Statement of Verification

BREG EN EPD No.: 000701 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

RCR Flooring Products

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

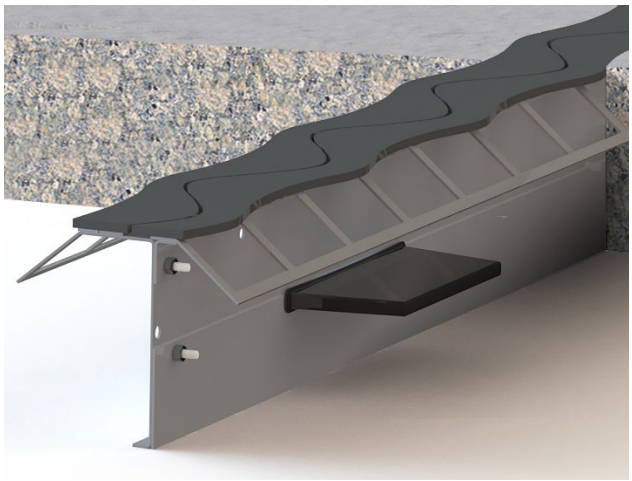
BRE Global Scheme Document SD207

This declaration is for:

1 unit of Permaban Wave (2.4m, weighing 35.4kg/unit)

Company Address

RCR Flooring Products
Mill Close, Lee Mill Industrial Estate
Ivybridge, Devon
PL21 9GL
United Kingdom



Signed for BRE Global Ltd	Hayley Thomson Operator	24 June 2025 Date of this Issue
24 June 2025 Date of First Issue		23 June 2030 Expiry Date

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Environmental Product Declaration

EPD Number: **000701**

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE 2023 Product Category Rules (PN 514 Rev 3.1) for Type III environmental product declaration of construction products to EN 15804:2012+A2:2019
Commissioner of LCA study	**LCA consultant/Tool**
RCR Flooring Products Mill Close, Lee Mill Industrial Estate Ivybridge, Devon PL21 9GL United Kingdom	LCA Tool: BRE LINA A2 LCA Consultant: Francis Yu
Declared/Functional Unit	**Applicability/Coverage**
1 unit of Permaban Wave (2.4m, weighing 35.4kg/unit)	Product Specific.
EPD Type	**Background database**
Cradle to Gate with options	Ecoinvent 3.8

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: Roger Connick
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+A2:2019. 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+A2:2019 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)

Lee Mill Works
Unit 1C Mill Close
Lee Mill Industrial Estate
Lee Mill
Ivybridge
PL21 9GL

Construction Product:

Product Description

Permaban is the brand of armoured joints for large-scale concrete floors. The use of Permaban Wave product is as a permanent in concrete formwork during the concrete pouring process to protect the construction joints from impact damage by vehicular traffic such as pallet trucks, forklift and any other MHE operations.

Permaban Wave combines a narrow top plate and a distinctive triple curve design, for impact-free joint protection that's easy to install. Its three sine wave shapes mean there are no straight edges, so materials handling equipment can flow smoothly across the joint in any direction. The extension plate means installers can easily choose the correct joint height on site and use any excess stock on the next job.

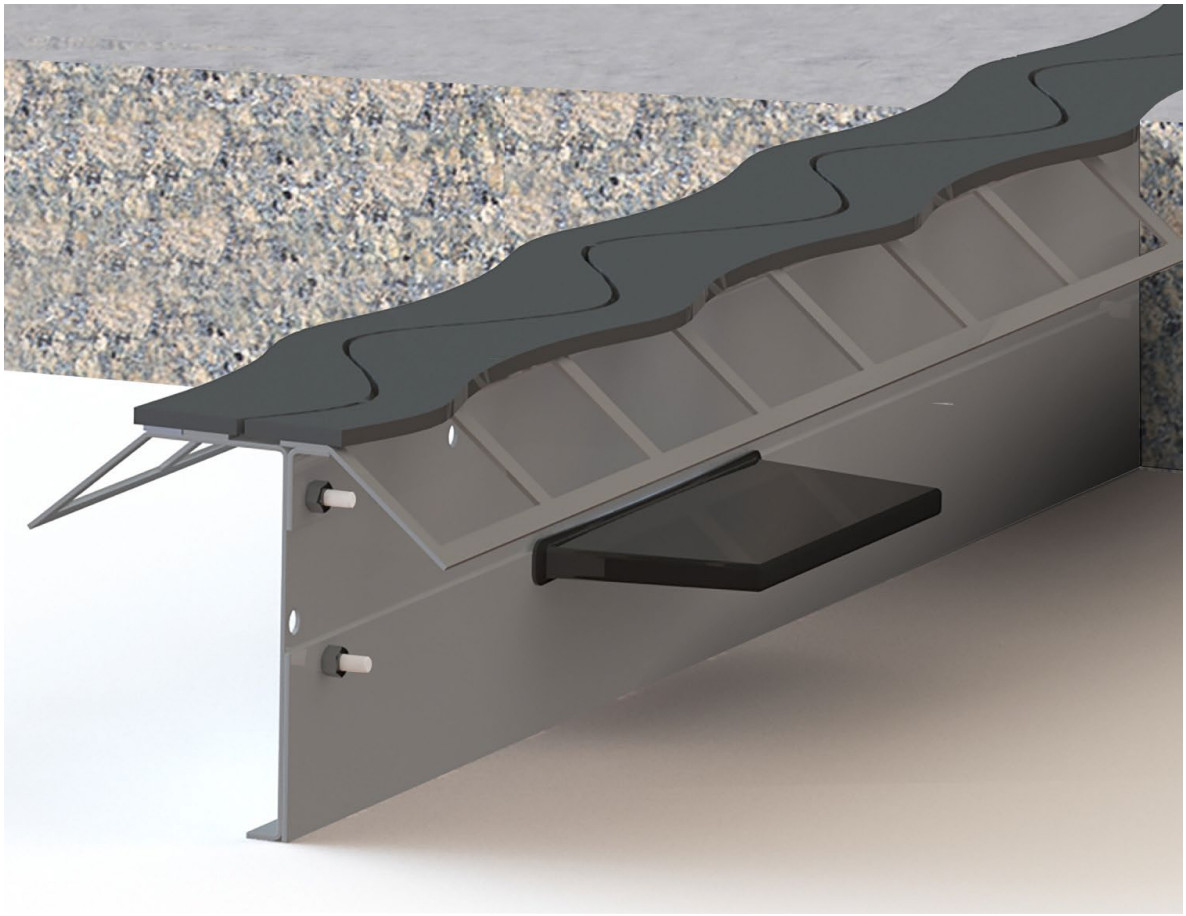
Wave is compatible with our plate dowels. With a tight-fitting plastic sleeve, these allow horizontal and lateral slab movement as the joint opens but prevent vertical movement.

Supplied in mild steel as standard, Permaban Wave is ideal for indoor use across a wide range of applications, including directional traffic areas and internal doorways. Galvanised and stainless-steel options are available to special order. The standard mild steel version is modelled in this LCA. Wave features an extension plate which can be adjusted to suit slabs of between 150 and 200mm (fixed height joints available to special order). One batch of product can therefore be used across multiple job sites, making it an economical choice. Permaban Wave is supplied in convenient 2.4m lengths.

Technical Information

Property	Value, Unit
Density at 20°C (kg/m3)	7.85
Melting Point °C	450 / 1520
Tensile Strength (N/mm2)	560Max
Yield Stress (N/mm2)	440Max
Length manufacturing tolerance (mm)	±2.0mm
Height manufacturing tolerance (mm)	±1mm
Straightness manufacturing tolerance (mm)	±0.5mm/600mm
Nominal slab depth (mm)	150-200; 225; 250; 275; 300; 325
Joint height (mm)	140-180; 200; 225; 250; 275; 300
Dowel size (mm)	151 x 120 x 8
Dowel centres (mm)	600
Length (mm)	2400
Single joint weight (kg)	28.5; 31.5; 32.5; 33.5; 34.5; 35.5
No. per bundle	50; 44; 44; 33; 33; 33
Bundle weight (kg)	1550; 1511; 1555; 1230.5; 1263.5; 1296.5
Standard for non-impact steel top provides joint arris	EN 10277-1:2018 S235JRC
Standard for sheet steel formwork	EN 10130:2006 DC01
Standard for plate dowel	BS EN 10025-2:2004 S275JR
Material for plate dowel sleeve	HDPP
Slab Depth (mm)	Extender Plate To Suit 150- 200; 225; 250; 275; 300; 325
Dowel Type	TD8; TD10
Unreinforced Slab bursting (kN/m)	35.7; 60.7; 72.6; 85.6; 86.9; 82.1
Unreinforced Slab bending (kN/m)	87.2; 124.7

Note: the technical information is derived from Permaban Wave specification sheet. Please contact RCR Flooring Products for more details.



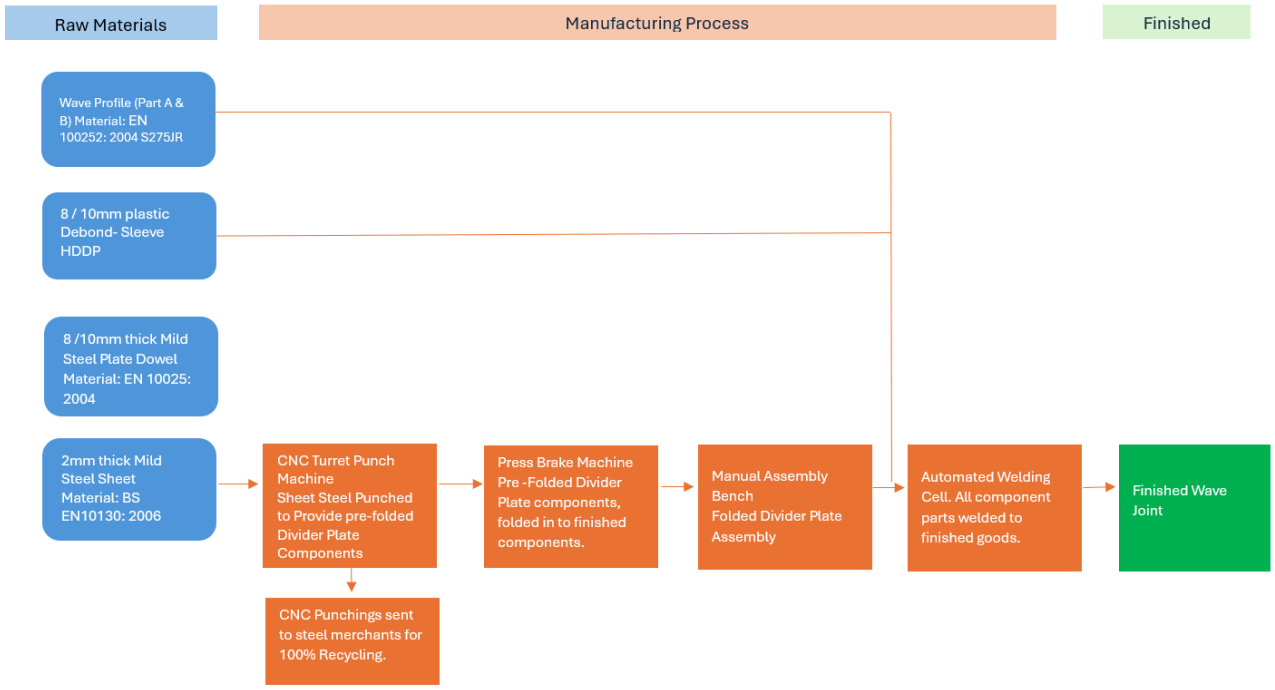
Main Product Contents

Material/Chemical Input	%
Iron	97.76
Carbon	0.24
Magnesium	1.5
Silicon	0.4
Sulphur	0.05
Phosphorus	0.05

Manufacturing Process

Stage 1: Raw material in the form of 6mm electroplated mild steel Top plates are manufactured off site by a company we use, by use of a lazer cutting CNC machine.
Stage 2: These top plates are then welded to another sub-unit which is manufactured wholly on site. 2mm sheet steel which is originally 2500 x 1250 are punched by an Amada CNC punch unit into narrower plates. These plates are then formed on an Amada press brake into the finished shape, which measures 2400mm x 192mm. Once both sub-units are welded together, they become the finished product.

Process flow diagram



Construction Installation

Manual installation, placed within concrete pours at industrial warehouse facility.

Suitable for a wide range of applications. Particularly suitable for directional traffic situations (such as transfer and racking aisles in distribution centres) where materials handling vehicles pass over the joint at 90°.
Suitable for use internally. If the product is to be used in places subject to water ingress, please request galvanised finish.
Suitable for use with pallet trucks and front and lateral stacker trucks.

End of Life

An industrial average end-of-life data has been used according to BRE 2023 Product Category Rules (PN 514 Rev 3.1), which is 95% of waste to recycling, 5% to landfill.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 unit of Permaban Wave (2.4m, weighing 35.4kg/unit).

System boundary

This is a Cradle-to-Gate with options LCA, reporting all production life cycle stages of modules A1 to A3, construction stages A4-A5, end-of-life stages C1-C4 and D in accordance with EN 15804:2012+A2:2019 and BRE 2023 Product Category Rules (PN 514 Rev 3.1).

Data sources, quality and allocation

Specific primary data derived from RCR Flooring Products' production process in Lee Mill Works, Unit 1C Mill Close, Lee Mill Industrial Estate, Lee Mill, Ivybridge, PL21 9GL factory, have been modelled using the LINA LCA A2 and the ecoinvent 3.8 database. In accordance with the requirements of EN 15804:2012+A2:2019, the most current available data has been used. The manufacturer-specific data from RCR Flooring Products covers a period of one year (01/01/2021 – 31/12/2021). Secondary data has been obtained for all other upstream and downstream processes that are beyond the control of the manufacturer (i.e. raw material production) from the ecoinvent 3.8 database. All ecoinvent datasets are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs, according to the requirements specified in EN 15804:2012+A2:2019.

The LCA studies is for Permaban Wave, which account for 5.3 % of the site total production. The factory also produces other products in addition to Permaban Wave. All energy, water and waste have been allocated to the product by unit according to the provisions of the BRE PCR PN514 Rev 3.1 and EN 15804:2012+A2:2019. Site wide values for energy, water and wastewater have been taken from bills. Figures for the raw materials, ancillary materials and packaging were from actual usages.

Quality Level	Geographical representativeness	Technical representativeness	Time representativeness
Very Good	Data from area under study.	Data from processes and products under study. Same state of technology applied as defined in goal and scope (i.e. identical technology).	There is less than 5 years between the ecoinvent LCI reference year, and the time period for which the LCA was undertaken.

Specific UK datasets have been selected from the ecoinvent LCI for this LCA. The quality level of geographical and technical representativeness is therefore very good. The quality level of time representativeness is good as the background LCI datasets are based on ecoinvent v3.8 which was compiled in 2021. Therefore, there is less than 5 years between the ecoinvent LCI reference year and the time period for which the LCA was undertaken.

UK Consumption mix was used for electricity with an emissions factor of 0.312kgCO2e/kWh.

Cut-off criteria

All processes associated with the manufacturing process have been included. All inputs or outputs have been included and all raw materials, packaging and transport, energy, water use and wastes are included, except for direct emissions to air, water and soil, which are not measured. Upstream extraction and/or processing of inputs are included within the use of the background datasets within LINA.

LCA Results

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

Parameters describing environmental impacts									
			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	kg $(PO_4)^{3-}$ eq
Product stage	Raw material supply	A1	9.24E+01	9.09E+01	1.37E+00	7.00E-02	5.14E-06	3.88E-01	4.35E-02
	Transport	A2	1.13E+00	1.13E+00	9.62E-04	4.43E-04	2.61E-07	4.58E-03	7.27E-05
	Manufacturing	A3	-6.01E-01	1.31E+00	-1.91E+00	2.63E-03	9.83E-08	6.43E-03	3.20E-04
	Total (of product stage)	A1-3	9.29E+01	9.33E+01	-5.45E-01	7.30E-02	5.50E-06	3.99E-01	4.39E-02
Construction process stage	Transport	A4	4.97E+00	4.97E+00	7.18E-04	3.17E-03	1.03E-06	1.23E-01	2.05E-04
	Construction	A5	2.18E+00	2.12E-02	2.16E+00	6.41E-06	3.13E-09	7.90E-05	1.11E-06
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
95% to recycling, 5% to landfill Scenario									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	2.95E-01	2.94E-01	2.51E-04	1.16E-04	6.81E-08	1.19E-03	1.89E-05
	Waste processing	C3	1.94E+00	1.94E+00	6.83E-04	1.93E-04	4.14E-07	2.01E-02	6.00E-05
	Disposal	C4	9.34E-03	9.32E-03	9.24E-06	8.80E-06	3.77E-09	8.77E-05	8.53E-07
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.68E+01	-3.69E+01	1.16E-01	-1.04E-02	-1.47E-06	-1.34E-01	-1.46E-02

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
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; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

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

Parameters describing environmental impacts									
			EP-marine	EP-terrestrial	POCP	ADP-mineral &metals	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived	disease incidence
Product stage	Raw material supply	A1	9.26E-02	8.78E-01	3.89E-01	8.53E-04	1.03E+03	3.89E+01	6.80E-06
	Transport	A2	1.38E-03	1.51E-02	4.62E-03	3.92E-06	1.71E+01	7.68E-02	9.74E-08
	Manufacturing	A3	1.73E-03	1.88E-02	6.57E-03	7.46E-06	3.41E+01	8.75E-01	1.10E-07
	Total (of product stage)	A1-3	9.57E-02	9.12E-01	4.01E-01	8.65E-04	1.08E+03	3.98E+01	7.01E-06
Construction process stage	Transport	A4	3.05E-02	3.39E-01	8.87E-02	9.65E-06	6.67E+01	2.01E-01	2.29E-07
	Construction	A5	5.38E-05	3.11E-04	9.06E-05	4.57E-08	2.11E-01	1.71E-03	1.51E-09
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
95% to recycling, 5% to landfill Scenario									
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	3.60E-04	3.93E-03	1.20E-03	1.02E-06	4.45E+00	2.00E-02	2.54E-08
	Waste processing	C3	8.91E-03	9.76E-02	2.68E-02	9.96E-07	2.66E+01	6.14E-02	5.39E-07
	Disposal	C4	3.05E-05	3.34E-04	9.71E-05	2.13E-08	2.60E-01	1.19E-02	1.77E-09
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.17E-02	-3.37E-01	-1.85E-01	-2.78E-05	-3.73E+02	-2.64E+00	-2.47E-06

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
PM = Particulate matter.

LCA Results (continued)

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

Parameters describing environmental impacts							
			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	6.97E+00	2.69E+03	6.15E-07	2.58E-06	3.44E+02
	Transport	A2	8.77E-02	1.33E+01	4.31E-10	1.40E-08	1.17E+01
	Manufacturing	A3	3.34E-01	1.72E+01	2.84E-09	1.52E-08	1.74E+02
	Total (of product stage)	A1-3	7.39E+00	2.72E+03	6.19E-07	2.61E-06	5.29E+02
Construction process stage	Transport	A4	3.14E-01	4.43E+01	2.69E-09	3.50E-08	2.03E+01
	Construction	A5	1.14E-03	1.72E-01	6.99E-12	1.88E-10	2.00E-01
Use stage	Use	B1	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND
95% to recycling, 5% to landfill Scenario							
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	2.29E-02	3.47E+00	1.12E-10	3.64E-09	3.06E+00
	Waste processing	C3	1.20E-01	1.55E+01	6.01E-10	1.13E-08	3.38E+00
	Disposal	C4	1.16E-03	1.64E-01	4.17E-12	1.08E-10	5.46E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.60E-01	-1.10E+03	-1.97E-07	-7.58E-07	-7.28E+01

IRP = Potential human exposure efficiency relative to U235;
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
HTP-nc = Potential comparative toxic unit for humans; and
SQP = Potential soil quality index.

LCA Results (continued)

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

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	9.05E+01	0.00E+00	9.05E+01	1.01E+03	0.00E+00	1.01E+03
	Transport	A2	2.40E-01	0.00E+00	2.40E-01	1.68E+01	0.00E+00	1.68E+01
	Manufacturing	A3	1.50E+01	1.83E+01	3.34E+01	2.43E+01	9.53E+00	3.38E+01
	Total (of product stage)	A1-3	1.06E+02	1.83E+01	1.24E+02	1.06E+03	9.53E+00	1.07E+03
Construction process stage	Transport	A4	5.99E-01	0.00E+00	5.99E-01	6.54E+01	0.00E+00	6.54E+01
	Construction	A5	-1.47E+01	1.47E+01	3.74E-03	-2.20E+00	2.41E+00	2.07E-01
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
95% to recycling, 5% to landfill Scenario								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.27E-02	0.00E+00	6.27E-02	4.37E+00	0.00E+00	4.37E+00
	Waste processing	C3	1.49E-01	0.00E+00	1.49E-01	2.60E+01	0.00E+00	2.60E+01
	Disposal	C4	2.22E-03	0.00E+00	2.22E-03	2.56E-01	0.00E+00	2.56E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-7.67E+00	0.00E+00	-7.67E+00	-3.69E+02	0.00E+00	-3.69E+02

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)

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

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	1.26E+01	0.00E+00	0.00E+00	9.61E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.90E-03
	Manufacturing	A3	7.05E-02	0.00E+00	0.00E+00	2.08E-02
	Total (of product stage)	A1-3	1.27E+01	0.00E+00	0.00E+00	9.84E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	4.97E-03
	Construction	A5	7.22E-05	0.00E+00	0.00E+00	4.16E-05
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
95% to recycling, 5% to landfill Scenario						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	4.96E-04
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	1.51E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	2.79E-04
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-6.42E-02

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)

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

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	2.94E+01	1.69E+02	2.83E-03
	Transport	A2	1.88E-02	3.34E-01	1.15E-04
	Manufacturing	A3	6.29E-02	1.45E+00	1.05E-04
	Total (of product stage)	A1-3	2.94E+01	1.71E+02	3.05E-03
Construction process stage	Transport	A4	8.44E-02	9.03E-01	4.59E-04
	Construction	A5	2.81E-04	6.20E-02	1.41E-06
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	MND	MND	MND
	Repair	B3	MND	MND	MND
	Replacement	B4	MND	MND	MND
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
95% to recycling, 5% to landfill Scenario					
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	4.90E-03	8.71E-02	3.01E-05
	Waste processing	C3	3.50E-02	2.45E-01	1.83E-04
	Disposal	C4	2.71E-04	3.82E-03	1.71E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-3.40E+00	-7.00E+01	-3.95E-04

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

LCA Results (continued)

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

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-5.78E-01
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-5.78E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	6.38E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
95% to recycling, 5% to landfill Scenario								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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	Transported from HQ in Devon to Port of Southampton and onwards by sea to Dubai UAE.		
	Vehicle type	vehicle type	Lorry, 16 - 32 metric ton
	Distance (road):	km	230
	Distance (sea):	km	10843
	Bulk density of transported products	kg/m^3	7.85
A5 – Installation in the building	Manual installation, placed within concrete pours at industrial warehouse facility. Whole product can used, so 0% wastage rate. Only packaging wastes of Permaban Wave will be generated during installation.		
	Plastic wrap waste - to landfill	kg	0.05668
	Wood waste – to recycling	kg	1.4745
C1 to C4 End of life,			
C1 – Deconstruction	There is currently no process in place to deconstruct the product. Once the product reaches the end of its life, it is assumed that it will be manually deconstructed or deconstructed using power tools from the building. Therefore, no extra energy and materials are needed.	MJ	0
C2 – Transport from site to pre-processing facility or landfill	There is currently no process in place to transport the product waste. 50km by road has been modelled for module C2 as a typical distance from the demolition site to the recycling plant. However, end-users of the EPD can use this information to calculate the impacts of a bespoke transport distance for module C2 if required.	km	50
C3 - Pre-processing of uninstalled product	There is currently no process in place to process the product waste. Therefore, an industrial average end-of-life data of 'Floor (raised access, pedestal), steel' has been used according to BRE PCR PN 514 Rev 3.1, i.e. 95% of waste to recycling.	kg	33.63
C4 – Disposal	There is currently no process in place to dispose of the product waste. Therefore, an industrial average end-of-life data of 'Floor (raised access, pedestal), steel' has been used according to BRE PCR PN 514 Rev 3.1, i.e. 5% to landfill.	kg	1.77

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
Module D	95% i.e. 33.63kg of product waste will be recycled, out of which, 11.81kg is from post-consumer waste. Therefore, only 33.63-11.81=21.82kg of steel waste is from virgin steel and can be declared for benefits in Module D. The calculation process has been listed below: Steel sheet accounts for 82.6% of 1 unit of the product. Post-consumer content of the Steel sheet accounts for 37.6% according to background data. Steel dowels account for 17.4% of 1 unit of the product. Post-consumer content of the Steel dowels accounts for 23.4% according to background data. So after excluding post-consumer waste, the waste from virgin material in the 95% (i.e.33.63kg) waste to recycling are: Steel sheet waste to recycling (from virgin) is: 33.63kg*82.6%*(1-37.6%) = 17.334 kg Steel dowels waste to recycling (from virgin) is: 33.63kg*17.4%*(1-23.4%) = 4.482 kg In total, only 17.334+4.484=21.82kg of steel waste are from virgin steel and can be therefore claimed for benefits due to recycling in Module D.		
	Products Recycled Content (post-consumer)	kg	11.81
	Recovered for recycling	kg	21.82

Interpretation

Out of the total mass of input materials, sheet steel makes up 77%, steel dowels make up the remaining of 23%. The bulk of the environmental impacts and primary energy demand are attributed to the manufacturing phase, covered by information modules A1-A3 of EN15804:2012+A2:2019.

As a result, the main contributor to GWP is Module A1, i.e. raw material inputs. For raw material inputs, hot-rolled steel contributes the most on GWP and overall environmental impacts, followed by steel hardware (see figure 1).

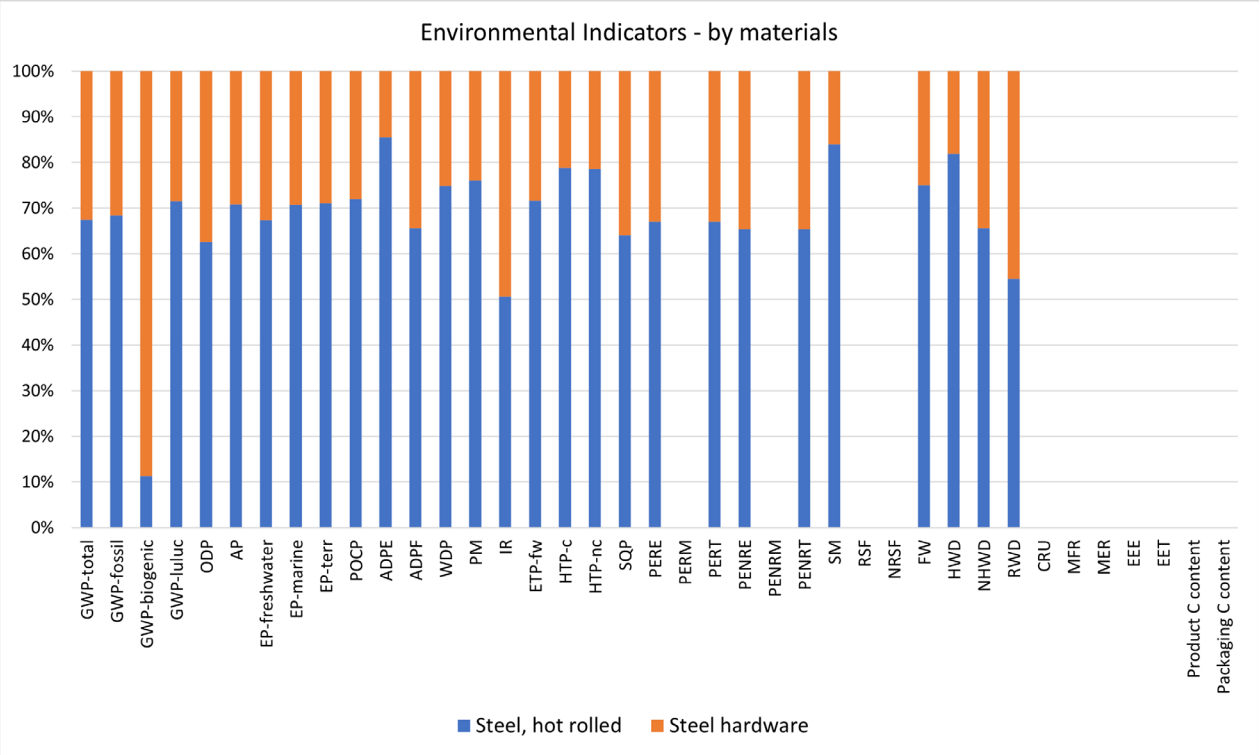


Figure 1

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