ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

Concrete Paving Flags - Standard Wet Pressed
Marshalls Plc

EPD HUB, HUB- 0553
Publishing date 30 June 2023, last updated date 8 April 2025, valid until date 30 June 2028.

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Marshalls Plc
Address	Landscape House, Premier Way, Elland HX5 9HT, England, UK
Contact details	epd@marshalls.co.uk
Website	www.marshalls.co.uk

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022 EN 16757 Product Category Rules for concrete and concrete elements
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-B1, and modules C1-C4, D
EPD author	C Griffiths, R Dorrington, S Lang - Marshalls PLC
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Elma Avdyli, EPD Hub

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	Concrete Paving Flags - Standard Wet Pressed
Additional labels	Standard Paving Pimple, Coloured Pimple Paving, Special Pressed Paving, Barface, Pendle, Richmond, Urbex, Ultipro, Stonemarket Flag, Ryton Riven, Stretton Smooth
Product reference	N/A
Place of production	Brookfoot, West Lane, Eaglescliffe, Falkirk, Ramsbottom, St Ives, Sittingbourne (UK)
Period for data	2022
Averaging in EPD	Multiple factories
Variation in GWP-fossil for A1-A3	-

ENVIRONMENTAL DATA SUMMARY

Declared unit	1m²
Declared unit mass	118 kg
GWP-fossil, A1-A3 (kgCO2e)	1,23E1
GWP-total, A1-A3 (kgCO2e)	1,18E1
Secondary material, inputs (%)	0.0179
Secondary material, outputs (%)	94.6
Total energy use, A1-A3 (kWh)	23.1
Total water use, A1-A3 (m3e)	3,47E-1

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Marshalls is the UK's largest manufacturer and supplier of building and hard landscaping products, including paving blocks and flags, kerbs, drainage channels, bricks, roof tiles, street furniture and natural stone paving. It provides products for both commercial and domestic markets.

PRODUCT DESCRIPTION

The product is a concrete paving unit. Concrete Flags are laid on mortar and sand to create an attractive, hardwearing surface. Different sub-base designs allow different levels of trafficking.

This document is for a flag manufactured using a wet-press process. The same material and pigment is used all the way through the slab.

Concrete flags are manufactured according to BS EN 1339. Different classifications of flag are denoted within the standard, and different classifications require different minimum standards of performance. Factors which must be satisfied to achieve the standard include minimum bending strength, deviations of flatness, slip / skid resistance, freeze / thaw performance and water absorption. Test methods and minimum criteria are detailed in the standard.

The nominated depth for the product specified in this document is 50mm. Conversion factors for different depths are listed in the document.

Further information can be found at www.marshalls.co.uk.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	N/A	N/A
Minerals	100	EU
Fossil materials	N/A	N/A
Bio-based materials	N/A	N/A

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	-
Biogenic carbon content in packaging, kg C	0.18

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1m²
Mass per declared unit	118 kg
Functional unit	1m² of 50mm concrete flag paving with useful service life of 50 years
Reference service life	50 years

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x	x	x	x	MND	MND	MND	MND	MND	MND	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demo	Transport	Waste	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

A specified blend of aggregates, binder material, water and admixtures is dispensed from hoppers into a mixer. The mixture is then emptied into a mould. The mould may have a pattern or texture moulded into the bottom to create a specific finish. The concrete is vibrated in the mould and a precision-cut tamper plate applies pressure to the top of each cell in the mould. Thie pressure ejects water from the mould. The concrete is lifted from the mould by robot, which transfers the unit to a pallet. Pallets move along a conveyor to the curing chamber, where they are stacked until the concrete achieves strength. Pallets are removed from the chamber. Flags are removed from the pallets by robot and entered into the packaging line. Units are stacked together into specified formations, and are strapped and banded. Plastic wrap is pulled over flags which then go through a heat oven to shrink the wrap onto the packs. Wrapped packs are transported to the storage yard.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

A4: During the time period measured, manufacture of wet pressed concrete paving took place at seven different sites spread over the UK: Brookfoot, West Lane, Eaglescliffe, Falkirk, Ramsbottom, St Ives & Sittingbourne. Transport to site or yard is undertaken by articulated lorries with Euro 6 engines. We have calculated that the average journey undertaken by these products during the time period allocated was199.2km. This is made up of two legs - one to a service yard (distribution hub) within our network and then to a site or yard.

A5: In the UK, installation of concrete paving is a manual process. Flags are laid by hand.

PRODUCT USE AND MAINTENANCE (B1-B7)

B1: The carbonation (sequestration) value has been calculated as per methodology outlined in EN 16757:2022.

Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

C1: In the UK, removal of concrete flag paving is a manual process.

C2: It is assumed that 7% of product is transported 50km to a waste processing site to be landfilled, and 93% of product is reused. This is evidenced on UK Governments Statistics on Construction Waste website:
7. Recovery rate from non-hazardous construction and demolition (C&D) waste - Table 8: England, 2010–2020:
https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste#recovery-rate-from-non-hazardous-construction-and-demolition-cd-waste

C3: All material (whether used on site or treated at a waste processing facility) will be crushed. 93% will be reused on site as infill; 7% will be transported to landfill.

C4: It is assumed that 7% of materials that leaves site will go to landfill because it will be too fine to use as aggregate.

D: Due to the recycling potential of concrete, it can be used as secondary raw material, which avoids the use of virgin raw materials. The 93% of concrete going to waste processing is converted into secondary raw materials after recycling. The benefit of recycled concrete claimed in module D have excluded the amount of secondary material input. In addition incineration of the strapping and packaging generates energy.

MANUFACTURING PROCESS

LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	Not applicable
Ancillary materials	Not applicable
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	Multiple factories
Averaging method	Averaged by shares of total mass
Variation in GWP-fossil for A1-A3	-

Primary data represents the 7 Marshalls sites at which flag paving is manufactured. All 10 products covered by this EPD use the same mix design with minor differences in pigmentation. The only material difference, other than the pigmentation and pattern moulded into the surface, is that the products are manufactured in different depths (35, 50, 63, 65 and 70mm).

The data was used to calculate average impacts for the product. The variability of the primary data or the emissions between the manufacturing sites did not amount to more than 10 % for the relevant data. The primary data was averaged by calculating a weighed average of the sites consumption of raw materials and energy, and production of wastes. The share of production volume per each site was used in the weighting.

Primary data represents the manufacturing of all through mix concrete block paving products (listed at the start of this document). The data was used to calculate average impacts for the products. The variability of the primary data or the emissions between the products did not amount to more than 10% of the relevant data (the highest compared to the lowest). The primary

data was averaged by calculating a weighed average of the products consumption of raw materials, energy and production of wastes. The production amount mass shares per each product was used in the weighting.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. Ecoinvent and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	1,12E1	4,76E-1	1,05E-1	1,18E1	2,26E0	7,83E-1	-2E0	MND	MND	MND	MND	MND	MND	0E0	5,23E-1	4,47E-1	4,43E-2	-1,46E0
GWP – fossil	kg CO_2e	1,11E1	4,75E-1	7,63E-1	1,23E1	2,28E0	1,15E-1	-2E0	MND	MND	MND	MND	MND	MND	0E0	5,23E-1	4,47E-1	4,42E-2	-1,91E0
GWP – biogenic	kg CO_2e	1,76E-1	3,44E-4	-6,6E-1	-4,83E-1	6,59E-4	6,69E-1	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	4,57E-1
GWP – LULUC	kg CO_2e	2,67E-3	1,43E-4	2,09E-3	4,91E-3	1,04E-3	1,65E-6	0E0	MND	MND	MND	MND	MND	MND	0E0	1,64E-4	3,77E-5	1,31E-5	-3,04E-3
Ozone depletion pot.	kg CFC_{-11}e	4,29E-7	1,12E-7	1,79E-7	7,2E-7	5,12E-7	8,83E-10	0E0	MND	MND	MND	MND	MND	MND	0E0	1,28E-7	9,64E-8	1,82E-8	-1,5E-7
Acidification potential	mol H^+e	3,21E-2	2E-3	4,05E-3	3,82E-2	3,95E-2	7,51E-5	0E0	MND	MND	MND	MND	MND	MND	0E0	1,68E-3	4,67E-3	4,2E-4	-1,37E-2
EP-freshwater[2)]	kg Pe	1,41E-4	3,87E-6	1,37E-5	1,58E-4	1,47E-5	8,85E-8	0E0	MND	MND	MND	MND	MND	MND	0E0	4,44E-6	1,81E-6	5,34E-7	-1,04E-4
EP-marine	kg Ne	8,53E-3	6,01E-4	1,19E-3	1,03E-2	9,73E-3	3,48E-5	0E0	MND	MND	MND	MND	MND	MND	0E0	3,69E-4	2,06E-3	1,45E-4	-2,14E-3
EP-terrestrial	mol Ne	1,03E-1	6,64E-3	1,31E-2	1,23E-1	1,08E-1	3,67E-4	0E0	MND	MND	MND	MND	MND	MND	0E0	4,11E-3	2,26E-2	1,59E-3	-2,7E-2
POCP ("smog")[3)]	kg NMVOCe	2,54E-2	2,13E-3	4,09E-3	3,17E-2	2,92E-2	9,17E-5	0E0	MND	MND	MND	MND	MND	MND	0E0	1,61E-3	6,22E-3	4,63E-4	-7,08E-3
ADP-minerals & metals[4)]	kg Sbe	5,05E-5	8,15E-6	6,41E-6	6,51E-5	2,85E-5	1,08E-7	0E0	MND	MND	MND	MND	MND	MND	0E0	9,31E-6	6,82E-7	4,04E-7	-1,01E-4
ADP-fossil resources	MJ	4,93E1	7,39E0	1,92E1	7,6E1	3,33E1	7,84E-2	0E0	MND	MND	MND	MND	MND	MND	0E0	8,49E0	6,15E0	1,24E0	-2,57E1
Water use[5)]	m^3e depr.	1,34E0	2,75E-2	1,42E-1	1,51E0	9,85E-2	-3,35E-3	0E0	MND	MND	MND	MND	MND	MND	0E0	3,16E-2	1,15E-2	5,72E-2	-1,71E0

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	3,23E0	9,31E-2	4,71E0	8,03E0	3,31E-1	1,5E-3	0E0	MND	MND	MND	MND	MND	MND	0E0	1,07E-1	3,32E-2	1E-2	-5,08E0
Renew. PER as material	MJ	0E0	0E0	6,34E0	6,34E0	0E0	-6,34E0	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	3,23E0	9,31E-2	1,11E1	1,44E1	3,31E-1	-6,34E0	0E0	MND	MND	MND	MND	MND	MND	0E0	1,07E-1	3,32E-2	1E-2	-5,08E0
Non-re. PER as energy	MJ	4,91E1	7,39E0	1,76E1	7,41E1	3,33E1	7,84E-2	0E0	MND	MND	MND	MND	MND	MND	0E0	8,49E0	6,15E0	1,24E0	-2,57E1
Non-re. PER as material	MJ	1,86E-1	0E0	1,66E0	1,85E0	0E0	-1,65E0	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	-1,86E-1	-1,4E-2	0E0

Total use of non-re. PER	MJ	4,93E1	7,39E0	1,92E1	7,6E1	3,33E1	-1,57E0	0E0	MND	MND	MND	MND	MND	MND	0E0	8,49E0	5,96E0	1,22E0	-2,57E1
Secondary materials	kg	1,48E-2	0E0	6,25E-3	2,11E-2	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Renew. secondary fuels	MJ	0E0	0E0	1,16E0	1,16E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	3,43E-1	1,54E-3	3,09E-3	3,47E-1	5,29E-3	1,15E-4	0E0	MND	MND	MND	MND	MND	MND	0E0	1,77E-3	5,43E-4	1,35E-3	-1,31E-1

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,83E-1	7,18E-3	2,08E-2	2,11E-1	3,39E-2	2,52E-3	0E0	MND	MND	MND	MND	MND	MND	0E0	8,24E-3	0E0	1,15E-3	-1,45E-1
Non-hazardous waste	kg	6,15E0	7,92E-1	5,33E-1	7,47E0	2,27E0	3,67E-1	0E0	MND	MND	MND	MND	MND	MND	0E0	9,12E-1	0E0	8,4E0	-4,06E0
Radioactive waste	kg	2,5E-4	5,07E-5	8,86E-5	3,89E-4	2,31E-4	2,95E-7	0E0	MND	MND	MND	MND	MND	MND	0E0	5,83E-5	0E0	8,18E-6	-1,3E-4

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	1,12E2	0E0	0E0
Materials for recycling	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	3,62E-1	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	4,97E0	0E0	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1,1E1	4,71E-1	7,48E-1	1,22E1	2,26E0	1,14E-1	-2E0	MND	MND	MND	MND	MND	MND	0E0	5,18E-1	4,43E-1	4,34E-2	-1,86E0
Ozone depletion Pot.	kg CFC_{-11}e	3,64E-7	8,88E-8	1,43E-7	5,96E-7	4,06E-7	7,29E-10	0E0	MND	MND	MND	MND	MND	MND	0E0	1,02E-7	7,63E-8	1,44E-8	-1,41E-7
Acidification	kg SO_2e	2,36E-2	9,67E-4	3,13E-3	2,77E-2	3,1E-2	5,06E-5	0E0	MND	MND	MND	MND	MND	MND	0E0	1,11E-3	6,59E-4	1,75E-4	-1,05E-2
Eutrophication	kg PO_4^3e	6,48E-3	1,95E-4	7,92E-4	7,47E-3	3,71E-3	6,85E-5	0E0	MND	MND	MND	MND	MND	MND	0E0	2,24E-4	1,16E-4	3,39E-5	-3,32E-3
POCP ("smog")	kg C_2H_4e	8,38E-4	6,13E-5	1,92E-4	1,09E-3	8,76E-4	1,21E-6	0E0	MND	MND	MND	MND	MND	MND	0E0	6,39E-5	6,79E-5	1,28E-5	-5,79E-4
ADP-elements	kg Sbe	5,05E-5	8,15E-6	6,41E-6	6,51E-5	2,85E-5	1,08E-7	0E0	MND	MND	MND	MND	MND	MND	0E0	9,31E-6	6,82E-7	4,04E-7	-1,01E-4
ADP-fossil	MJ	4,93E1	7,39E0	1,92E1	7,6E1	3,33E1	7,84E-2	0E0	MND	MND	MND	MND	MND	MND	0E0	8,49E0	6,15E0	1,24E0	-2,57E1

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliance with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

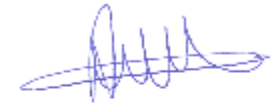
I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Elma Avdyli, as an authorized verifier acting for EPD Hub Limited
Updated 13.07.2023



CONVERSION TABLE FOR ALTERNATIVE DEPTHS

The correlation between the material and energy inputs to calculate A1-A3 numbers is linear.

Therefore, to calculate A1-A3 (GWP Total & GWP Fossil) values for profiles and / or sizes, apply the following percentages to the A1-A3 number shown within this document:

Unit depth (mm)	A1- A3		
	Conversion factor	kg CO_2e - fossil	kg CO_2e - total
35	-25.1%	10.71	9.81
50	**0.0%**	**14.30**	**13.10**
63	26.2%	18.05	16.53
65	33.9%	19.15	17.54
70	42.7%	20.41	18.69