhead gantries to move the elements between assembly stations. Fixings are mechanical and are included in the EPD. All machinery required to undertake the manufacture of i-Roof are electrically powered.

A4, Transport to site: An average distance of 129 km by road from the Roofspace Solutions facility to the construction site has been used, this is a one way journey. The lorries used are assumed to be of EURO6 emissions and a 70:30 split between rigid and articulated lorries.

A5, Construction: A crane is used to lift the i-Roof components into place. The crane consumes diesel fuel for a duration of approximately 4.5 hours to complete the installation. No waste is generated on site as the i-Roof is made to measure in the factory. There is also no packaging waste as the i-Roof components arrive on site on reusable timber bearers with no further packaging required.

C1, De-construction demolition: Demolition of the i-Roof is assumed to be undertaken by plant consuming diesel fuel.

C2, Transport: Transportation of the demolition waste is assumed to be transported a maximum of 300 km by a rigid lorry of EURO6 emissions.

C3, Waste processing: The waste that requires processing ahead of disposal is assumed to be all those that can be recycled or incinerated, this includes the timber based components, the membranes, the plasterboard and the steelwork.

C4, Disposal: The impacts of the components that are assumed to be landfilled at their end-of-life are included here. This is the insulation, the cavity stop socks and nails.

D, Re-use, recovery, recycling potential: It is assumed that the components sent for incineration are done so at a waste to energy plant and therefore their combustion generates usable energy (assumed to be electricity). Components that are recycled are the plasterboard and the steelwork.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X								X	X	X	X	X
Geography																	
Specific data used	Manufacturer specific data using Ecoinvent datasets					-	-	-	-	-	-	-	Ecoinvent datasets				Ecoinvent datasets

## Content information

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Timber I-joists	438.5	0	95
Softwood timber	813	0	100
OSB	441.5	0	90
Glue laminated timber	228.5	0	98
Mineral wool insulation	193	0	0
Plasterboard	81.5	0	0
Metalwork	45	0	0
Nails	25	0	0
Membranes	10	0	0
Cavity stop socks	10	0	0
TOTAL	2,286	0	81
Packaging materials	Weight, kg	Weight-% (versus the product)	
Lifting straps	15	0.66	
TOTAL	15	0.66	

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
None included	N/A	N/A	N/A

## Environmental Information

### Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq.	1.75 E+0 3	1.71 E+0 2	1.51 E+0 2	2.07 E+0 3	4.14 E+0 1	1.88 E+0 2	ND	1.76 E+0 2	1.12 E+0 2	6.37 E+0 1	1.20 E+0 0	- 2.30 E+0 3						
GWP-biogenic	kg CO <sub>2</sub> eq.	- 5.29 E+0 3	- 4.00 E-02	1.72 E+0 2	- 5.12 E+0 3	7.57 E-03	1.27 E-02	ND	1.00 E-02	- 3.00 E-02	1.89 E+0 3	1.60 E-03	2.81 E+0 3						
GWP-luluc	kg CO <sub>2</sub> eq.	4.63 E+0 0	6.00 E-02	1.00 E-02	4.70 E+0 0	1.00 E-02	1.58 E-02	ND	1.00 E-02	4.00 E-02	1.00 E-02	3.57 E-04	- 3.16 E+0 0						
GWP-total	kg CO <sub>2</sub> eq.	- 3.53 E+0 3	1.71 E+0 2	3.23 E+0 2	- 3.04 E+0 3	4.14 E+0 1	1.88 E+0 2	ND	1.76 E+0 2	1.12 E+0 2	1.95 E+0 3	1.20 E+0 0	5.11 E+0 2						
ODP	kg CFC 11 eq.	1.83 E-04	3.88 E-05	1.19 E-06	2.23 E-04	9.56 E-06	4.03 E-05	ND	3.78 E-05	2.55 E-05	8.49 E-06	4.94 E-07	- 2.30 E-04						
AP	mol H <sup>+</sup> eq.	1.13 E+0 1	4.30 E-01	5.80 E-01	1.23 E+0 1	1.00 E-01	3.19 E-01	ND	3.00 E-01	2.60 E-01	2.90 E-01	1.00 E-02	8.15 E+0 0						
EP-freshwater	kg P eq.	7.00 E-01	1.00 E-02	1.00 E-02	7.20 E-01	3.10 E-03	6.78 E-03	ND	1.00 E-02	1.00 E-02	1.00 E-02	1.24 E-04	- 4.80 E-01						
EP-marine	kg N eq.	2.62 E+0 0	6.00 E-02	1.90 E-01	2.87 E+0 0	1.00 E-02	4.29 E-02	ND	4.00 E-02	4.00 E-02	3.60 E-01	1.11 E-03	- 1.58 E+0 0						
EP-terrestrial	mol N eq.	3.11 E+0 1	6.60 E-01	1.43 E+0 0	3.32 E+0 1	1.40 E-01	4.59 E-01	ND	4.30 E-01	3.80 E-01	1.22 E+0 0	1.00 E-02	- 1.72 E+0 1						
POCP	kg NMVOC eq.	8.43 E+0 0	3.10 E-01	4.70 E-01	9.21 E+0 0	7.00 E-02	2.76 E-01	ND	2.60 E-01	1.90 E-01	3.60 E-01	4.94 E-03	- 4.41 E+0 0						
ADP-minerals&metals*	kg Sb eq.	4.00 E-02	4.69 E-03	1.32 E-03	4.60 E-02	1.07 E-03	2.85 E-04	ND	2.67 E-04	3.09 E-03	7.93 E-04	1.10 E-05	- 1.00 E-02						
ADP-fossil*	MJ	2.81 E+0 4	2.55 E+0 3	1.79 E+0 3	3.24 E+0 4	6.27 E+0 2	2.54 E+0 3	ND	2.38 E+0 3	1.67 E+0 3	6.68 E+0 2	3.34 E+0 1	- 4.08 E+0 4						
WDP	m <sup>3</sup>	6.63 E+0 4	2.48 E+0 3	2.52 E+0 2	6.90 E+0 4	5.89 E+0 2	5.45 E+0 2	ND	5.11 E+0 2	1.64 E+0 3	4.09 E+0 2	1.03 E+0 1	- 2.06 E+0 5						
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption																		

\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

### Additional required impact indicator according to PCR 2019:14

Results per declared unit																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG <sup>1</sup>	kg CO <sub>2</sub> eq.	1.76 E+03	1.71 E+02	1.51 E+02	2.08 E+03	4.14 E+01	1.88 E+02	ND	1.76 E+02	1.12 E+02	6.43 E+01	1.20 E+00	- 2.30 E+03						

### Use of resources

Results per declared unit																			
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4.33 E+04	3.68 E+00	7.29 E+02	4.40 E+04	8.87 E+00	1.39 E+01	ND	1.30 E+01	2.42 E+01	5.40 E-01	2.89 E+04	- 4.77 E+02						
PERM	MJ	2.89 E+04	0.00 E+00	0.00 E+00	2.89 E+04	0.00 E+00	0.00 E+00	ND	0.00 E+00	0.00 E+00	1.03 E+01	- 2.89 E+04	9.05 E+03						
PERT	MJ	7.22 E+04	3.68 E+01	7.29 E+02	7.29 E+02	8.87 E+00	1.39 E+01	ND	1.30 E+01	2.42 E+01	1.08 E+01	2.71 E-01	- 9.53 E+03						
PENRE	MJ	2.60 E+04	2.60 E+03	1.91 E+03	3.05 E+04	6.40 E+02	2.55 E+03	ND	2.39 E+03	1.71 E+03	3.41 E+01	4.77 E+03	- 3.15 E+03						
PENRM	MJ.	4.74 E+03	0.00 E+00	0.00 E+00	4.74 E+03	0.00 E+00	0.00 E+00	ND	0.00 E+00	0.00 E+00	6.47 E+02	- 4.74 E+03	5.98 E+04						
PENRT	MJ	3.07 E+04	2.60 E+03	1.91 E+03	3.52 E+04	6.40 E+02	2.55 E+03	ND	2.39 E+03	1.71 E+03	6.81 E+02	3.38 E+01	- 6.29 E+04						
SM	kg	2.12 E+02	1.06 E+00	- 2.70 E-01	2.13 E+02	2.50 E-01	1.26 E+00	ND	1.18 E+00	6.90 E-01	6.60 E-01	1.00 E-02	- 2.77 E+01						
RSF	MJ	5.43 E+01	1.32 E+00	2.70 E-01	5.59 E+01	3.20 E-01	3.42 E-01	ND	3.20 E-01	8.70 E-01	2.80 E-01	1.00 E-02	- 4.64 E+00						
NRSF	MJ	- 9.78 E+01	- 4.74 E+00	- 8.90 E-01	- 1.03 E+02	- 1.12 E+00	- 5.03 E+00	ND	- 4.72 E+00	- 3.10 E+00	- 3.08 E+00	- 3.00 E-02	- 5.88 E+01						
FW	m <sup>3</sup>	1.02 E+01	1.90 E-01	1.10 E+00	1.15 E+01	8.65 E+00	7.06 E-02	ND	7.00 E-02	1.20 E-01	- 9.00 E-02	3.00 E-02	- 9.61 E+00						
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water																		

<sup>1</sup> The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

## Waste production and output flows

### Waste production

		Results per declared unit																	
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.43 E+0 2	2.66 E+0 0	2.73 E+0 0	2.48 E+0 2	6.50 E-01	2.76 E+0 0	ND	2.59 E+0 0	1.74 E+0 0	7.70 E+0 0	3.00 E-02	- 1.73 E+0 2						
Non-hazardous waste disposed	kg	3.43 E+0 3	1.82 E+0 2	1.88 E+0 2	3.80 E+0 3	4.96 E+0 1	2.95 E+0 1	ND	2.77 E+0 1	1.20 E+0 2	1.99 E+0 3	2.29 E+0 2	- 3.14 E+0 2						
Radioactive waste disposed	kg	8.41 E-02	2.00 E-02	3.90 E-04	1.00 E-01	4.37 E-03	1.80 E-02	ND	2.00 E-02	1.00 E-02	3.57 E-03	2.20 E-04	- 4.50 E-01						

### Output flows

		Results per declared unit																	
Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	ND	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0						
Material for recycling	kg	1.96 E+0 2	8.80 E-01	- 1.60 E-01	1.97 E+0 2	2.10 E-01	1.24 E+0 0	ND	1.16 E+0 0	5.70 E-01	6.30 E-01	8.54 E-03	- 2.61 E+0 1						
Materials for energy recovery	kg	6.10 E-01	1.00 E-02	- 5.10 E-04	6.19 E-01	3.50 E-03	3.84 E-03	ND	3.60 E-03	9.62 E-03	3.10 E-03	6.90 E-05	- 9.00 E-02						
Exported energy	MJ	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	ND	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0	0.00 E+0 0						

## Information on biogenic carbon content

Results per declared unit		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	6.83E+02
Biogenic carbon content in packaging	kg C	0.00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>.

## Additional information

i-Roof is a system product and therefore comprises multiple individual products that have their own supply chains and life cycle impacts. This EPD collectivises this information as far as possible to represent the aggregated impacts of all constituent materials of a whole i-Roof unit. The following products included in an i-Roof have their own EPD:

Material	Manufacturer	EPD registration number
Timber I-joists	James Jones & Sons	S-P-01072
OSB	West Fraser (Norbord)	S-P-01850
Mineral wool insulation	Isover	S-P-05654
Plasterboard	British Gypsum	S-P-00508

The i-Roof variant that has been considered for this EPD is of certain dimensions and weight (see above). This information can be used to scale the impacts of an i-Roof with dimensions that differ from those assumed in this EPD. However, it must be noted that each material within i-Roof does not scale linearly and therefore subsequent results will not be a precise reflection of actual life cycle impacts.

To obtain life cycle impacts of an i-Roof of different dimensions than those assumed here, the above EPDs and generic data for other materials would need to be utilised with appropriately scaled quantities.

## References

General Programme Instructions of the International EPD® System. Version 3.01.

Product Category Rules: PCR 2019:14. Construction Products (EN 15804+A2 2019). Version 1.11

EN ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations – Principles and procedures

EN 15804: 2012+A2:2019 Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products

EuGeos 15804\_A2-IA Database Method, June 2020, EuGeos Limited

EN 15978: 2011 Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method

EN 16449: 2014 Wood and wood-based products – Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

EN 350: 2016 Durability of wood and wood-based products – Testing and classification of the durability to biological agents of wood and wood-based products

BR 443 Conventions for U-Value Calculations

BR 497 Conventions for Calculating Linear Thermal Transmittance and Temperature Factors

