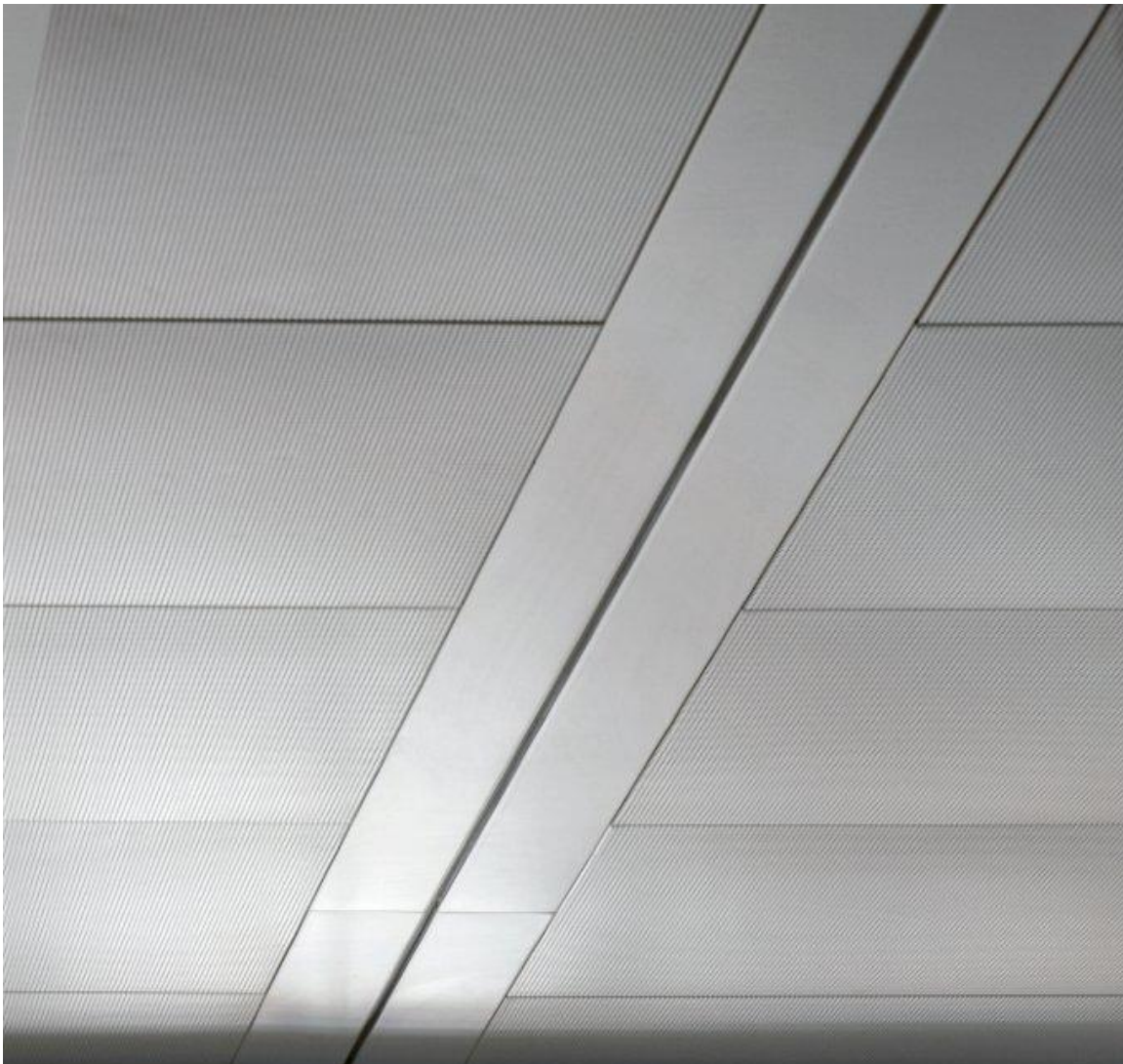


Environmental Product Declaration (EPD)

According to ISO14025, BS EN ISO 15804:2012 and International EPD System PCR 2012:01

Declaration Holder	SAS International
LCA Practitioner / Issuer	Atkins Ltd / ERM
Date of Issue	01-12-2014
Valid Until	30-11-2019

EPDs of construction products may not be comparable if they do not comply with the
BS ISO EN15804:2012 standard



Metal Ceiling System
SAS330 – Aluminum
CPC Code 42190

SAS330 – Aluminium

SAS International - Environmental Product Declarations (EPDs)

Metal Ceiling Tiles

Company: SAS International, 31
Suttons Business Park, London
Road, Reading, Berkshire, RG6
1AZ, United Kingdom

Production Site: Parc Crescent,
Waterton Industrial Estate,
Bridgend, Mid Glamorgan, CF31
3XU, United Kingdom

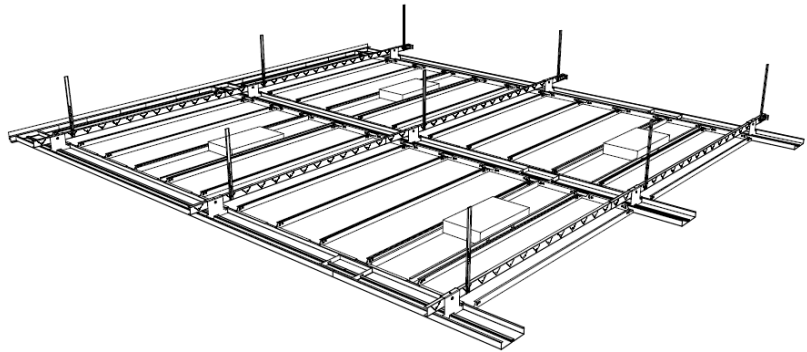
Standard: Verified EPD based on
IES PCR 2012:01

Type: Cradle-to-Gate with
Options¹

Declared Product Unit: 1 m² Metal Ceiling Tile and Grid System

Reference Service Life (RSL): 25 Years

Intended Audience: Business



SAS330 – Aluminium is a lay-in suspended aluminium ceiling system; it offers the facility to design the ceiling to any building grid size. Tiles are available in a range of shapes and sizes to meet individual project requirements. A range of acoustic backing options provide up to 49dB acoustic attenuation or Class A acoustic absorption. For further details please visit <https://sasintgroup.com/metal-ceilings/suspended-sas330/>

There are various ceiling tile sizes available; however the amount of material per square metre was determined based on the assumption of a 1200x300mm aluminium tile. A standard grid system is defined for this ceiling system; however a choice of ceiling tiles is available and as such this EPD includes LCA data on all six of the following tile options.

SAS330 – Aluminium Tile Options

- Tile 1: Plain tile.
- Tile 2: Perforated tile with acoustic fleece.
- Tile 3: Perforated tile with 18mm x 80kg/m³ acoustic pad
- Tile 4: Perforated tile with 30mm x 80kg/m³ acoustic pad
- Tile 5: Perforated tile with 30mm x 80kg/m³ acoustic pad and aluminium backing plate.
- Tile 6: Perforated tile with 18mm x 80kg/m³ acoustic pad and 12mm plasterboard.

There are a number of environmental advantages to using metal ceiling tiles; not only does it have a long RSL (meaning it doesn't have to be replaced as often as mineral wool) but it requires minimal to no maintenance throughout its RSL, can be washed in place and is almost completely recyclable at the end of life.

Declaration of Key Materials (>99% of mass):

Ceiling tile (aluminium), grid system (steel), optional backing plate (aluminium), acoustic backing (options include; plasterboard, stone wool, non-woven fabrics, polyethylene film and aluminium foil); packaging (cardboard, wood, steel strapping) and other smaller items such as (but not limited to) labels (paper), and tape buff (polyethylene).

System Weight (Including packaging): 3.94-14.48 kg/m² depending on tile option.

¹ Gate-to-Grave stages are very dependent on scenario information and where presented are intended as an illustration. These stages are better developed for specific buildings or construction projects.

LCA Scenarios & Assumptions

Product Stage (Raw Materials, Transport to Factory & Manufacturing):

These are the environmental impacts associated with raw material extraction and processing, transport of raw materials to the SAS factory (the manufacturer) and the manufacturing at the factory including energy usage and any waste streams resulting from the manufacturing process.

The majority of raw materials are sourced from the UK; however some are sourced from countries elsewhere in the European Union. These raw materials are delivered to the SAS factory in Bridgend, Wales by a combination of articulated truck and rail (Eurostar) depending on the supplier location. The Bridgend factory is split into two separate units; Unit 1 is where the tile systems are formed, including the addition of the various types of acoustic padding. Key Unit 1 processes include: slitting of the steel/aluminium coils, perforating, washing, spray coating and drying. These processes account for the most energy intensive stages of the products life cycle. Unit 2 is where the grid systems are rolled and formed; it houses less energy-intensive processes than Unit 1.

It is assumed that the gas and electricity consumption is the same for the production of all systems and that the variation in size of tile or grid has no effect; since the machines responsible for slitting, perforating and drying are either on or off and therefore will be using the same amount of energy regardless of the size of the tile or grid passing through. This same principle is applicable to the quantity of water used in the factory and the spray coating plus any resulting waste.

The pallets, crates and cartons are formed and built at the factory and are included in the LCA, along with additional packaging items such as steel strapping, interleaving paper and polyethylene film.

Construction Stage (Transport to Building Site & Installation):

As there are different tile options with varying weights that can be selected for each system, a single average weight of each system has been assumed so that the emissions can be determined using the tonne kilometre emission factors. SAS products are shipped to many different destinations but only the four most frequent shipping destinations were used in the transport model for this EPD. The four regions are assumed to be the UK, EU, Middle East and Australia. The mode of transport is assumed to be a rigid truck (>22 tonnes) and the emission factors were supplied by Defra. The weight of packaging has been taken into account when carrying out the LCA for transport to client.

Each ceiling system is carefully designed by SAS to ensure that it is a bespoke fit for each of their customers and that any resulting site waste from installation is negligible.

The product is loaded directly onto the truck from the factory and is shipped to the client by a combination of road, rail or sea.

The emissions or environmental impacts associated with the installation into the building itself are extremely small and the majority of the work is completed by hand. The installation process is outside of the influence of SAS hence installation into the building has been considered out of scope.

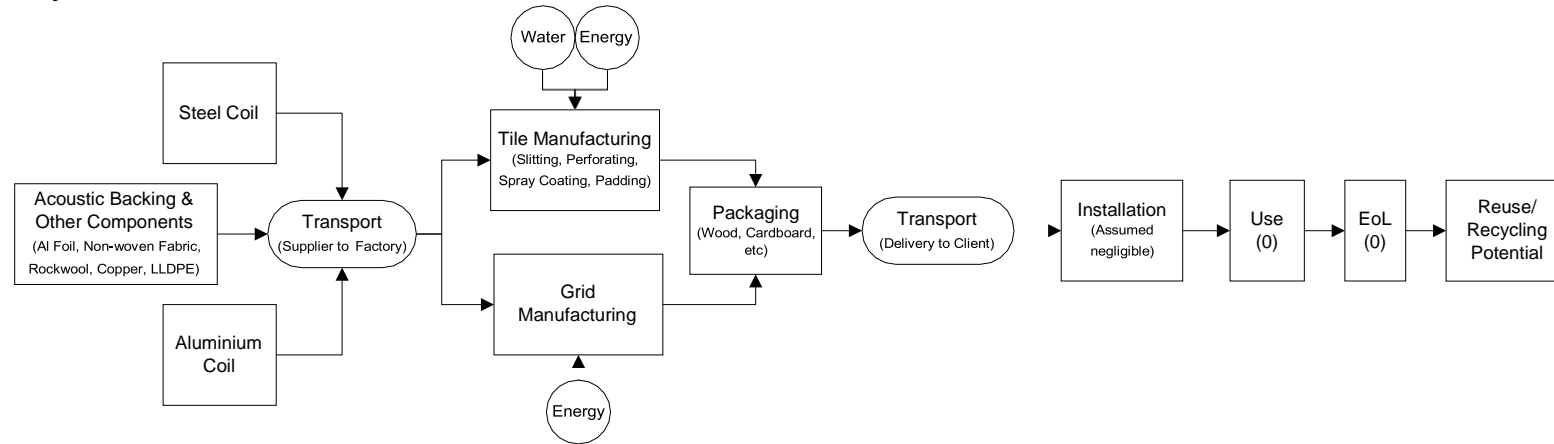
Use Stage:

The use stage accounts for the actual use or application of the installed product; maintenance; repair; replacement; refurbishment. This also takes into account any operational energy or water use throughout the operational life of the building. As this is a passive building component and has no operational requirements beyond cleaning (i.e. no electricity, gas or water) and as the ceiling tile is built from robust metal with a RSL of 25 years, it can be excluded from the LCA analysis.

End of Life Stage:

It is assumed that 100% of the product is recycled at a facility near the building site and therefore any resulting impacts from landfill, waste processing or waste transport have been considered negligible.

System Boundary Flow Chart



System Boundary – BS EN 15804 Life Cycle Stage

BS EN 15804 System Boundaries			Included in LCA	System Boundary Notes
Product Stage	Raw Material Supply	A1	✓	All raw materials analysed and included in the LCA.
	Transport	A2	✓	All transport from supplier to factory for each raw material quantified and include in the LCA.
	Manufacturing	A3	✓	All manufacturing, including energy & water consumption, quantified and included in the LCA.
Construction Process Stage	Transport	A4	✓	All transport from factory to building site for each ceiling system quantified and include in the LCA.
	Construction Installation Process	A5	✗	This has been investigated as part of the LCA and assumed negligible.
Use Stage	Use; Maintenance, Repair, Replacement, Refurbishment & Operational Energy/Water Use	B1-B7	✗	There are no environmental impacts associated with the Use Stage of this product and it is therefore not considered in the LCA results.
End-of-Life	De-construction demolition, Transport, Waste Processing & Disposal	C1-C4	✗	This was investigated in the LCA; however as <1% of the final product is sent to Landfill and recycling facilities are local to the product's point of use; this is assumed to be negligible.
Benefits & Loads Beyond the System Boundary	Reuse, Recovery or Recycling Potential	D	✓	It is assumed that >99% of the product and packaging is recycled and therefore the product has clear recycling potential.

Note: Those LCA stages marked with a cross have still been considered as part of the LCA analysis but have not been included in the LCA results due to either being negligible or out of scope.

LCA RESULTS

LCA Results – Environmental Impacts: 1 m² metal ceiling system¹

	Unit	Product Stage (A1-A3)							Construction Process Stage (A4-A5)				Use Stage	End of Life ³	
		Raw Material Supply, Manufacturing							Transport to Building Site (A4)				Installation (A5)	(B1-B7)	(C1-C4)
		Grid System ²	Tile 1	Tile 2	Tile 3	Tile 4	Tile 5	Tile 6	UK	EU	ME	Aus			
Global Warming Potential (GWP 100 years)	[kg CO ₂ -eqv.]	3.49	17.39	15.83	20.31	29.27	37.66	31.35	0.47	1.20	2.21	3.64	-	-	∞
Ozone Depletion Potential (ODP)	[kg CFC11-eqv.]	1.37E-08	3.96E-04	3.96E-04	3.96E-04	3.96E-04	3.97E-04	3.96E-04	1.63E-11	4.24E-11	2.12E-11	2.12E-11	-	-	∞
Acidification Potential (AP)	[kg SO ₂ -eqv.]	3.91E-03	3.08E-02	2.92E-02	3.43E-02	4.60E-02	5.90E-02	5.71E-02	3.61E-05	1.07E-04	4.70E-05	4.70E-05	-	-	∞
Eutrophication Potential (EP)	[kg PO ₄ -eqv.]	4.04E-04	1.63E-03	1.54E-03	1.80E-03	2.40E-03	3.06E-03	1.26E+00	8.17E-06	2.23E-05	1.07E-05	1.07E-05	-	-	∞
Photochemical Ozone Creation Potential (POCP)	[kg C ₂ H ₂ -eqv.]	1.19E-03	1.61E-03	1.52E-03	1.79E-03	2.39E-03	3.07E-03	2.41E-03	2.51E-06	7.13E-06	3.27E-06	3.27E-06	-	-	∞
Abiotic resource depletion potential (ADP elements)	[kg Sb-eqv]	3.02E-06	9.94E-09	9.79E-09	1.02E-08	1.12E-08	1.24E-08	1.88E-02	3.41E-11	8.91E-11	4.45E-11	4.45E-11	-	-	∞
Abiotic resource depletion potential (ADP fossil)	[MJ]	18.17	100.65	95.20	111.91	149.84	192.11	195.22	1.38	3.54	1.80	1.80	-	-	∞

LCA data include robust and traceable empirical measurements of raw materials, utilities, outputs and wastes for the most recent three year period. Factors for environmental impacts are derived from the EU LCA database and UK government departments. Estimated impact results are relative.

¹ The total environmental impacts are the sum of the grid system (common to all), one of tiles 1-6 and the transport destination. For example, the total GWP for Tile 3 transported to Middle East would be (3.49+20.31+2.21=) 26.01 kgCO₂e.

² For full details of the grid system please visit: <https://sasintgroup.com/metal-ceilings/suspended-sas330/>

³ For modules C1-C4, a '∞' value has been presented in the table to denote that each of the stages considered were negligible since >99% of the final product is recycled or re-used (module D).

Recycling Potential (EN BS 15804 Module D) Note: One of the main benefits of using a metal ceiling system is that the product is formed of few components and almost 100% recyclable. This means that at the end of the 25 year RSL the entire metal ceiling and grid system can be recycled; as such it is safe to assume that the entire metal weight that enters at product stage is recycled. The acoustic padding components (plasterboard, stone wool etc) can also be recycled or sent back to the supplier to be used as a secondary material.

Components for Re-Use/Materials for Recycling (A1-A3) Note: During the manufacturing stage, waste is generated from the slitting, perforating and cutting processes. All of the metal waste (steel/aluminium) at this stage is either sold back to the supplier or to another company as secondary material input to another process. The same applies to the acoustic padding components where all waste is returned to the supplier (in the case of stone wool, plasterboard etc) or recycled (in the case of plastic, cardboard etc).

LCA Results Resource Input: 1 m² metal ceiling system

	Unit	Product Stage (A1-A3)							Construction Process Stage (A4-A5)					Use Stage	End of Life
		Raw Material Supply, Manufacturing							Transport to Building Site (A4)				Installation (A5)	(B1-B7)	(C1-C4)
		Grid System	Tile 1	Tile 2	Tile 3	Tile 4	Tile 5	Tile 6	UK	EU	ME	Aus			
Primary Energy non-renewable resources	[MJ]	45.53	289.53	270.42	336.42	491.65	627.64	523.65	5.59	14.34	26.49	43.57	-	-	∞
Primary energy renewable resources	[MJ]	-	-	-	-	-	-	-	-	-	-	-	-	-	∞
Feedstock energy non-renewable	[MJ]	-	-	-	-	-	-	-	-	-	-	-	-	-	∞
Feedstock energy renewable	[MJ]	-	-	-	-	-	-	-	-	-	-	-	-	-	∞
Water utilisation	[m ³]	<0.001	0.008	0.008	0.008	0.008	0.008	0.008	-	-	-	-	-	-	∞
Secondary fuels	[MJ]	-	-	-	-	-	-	-	-	-	-	-	-	-	∞
Secondary Material	[kg]	-	-	-	-	-	-	-	-	-	-	-	-	-	∞

LCA Results Output Flows & Waste: 1 m² metal ceiling system

	Unit	Product Stage (A1-A3)	Construction Process Stage (A4-A5)				Use Stage	End of Life	Reuse, recovery or Recycling Potential ⁴
		Raw Material Supply, Manufacturing	Transport to Building Site (A4)			Installation (A5)	(B1-B7)	(C1-C4)	(D)
		1m ² Ceiling System	UK	EU	ME				
Components for re-use (metal)	[kg]	2.84	-	-	-	-	-	∞	3.10 - 5.18
Materials for recycling (non-metal)	[kg]	0.74	-	-	-	-	-	∞	0.80 - 10.15
Materials for energy recovery	[kg]	-	-	-	-	-	-	∞	-
Exported energy	[MJ]	-	-	-	-	-	-	∞	-
Hazardous waste	[kg]	0.034	-	-	-	-	-	∞	-
Non-hazardous waste	[kg]	0.106	-	-	-	-	-	∞	-
Radioactive waste	[kg]	-	-	-	-	-	-	∞	-

⁴ Due to the residual value of the metal and the recyclable content of the acoustic backing components & packaging, it is assumed that >99% of the product is re-used or recycled at the EoL.

About SAS:

SAS International is a leading British manufacturer of quality metal ceilings and bespoke architectural metalwork. Installed in iconic, landmark buildings worldwide, SAS leads through innovation, cutting-edge design and technical acoustic expertise. Success is built on continued investment in manufacturing and achieving value for their clients through world-class engineered solutions.

Sustainability at SAS:

SAS International manufactures a broad range of durable, sustainable and aesthetic products, meeting design, performance and integration requirements. All our state-of-the-art factories are ISO 9001, 14001 and OHSAS 18001 accredited. With total control of the production process we maintain product quality and ensure maximum value.

Our continuous investment in manufacturing facilities and technology enables us to stay ahead in the marketplace, and provide a tailored and quick response for a global market.

As a business we have taken the strategic decision to focus on metal products to achieve the highest performance, long term value and sustainability demanded today.

Through better design, responsible sourcing of materials and innovative manufacturing techniques, we are able to provide our clients with solutions provide many benefits over comparable materials during the lifecycle of a product. Steel is a unique product in recycling terms – its properties remain unchanged no matter how many times it is recycled. The use of steel in construction sets the standard in the reduction of waste.

Demonstration of verification:

CEN Standard EN15804 serves as the core PCR IES PCR 2012:01 is the specific PCR	The EPD Programme is the International EPD System (environdec.com)
Independent verification of the declaration, according to EN ISO 14025:2010 internal <input type="checkbox"/> external <input checked="" type="checkbox"/>	Registration Number: S-P-00625 Global Validity
Third party verifier: Gavin Bollan, Environmental Resources Management Ltd	PCR Review conducted by the Technical Committee of the International EPD System. Chair: Massimo Marino. Contact via info@environdec.com

EPD Issuer:

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