# Statement of Verification

BREG EN EPD No.: 000474 Issue 02

This is to verify that the

**Environmental Product Declaration**

provided by:

Specwall SP Ltd

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

BRE Global Scheme Document SD207

This declaration is for:

1m2 of Specwall SP 75mm and 100mm Panels

## Company Address

Specwall SP Ltd,
St Mary's Parsonage,
Manchester.
M3 2PN

| | | |
|---|---|---|
| | Emma Baker | 08 December 2023 |
| Signed for BRE Global Ltd | Operator | Date of this Issue |
| 06 February 2023 | | 31 October 2027 |
| Date of First Issue | | Expiry Date |



# Environmental Product Declaration

## EPD Number: 000474

## General Information

| EPD Programme Operator | Applicable Product Category Rules |
|---|---|
| BRE Global<br>Watford, Herts<br>WD25 9XX<br>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** |
| Specwall SP Ltd<br>St Mary's Parsonage,<br>Manchester.<br>M3 2PN | Tool: BRE LINA v2.0<br>Consultant: Chris Wilson, Trident Utilities Ltd. |
| **Declared/Functional Unit** | **Applicability/Coverage** |
| 1m2 of Specwall SP 75mm and 100mm Panels | Product Specific. |
| **EPD Type** | **Background database** |
| Cradle to Gate with options | 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<br>☐Internal ☒ External |
| (Where appropriate [b])Third party verifier:<br>Pat Hermon |
| a: Product category rules<br>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)

Technical Supplies & Services Co. LLC.
P. O Box 77031, Dubai Investments Park – Phase 2
Dubai, UAE

# Construction Product:

## Product Description

The Specwall is a sandwich wall panel made of Fibre cement board on the exterior. The Interior composite core material is a system of Lightweight concrete mix made from Ordinary Portland cement, additives, aggregates, admixtures and expanded polystyrene.

The panels are available in thickness from 75 mm to 100 mm. One side of the panel has Male-Tongue profile and other side Female – Groove profile. When the panels are erected, the Tongue and groove fit together to form a precise fit. The result is High quality wall system resulting in less manpower and faster assembly.

## Technical Information

| Property | Value, Unit |
|---|---|
| Compression Strength Average BS EN 12390-3 | >2.5 Mpa |
| Water absorption test BS1881 Part122 | <25% |
| Flexural Test BS EN 12390-5 | >1.5 Mpa |
| Density BS EN 12390-7 | 550 kg/m3 |

## Main Product Contents

| Material/Chemical Input | % |
|---|---|
| Portland Cement, Pulverised Fuel Ash, Expanded Polystyrene & Calcium Silicate Board | 86 % |
| Water | 13% |
| Aggregates,& Admixtures | 1% |

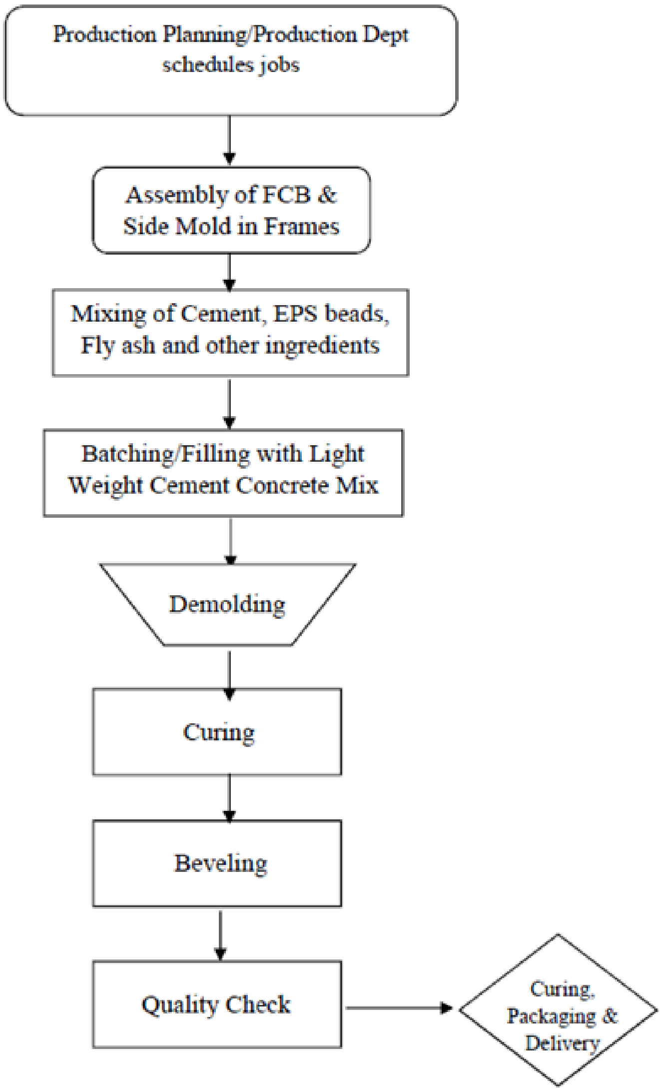
Average Percentages for 75mm and 100mm applicable for 1m2 of panel.

## Manufacturing Process

The concrete mixing process uses a batching process; the proportion of raw materials are mixed in accordance with the specification. Panel moulds are assembled into holding frames and the wet concrete mix is pumped into the panel moulds. The filled moulds are then moved over to curing areas. After the curing time, the holding frames (holding the moulds together) are brought to the de-moulding station.

The panels are stacked in pallets and kept in the yard/stock are for further curing. The panels are then watered for about 3days at least twice a day. After curing, the panels are brought to the recessing/bevelling machine for any finishing or surface repairs required. The panels are then packed onto pallets, labelled, strapped together and wrapped in plastic.  QC and delivery label/stamps are added prior to dispatch.

## Process flow diagram




## Construction Installation

The product is installed as a wall application for exterior and internal use. The solid, lightweight panels fit together using a simple tongue and groove system. Simple adhesive and dowel system used to fix them together. Panels connect directly to floor and ceiling via base and head track channels. Full bead of fire mastic used in the tracks along the length of the panel. Panels can be cut to size on site using circular saws or hand saws. All off-cuts can be reused elsewhere on site

## Use Information

The product will be left alone after installation, there are no known associated environmental impacts.

## End of Life

At the end of the product lifetime (30 years) the panel can be removed and reused in a different location within the building. To reuse the product it can be dismantled by cutting down the middle of the panel to remove. The panel would then have a replacement male and female groove re-formed along its length. The panel can then be reinstalled as before. It is assumed that 50% of panels will be re-used. The remaining 50% of panels, Specwall will receive back 10% of panels to use as samples for architects etc. 38% will be recycled and used a sub-base in road construction (“down cycling”), paving applications, engineering fill or landfill engineering, while only a small proportion is re-used as recycled aggregates in the concrete industry (high-value application)100% yield assumed, and 2 % sent to landfill (ZHAO, Z. et al. (2020).

# Life Cycle Assessment Calculation Rules

## Declared / Functional unit description

1m2 of Specwall SP 75mm and 100mm Panels

## System boundary

Type of EPD: Cradle to Gate with all options declared. The modules considered in the Life Cycle Assessment are modules A1- D inclusive.

Specific primary data derived from the Specwall SP – 75mm and 100mm in Technical Supplies & Services Co. LLC, UAE have been modelled using BRE LINA v2.0 and the BRE LINA database v2.0.92. In accordance with the requirements of EN15804, the most current available data has been used. No inputs or outputs have been excluded, all the ancillary materials, energy, and water use are included. The only exceptions are direct emissions to air, water, and soil, which are not measured.

## Data sources, quality and allocation

Manufacturing data has been collected for the period January 2021 to December. In addition to 75mm and 100mm panels, the site produces 150mm and 200mm panels. Allocation of site energy consumption and water usage has been calculated on the basis of 75mm panels shipped to the UK (Specwall) divided by the total production output of the whole site. Allocation procedures were by physical allocation and are according to EN15804 and are based on ISO14044 guidance.

Specwall 75 mm and 100 mm involve fibre cement board and hardener as raw material ingredients. Though there was no direct dataset in Ecoinvent v3.2 to represent these raw materials, we got their chemical composition from the manufacturer and used that to model the fibre cement board and hardener datasets modelled in SimaPro. Further, the polypropylene dataset is used as a proxy dataset for Admixtures. Because there is no appropriate dataset in Ecoinvent 3.2 to represent Admixtures, so the polypropylene resin dataset has been used as a suitable proxy. In previous decades, polypropylene was used in cement mixtures, and later, the Admixtures replaced them because they had better physical properties, though, Admixture contain polypropylene as a main raw material ingredient. Regarding the grid mix, Saudi electricity mix dataset has been used because the electricity intensity in the UAE which is similar to that in Saudi.

The quality level of geographical and technical representativeness is very good as the background LCI datasets are based on Ecoinvent v3.2 which was compiled in 2015. Therefore, there is approximately 5-6 years between the Ecoinvent LCI reference year and the time period for which the LCA was undertaken.

## Cut-off criteria

No inputs or outputs have been excluded. All raw materials, packaging materials, associated transport to the manufacturing site, and from the manufacturing site to the building site, process energy, water use, direct production waste, installations waste and emissions are included.

## LCA Results 75mm Panel

(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 | 3.59E+01 | 1.50E-06 | 1.09E-01 | 2.40E-02 | 1.26E-02 | 1.71E-04 | 3.09E+02 |
| Construction process stage | Transport | A4 | 1.14E+01 | 1.95E-06 | 1.63E-01 | 2.01E-02 | 1.28E-02 | 1.38E-05 | 1.66E+02 |
| | Construction | A5 | 5.67E+00 | 3.51E-07 | 4.35E-02 | 1.32E-02 | 4.24E-03 | 3.53E-04 | 5.97E+01 |
| Use stage | Use | B1 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | 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 | 2.68E-03 | 7.06E-10 | 1.88E-05 | 6.16E-06 | 3.12E-06 | 3.80E-09 | 6.58E-02 |
| | Transport | C2 | 2.74E+00 | 5.05E-07 | 9.17E-03 | 2.42E-03 | 1.60E-03 | 7.22E-06 | 4.14E+01 |
| | Waste processing | C3 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | Disposal | C4 | 5.04E-03 | 1.74E-09 | 3.88E-05 | 9.58E-06 | 6.70E-06 | 5.44E-09 | 1.46E-01 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -2.19E+01 | -9.37E-07 | -6.74E-02 | -1.50E-02 | -7.81E-02 | -1.04E-04 | -1.90E+02 |

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 | 2.42E+01 | 6.56E-03 | 2.42E+01 | 3.15E+02 | 1.38E+01 | 3.28E+02 |
| Construction process stage | Transport | A4 | 3.37E+00 | 5.83E-06 | 3.37E+00 | 1.68E+02 | 0.00E+00 | 1.68E+02 |
| | Construction | A5 | 4.71E+00 | 2.44E-04 | 4.71E+00 | 6.28E+01 | 4.13E-01 | 6.32E+01 |
| Use stage | Use | B1 | MNR | MNR | MNR | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR | MNR | MNR | MNR |
| | 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 | 2.01E-03 | 5.50E-09 | 2.01E-03 | 6.62E-02 | 0.00E+00 | 6.62E-02 |
| | Transport | C2 | 5.50E-01 | 2.05E-06 | 5.50E-01 | 4.11E+01 | 0.00E+00 | 4.11E+01 |
| | Waste processing | C3 | MNR | MNR | MNR | MNR | MNR | MNR |
| | Disposal | C4 | 3.78E-03 | 5.73E-09 | 3.78E-03 | 1.45E-01 | 0.00E+00 | 1.45E-01 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.48E+01 | -3.94E-03 | -1.48E+01 | -1.94E+02 | -8.28E+00 | -2.02E+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)

| 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 | 7.70E-01 | 0.00E+00 | 0.00E+00 | 2.25E-01 |
| Construction process stage | Transport | A4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.88E-02 |
| | Construction | A5 | 2.31E-02 | 0.00E+00 | 0.00E+00 | 9.26E-02 |
| Use stage | Use | B1 | MNR | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR | MNR |
| | 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 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.41E-05 |
| | Transport | C2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.97E-03 |
| | Waste processing | C3 | MNR | MNR | MNR | MNR |
| | Disposal | C4 | 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 | -4.62E-01 | 0.00E+00 | 0.00E+00 | -1.43E-01 |

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 | 5.50E-01 | 5.74E-01 | 8.92E-04 |
| Construction process stage | Transport | A4 | 7.01E-02 | 3.20E+00 | 1.14E-03 |
| | Construction | A5 | 5.81E-01 | 1.83E+00 | 1.81E-04 |
| Use stage | Use | B1 | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR |
| | 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 | 4.95E-05 | 2.60E-01 | 4.07E-07 |
| | Transport | C2 | 1.73E-02 | 1.93E+00 | 2.86E-04 |
| | Waste processing | C3 | MNR | MNR | MNR |
| | Disposal | C4 | 5.25E-05 | 9.71E-01 | 9.87E-07 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -3.34E-01 | -4.53E-01 | -5.59E-04 |

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 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.13E-04 |
| Construction process stage | Transport | A4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Construction | A5 | 0.00E+00 | 6.20E-01 | 0.00E+00 | 1.24E-05 |
| Use stage | Use | B1 | MNR | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR | MNR |
| | 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 | 8.66E-01 | 2.19E-01 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Waste processing | C3 | MNR | MNR | MNR | MNR |
| | Disposal | C4 | 4.34E+01 | 3.86E+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 | -2.48E-04 |

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

## LCA Results 100mm Panel

(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 | 4.67E+01 | 1.83E-06 | 1.36E-01 | 3.01E-02 | 1.63E-02 | 1.95E-04 | 4.03E+02 |
| Construction process stage | Transport | A4 | 1.49E+01 | 2.54E-06 | 2.12E-01 | 2.62E-02 | 1.67E-02 | 1.80E-05 | 2.17E+02 |
| | Construction | A5 | 6.39E+00 | 4.13E-07 | 4.98E-02 | 1.48E-02 | 4.92E-03 | 3.86E-04 | 7.02E+01 |
| Use stage | Use | B1 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | 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 | 3.41E-03 | 8.99E-10 | 2.39E-05 | 7.85E-06 | 3.97E-06 | 4.85E-09 | 8.39E-02 |
| | Transport | C2 | 2.82E+00 | 5.27E-07 | 1.25E-02 | 3.28E-03 | 2.07E-03 | 7.10E-06 | 4.34E+01 |
| | Waste processing | C3 | MNR | MNR | MNR | MNR | MNR | MNR | MNR |
| | Disposal | C4 | 6.59E-03 | 2.27E-09 | 5.08E-05 | 1.25E-05 | 8.77E-06 | 7.13E-09 | 1.91E-01 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -2.74E+01 | -9.13E-07 | -6.86E-02 | -1.59E-02 | -8.30E-03 | -8.48E-05 | -2.23E+02 |

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 | 2.72E+01 | 9.96E-03 | 2.72E+01 | 4.05E+02 | 2.10E+01 | 4.26E+02 |
| Construction process stage | Transport | A4 | 4.40E+00 | 7.60E-06 | 4.40E+00 | 2.19E+02 | 0.00E+00 | 2.19E+02 |
| | Construction | A5 | 5.45E+00 | 3.48E-04 | 5.45E+00 | 7.36E+01 | 6.31E-01 | 7.43E+01 |
| Use stage | Use | B1 | MNR | MNR | MNR | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR | MNR | MNR | MNR |
| | 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 | 2.56E-03 | 7.01E-09 | 2.56E-03 | 8.44E-02 | 0.00E+00 | 8.44E-02 |
| | Transport | C2 | 6.21E-01 | 2.09E-06 | 6.21E-01 | 4.31E+01 | 0.00E+00 | 4.31E+01 |
| | Waste processing | C3 | MNR | MNR | MNR | MNR | MNR | MNR |
| | Disposal | C4 | 4.95E-03 | 7.50E-09 | 4.95E-03 | 1.90E-01 | 0.00E+00 | 1.90E-01 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -8.79E+00 | -5.95E-03 | -8.79E+00 | -2.23E+02 | -1.26E+01 | -2.36E+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)

| 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 | 7.70E-01 | 0.00E+00 | 0.00E+00 | 3.01E-01 |
| Construction process stage | Transport | A4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.06E-02 |
| | Construction | A5 | 2.31E-02 | 0.00E+00 | 0.00E+00 | 1.07E-01 |
| Use stage | Use | B1 | MNR | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR | MNR |
| | 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 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.44E-05 |
| | Transport | C2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.82E-03 |
| | Waste processing | C3 | MNR | MNR | MNR | MNR |
| | Disposal | C4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.19E-04 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -4.62E-01 | 0.00E+00 | 0.00E+00 | -1.72E-01 |

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 | 6.19E-01 | 6.88E-01 | 1.06E-03 |
| Construction process stage | Transport | A4 | 9.13E-02 | 4.17E+00 | 1.48E-03 |
| | Construction | A5 | 6.36E-01 | 2.32E+00 | 2.13E-04 |
| Use stage | Use | B1 | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR |
| | 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 | 6.31E-05 | 3.31E-01 | 5.19E-07 |
| | Transport | C2 | 1.83E-02 | 2.63E+00 | 2.98E-04 |
| | Waste processing | C3 | MNR | MNR | MNR |
| | Disposal | C4 | 6.87E-05 | 1.27E+00 | 1.29E-06 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -3.28E-01 | -4.65E-01 | -5.81E-04 |

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 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.89E-04 |
| Construction process stage | Transport | A4 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Construction | A5 | 0.00E+00 | 6.20E-01 | 0.00E+00 | 2.07E-05 |
| Use stage | Use | B1 | MNR | MNR | MNR | MNR |
| | Maintenance | B2 | MNR | MNR | MNR | MNR |
| | Repair | B3 | MNR | MNR | MNR | MNR |
| | Replacement | B4 | MNR | MNR | MNR | MNR |
| | 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 | 9.44E-01 | 2.36E-01 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Waste processing | C3 | MNR | MNR | MNR | MNR |
| | Disposal | C4 | 5.65E+01 | 5.03E+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 | -4.13E-04 |

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

# Scenarios and additional technical information

The scenario table includes the generic values used during the LCA analysis for both the Specwall 75 mm and 100 mm products. together

| Scenarios and additional technical information | | | |
|---|---|---|---|
| Scenario | Parameter | Units | Results |
| Lorry > A4 – Transport to the building site | The panels are transported from Dubai to storage at Felixstowe by container ship. From storage the panels are transported by road to construction sites mainly in the London & Manchester areas. | | |
| | Diesel / Lorry | Litre of fuel type per distance or vehicle type | 16 – 32 metric ton |
| | Distance: | km | 550 |
| | Capacity utilisation (incl. empty returns) | % | 100 |
| | Bulk density of transported products | $kg/m^3$ | 650 - 750 |
| A5 – Installation in the building | The solid, lightweight panels fit together using a simple tongue and groove system. Simple adhesive and dowel system used to fix them together.<br>Panels connect directly to floor and ceiling via base and head track channels. Full bead of fire mastic used in the tracks along the length of the panel<br>Panels can be cut to size on site using circular saws or hand saws. All off-cuts can be reused elsewhere on site | | |
| | Material wastage rate | % | 3 |
| | Head Fixings | kg | 0.787 |
| | Base Fixings | kg | 0.295 – 0.393 |
| | Adhesives & Sealants | kg | 0.225 – 0.267 |
| | Rockwool Insulation | kg | 0.25 – 0.33 |
| | Electricity | kWh | 0.02 |
| C1 to C4<br>End of life, | At the end of the product lifetime (30 years) the panel can be removed and reused in a different location withing the building.<br>To reuse the product would be dismantled by cutting down the middle of the panel to remove. The panel would then have a replacement male and female groove re-formed along its length. The panel can then be reinstalled as before.<br>It is assumed that 50% of panels will be re-used.<br>Of the remaining 50% of panels, Specwall will receive back 10% of these panels for recycling to use as samples for architects etc. The remaining 38% of panels will be recycled and 2 % sent to landfill. The panels sent to landfill will be sent to a local waste disposal facility. As most construction sites are in either London or Manchester this is estimated at 20kM.<br>For panels to be returned to Specwall for reuse this will be London to Manchester 320 km | | |
| | Panels to be reused | % | 60 |
| | Panels to recycle | % | 38 |
| | Panels to landfill | % | 2 |
| | Transport to recycle at Specwall - Lorry | km | 320 |
| | Transport to landfill at local waste disposal site | km | 20 |

| Scenarios and additional technical information | | | |
|---|---|---|---|
| Scenario | Parameter | Units | Results |
| Module D | 60% of panels reused, 38% recycled and 2% to landfill. | | |

## Interpretation of Results

Out of the total mass of input materials, Portland cement makes up 53%, followed by calcium silicate board of 25%, and other input materials make up the remaining of 22%. As a result, Portland cement and calcium silicate board is the responsible for the greatest impact on all indicators except PERM, PENRM, SM, and EE. Epoxy resin is one of the raw material inputs for Specwall products which has its composition of 0.6%, with its composition it is responsible for the greatest proportion of impact on PERM and PENRM, and hardener quantity is very low, but it is responsible for EE impact

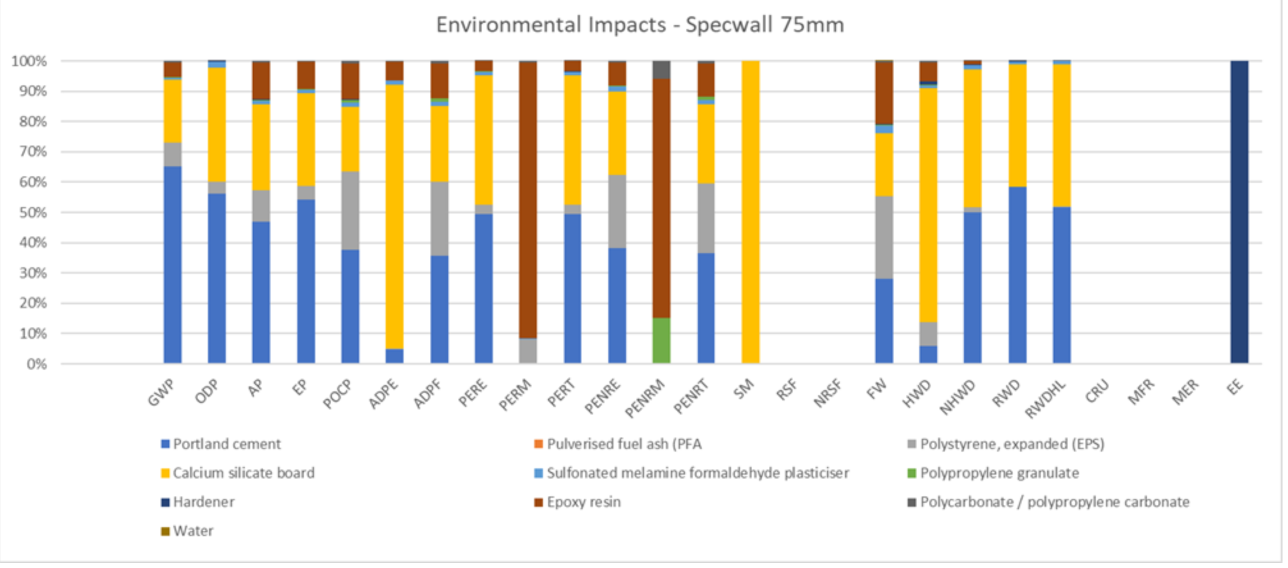


Figure 1

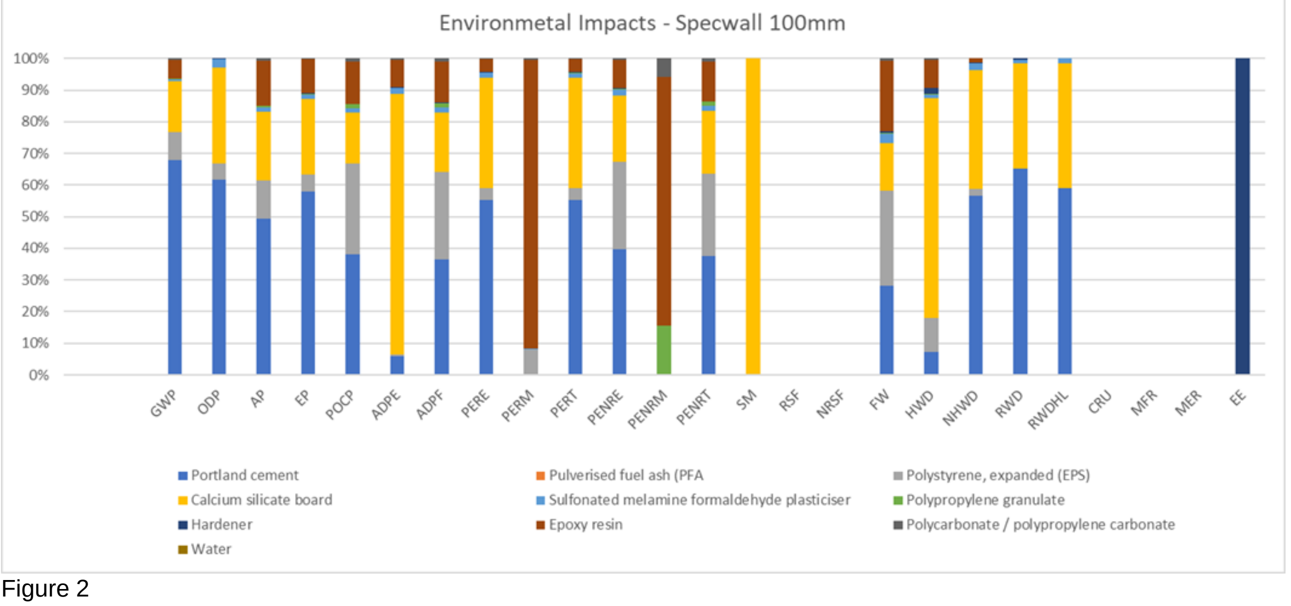


Figure 2

## References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