Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Structura System – beams and plates

from

Scaffsystem

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General information

Programme information

Programme:	The International EPD® System
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): construction products version 2019:14, version 1.11
PCR review was conducted by: Martin Erlandsson, IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: RINA Services S.p.a. – Via Corsica 12, I – 16128 Genova (Italia) Tel: +39.010.53851 – Fax: +39.010.5351000 – www.rina.org *In case of accredited certification bodies:* Accredited by: *Accredia n° 001H* *In case of recognised individual verifiers:* Approved by: The International EPD® System
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EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

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Scaffsystem srl:
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Description of the organisation:

Scaffsystem is an industrial company born in Ostuni in 1957, which rapidly become one of the most important players on the national and international market for production of steel solutions for logistics and architecture. The technical department meets the needs of designers and clients on a daily basis offering effective and cutting-edge solutions for logistics and construction applications in terms of technical characteristics and value-for-money.

Architecture Division

The Architecture division deals with structural steel solutions for industrial and residential architecture. The overall lightness of construction, the speed of assembly, the modularity and the seismic safety are the innovative values of the construction system developed by Scaffsystem. Among the most innovative projects for residential architecture stands out Mechano Steel Frame, where Scaffsystem's steel structures are combined with building envelope systems.

Logistics Division

The Logistics Division offers to their clients solutions for space optimisation in warehouses and for a better management of the flows of goods in the storage. It offers different solutions based on the company's core business: industrial metal shelving, mezzanines, cantilever systems for storing bulky materials, automated warehouses and self-supporting structures for warehouses with a high volume of goods to be stored.

Design Division

The design division of Scaffsystem is represented by "Officine Tamborrino" brand through which the company expresses an unique aesthetical and design sensibility, highlighting the know-how in the processing of steel that in this area acquires handcrafted connotations characterized by simplicity and linearity typical of the Italian design since ‘50s. Design and elements of industrial architecture are mixed together creating unique and refined collections praised for their dynamic and innovative ways of designing and producing metal objects.

Quality and safety:

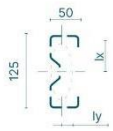
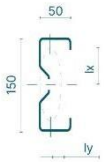
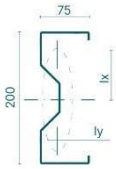
Scaffsystem pursues its high standard production internal goals for the testing, inspection, and certification of its own quality management system in compliance with ISO 9001 and its own production process according to EN 1090-1. Moreover, Scaffsystem works with scientific laboratories specialised in testing construction materials for stress tests, resilience tests on steels to guarantee that all structures are always providing safety and high-quality performances at the maximum extent. Internal quality standards imply the use of steels with special protection coatings, every time that increased resistance to corrosion is required for constructions. As to anti-seismic design, Scaffsystem provides several solutions for residential housing and industrial buildings designed in compliance with the most up-to-date anti-seismic criteria and legislation. The technical department focuses on the fittest solutions to guarantee mechanical joints capable of facing seismic loads as far as structural connections are concerned: between vertical and horizontal components, cladding and beams, side cladding and load-bearing structure, foundations.

Name and location of production site:
The production site is based in Ostuni (Brindisi), Italy.

Product information

Product name:
Structura system

Product identification:
The products covered in the present EPD are load-bearing beam Sigma sections (sigma 125, 150, 200, 255, 300 and 400) and plates of the Structura system.
The sigma beams are steel sections drilled at a pitch of 25/50 mm with a thickness ranging from 3 to 4 mm. The code number after the name (i.e. 255) identifies the height of the profile expressed in mm.
The beams can be made with double-sided hot dip galvanised coated steel - consisting of steel substrate with a metallic pure zinc coating applied by means of a continuous hot dip galvanising process – or hot-rolled steel with an epoxy coating for preserving the products from corrosion.
The technical characteristics of the Sigma beams are presented in Figure 1.

SCHEMA TRAVE/BEAM SECTION							
Tipo/Type		Sigma 125	Sigma 125	Sigma 150	Sigma 150	Sigma 200	Sigma 200
Spessore/Thickness	mm	3	4	3	4	3	4
Base/Base	mm	50	50	50	50	75	75
Altezza/Height	mm	125	125	150	150	200	200
Peso teorico/Weight	Kg/mt	5,2	6,9	5,9	7,8	8,4	11,1
Wx - x /Wx - x	cm^3	22,52	28,92	30,00	38,88	50,94	77,48
Jx/Jx	cm^4	140,30	180,78	225,03	291,66	599,39	774,78
Area/Surface	cm^2	6,063	7,95	6,82	8,97	10,50	13,80

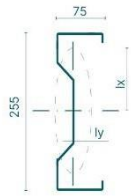
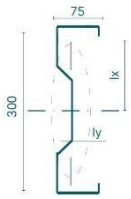
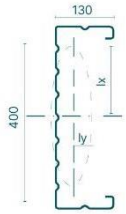
SCHEMA TRAVE/BEAM SECTION							
Tipo/Type		Sigma 255	Sigma 255	Sigma 300	Sigma 300	Mensola 400	Mensola 400
Spessore/Thickness	mm	3	4	3	4	3	4
Base/Base	mm	75	75	75	75	130	130
Altezza/Height	mm	255	255	300	300	400	400
Peso teorico/Weight	Kg/mt	9,3	12,2	10,3	13,5	16,7	22,2
Wx - x /Wx - x	cm^3	89,03	116,65	113,21	148,61	270,77	372,07
Jx/Jx	cm^4	1135,16	1487,25	1698,16	2229,12	5415,24	7441,46
Area/Surface	cm^2	10,58	13,96	11,91	15,76	22,22	31,53

Figure 1: Technical characteristics of the Sigma beams

The various structural vertical and horizontal elements (beams) are joined together using pressed and/or press-bent plates with a thickness ranging from 3 to 8 mm by means of bolts (structural bolts M10 - M12). The bolts used to join the various elements (beams and plates) are out of the scope of the present EPD.
The design of the plates is represented in Figure 2, whereas a model of a building structure with Structura system is illustrated in Figure 3.

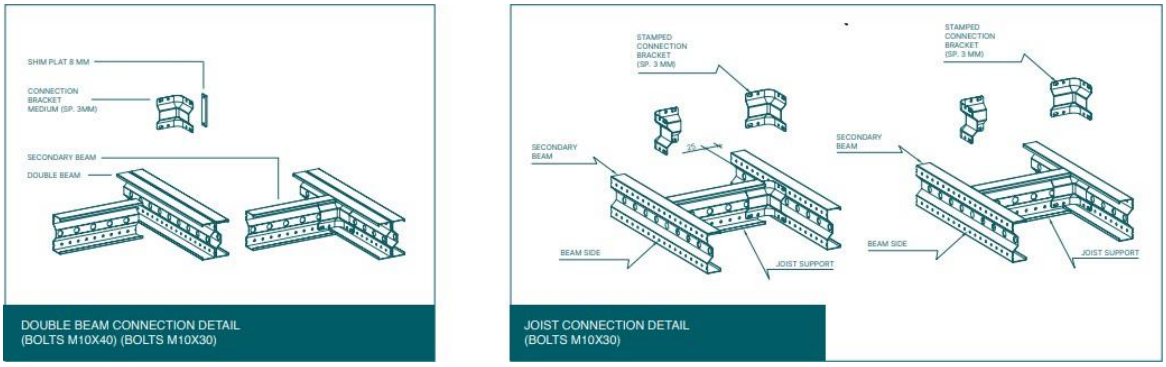


Figure 2: Details of the design of a plate

Product-specific technical requirements regarding mechanical and other properties arise from national and/or international standards, such as CNR UNI 10011/97, CNR UNI 10022/84, EN 10204/10149, UNI EN 10025 and UNI EN 1179 (for the zinc coating).

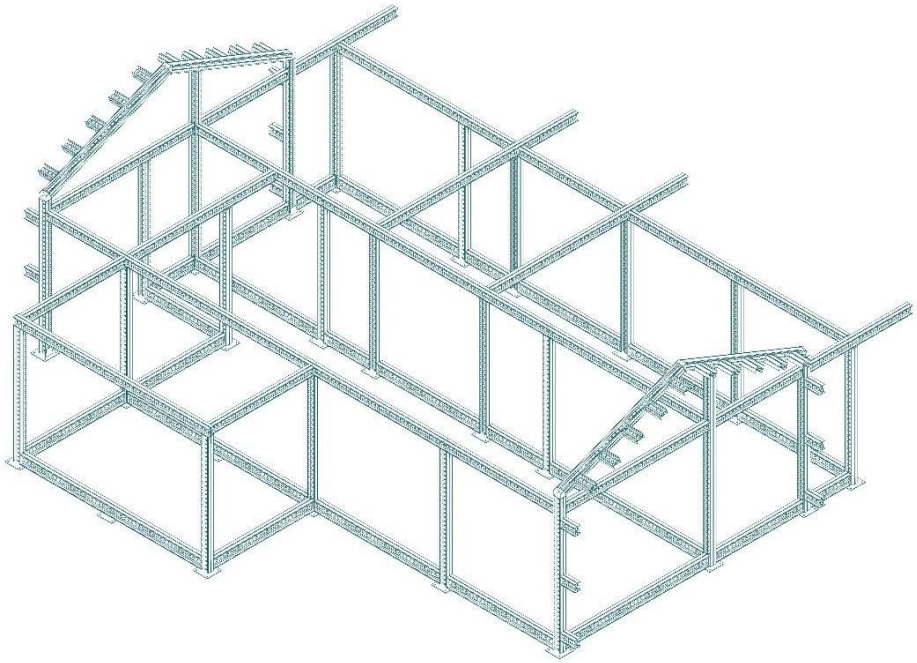


Figure 3: Model of a structure made with Structura system

Product description:

The use of steel in construction has been associated with large infrastructure projects for a long time, but with new technologies and new construction methods, steel architecture is no longer the exclusive prerogative of industrial buildings.

An increasing number of engineers and designers are using steel constructions more and more often. These works are aimed at resizing and reshaping the urban context or designed in response to the new needs in the residential and industrial sectors.

In this context the Structura system was conceived, a construction system developed by Scaffsystem to support architects, engineers and technicians in designing new building structures. It consists of

structural steel solutions and a range of modular and flexible ideas, based on the use of light sections and cold forming steel.

Structura system allows cost-effective and fast construction of mezzanines, canopies, industrial buildings, bungalow, residential buildings and special projects such as roof-truss, booths and similar installations. Moreover, Structura can be used for designing complex structures in the field of structural consolidation and seismic adaptation.
Through this construction method, steel, thanks to its structural and technological features, can be combined with a series of complementary materials to offer a customisable building product with high acoustic, thermal, fireproof and functional and energetic performances.
This innovative construction method allows users to go beyond the traditional carpentry profiles and the traditional construction concrete-based techniques, as it is focused on a very simple mechanical process: all the components are produced off-site, while on site you only need to assemble them, according to the architectural-technological design.
Beams and plates are then joined mechanically together, generally by screwing or by bolting – in case of structures- and their on-site installation does not have to be subject to any weather conditions.

The main advantages of this construction technique compared with the traditional ones are:

- Modular structure to meet the widest possible range of customer requirements, to adapt to anyenvironment and to prepare for possible extensions.
- Fully bolted and always accompanied by a detailed assembly scheme in order to make the assembly on site simple and intuitive.
- Easy assembly and disassembly which means considerable savings in construction and management time, even for extraordinary maintenance or temporary installations.
- Structural lightness, the cold-formed, pre-drilled profiles make our structure seismically efficient a lighter from 20% to 30% than traditional carpentry.
- Architectural quality compared to traditional carpentry, which makes the product suitable for residential and commercial applications:
- The drilling of the beams allows the maximum integration with the installations and, in the event of relocation, total re-adaptability thanks to the constant drilling pitch.
- Certification: the structures are always calculated in accordance with current regulations and are accompanied by a calculation report and CE certificate (1090 - EXC3).
- Circularity steel itself can be recycled without weaking their properties. In addition, the design of Structura system guarantees the total reuse of the structures even in new and different configurations.

Figure 4: Installation of the Structura system

More information and video of the Structura system are available on Scaffsystem's youtube channel
UN CPC code:
The reference CPC code of the analysed products is 421 "Structural metal products and parts thereof".

LCA information

Declared unit: 1 kg of Structura beam (hot-dip galvanised or painted) and its primary packaging; 1 kg of painted plate -
The environmental profiles of the different beam sections can be calculated using the conversion kg/m reported in Figure 1, whereas for plates the following conversion factors can be applied:

Product	Conversion	Unit
Plate – 3 mm thickness	20,5	kg/m^2
Plate – 4 mm thickness	26,1	kg/m^2
Plate – 5 mm thickness	31,5	kg/m^2
Plate – 6 mm thickness	32,4	kg/m^2
Plate – 8 mm thickness	39,7	kg/m^2

Time representativeness: the reference year for the LCA calculation is 2021
Database(s) and LCA software used: SimaPro and Ecoinvent 3.8
Description of system boundaries:
The system boundaries are cradle to gate with options, modules C1–C4, module D and with A4 as optional module. Modules A5 and B1 to B7 are excluded as they are strongly dependent on the specific application case.

The following stages are included in the study:

- **Raw Materials supply (A1).** Production of raw materials used in the products as well as the production of energy carriers used in the production process.
- **Transport to the factory (A2).** Transport to the factory of raw materials, packaging materials and ancillary
- **Manufacturing of the Structura beams and plates (A3**), as represented in figure 5, figure 6 and figure 7.

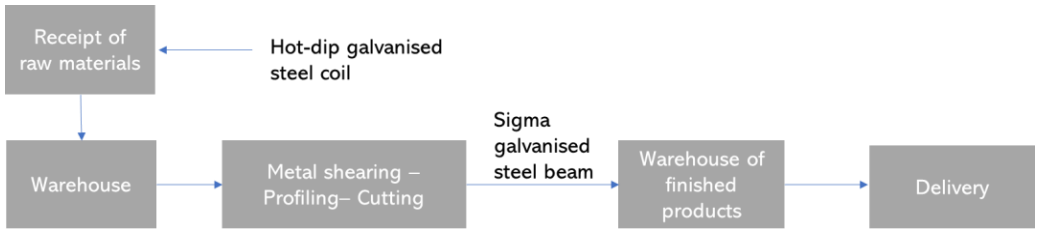


Figure 5: Process layout for the manufacturing of Sigma galvanised steel beam in Scaffsystem plant.

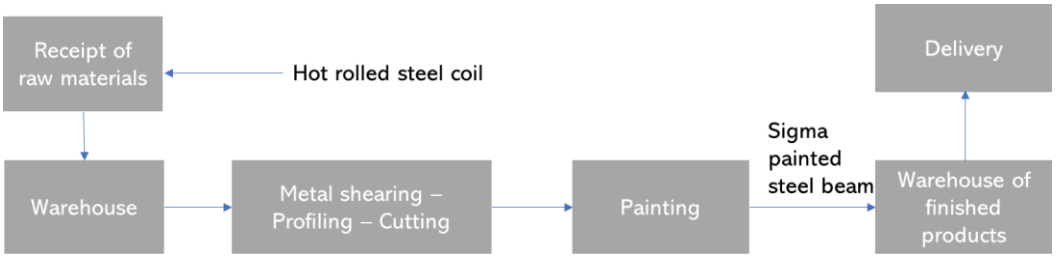


Figure 6: Process layout for the manufacturing of Sigma painted steel beam in Scaffsystem plant.

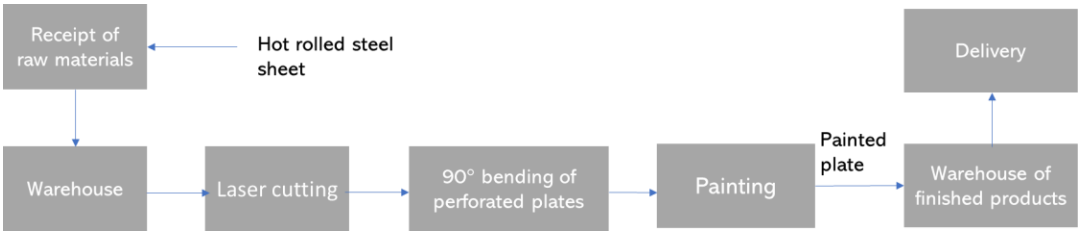
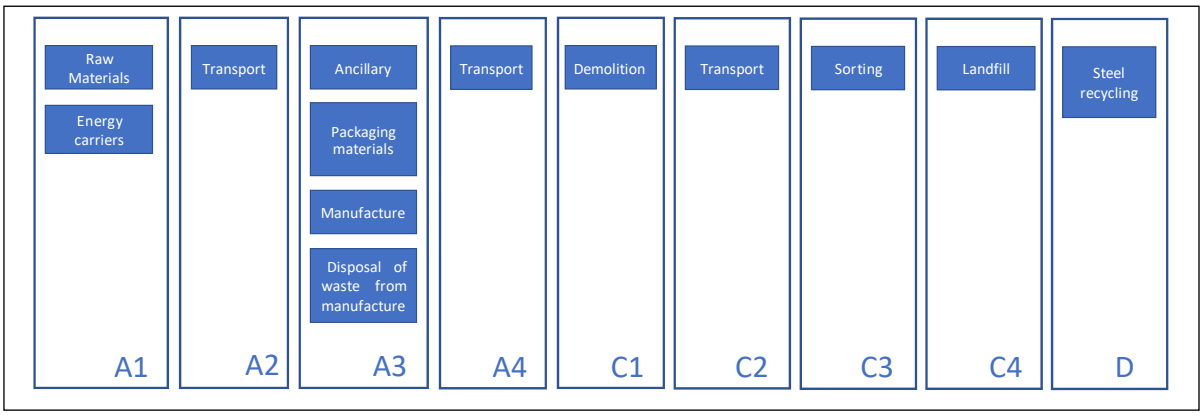


Figure 7: Process layout for the manufacturing of Sigma painted plate in Scaffsystem plant.

Module A3 also includes the production of primary packaging and of the ancillary materials and the treatment of waste generated from the manufacturing processes are accounted for.

- **Transport to the clients(A4)**
- **Demolition/Deconstruction (C1)**
- **Transport from collection to waste processing and disposal site (C2)**
- **Waste processing (C3):** sorting of the steel scraps before recycling
- **Disposal (C4):** landfill of the unrecovered fraction of waste (2% of the product mass)
- **Module D**: load and benefit due to recycling of steel (98% of the product mass)

System diagram:



Data quality:

Specific data used for the manufacturing phase are based on the production year 2021. All background data used in the study are from LCI database and are not older than 5 years. With specific reference to the electricity used in the manufacturing processes, the electricity mix of the specific electricity residual is used.

Allocation:
The allocation is made in accordance with the provisions of EN 15804. The ancillary products and waste generated in all the processes performed in the Scaffsystem plant have been allocated to the overall production based on mass.

Cut-offs criteria and main assumption
The construction of the manufacturing site (capital goods) is not included in the study as well as the external transport of the steel profile for galvanisation.
For the majority of the raw materials as well as for the packaging of the finished products a European production is considered. The transport by truck of raw materials is assumed to be performed with a Transport, freight, lorry > 32 metric ton, EURO5 (RER) | transport, freight, lorry > 32 metric ton, EURO5 | Cut-off, S with an utilisation ratio of 64%.

Scenarios for optional modules
For module A4, specific distance to Scaffsystem's clients referred to 2021 have been used. For road transport a Transport, freight, lorry > 32 metric ton, EURO5 (RER) | transport, freight, lorry > 32 metric ton, EURO5 | Cut-off, S has been considered, whereas for sea transport a Container ship ocean l, 27,500 dwt payload capacity has been assumed.
As the products are design for easy disassembly, a collection rate of 98% has been assumed at the construction site, then after a sorting process, steel is sent to recycling. For the demolition process a diesel consumption of 0,6269 MJ/kg is considered.

LCA practitioners
This EPD and the supporting LCA study has been performed by:

Forethinking Srl Società Benefit

fore_thinking
CIRCULAR STRATEGIES

www.forethinking.com

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

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU-28	Eu-28	IT	EU-28	ND	ND	ND	ND	ND	ND	ND	ND	EU-28	EU-28	EU-28	EU-28	EU-28
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10% for Sigma painted steel plates																

Content information

Sigma galvanised steel beam

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Hot-dip galvanised steel	1	-	-
TOTAL	1	-	-
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
PET strip	7,48E-06	< 1%	
Steel strip	3,79E-04	< 1%	
Cardboard	3,41E-04	< 1%	
LD-PE film	8,60E-04	< 1%	
Wood	4,86E-03	< 1%	
TOTAL	6,45E-03	< 1%	

Sigma painted steel beam

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Hot- rolled steel	1	-	-
Epoxy paint	0,0003	-	-
TOTAL	1		
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
PET strip	7,48E-06	< 1%	
Steel strip	3,79E-04	< 1%	
Cardboard	3,41E-04	< 1%	
LD-PE film	8,60E-04	< 1%	
Wood	4,86E-03	< 1%	
TOTAL	6,45E-03	< 1%	

Sigma painted and galvanised steel plate

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Hot- rolled steel	1	-	-
Epoxy paint	0,027	-	-

TOTAL	1

Packaging materials	Weight, kg	Weight-% (versus the product)
PET strip	7,48E-06	< 1%
Steel strip	3,79E-04	< 1%
Cardboard	3,41E-04	< 1%
LD-PE film	8,60E-04	< 1%
Wood	4,86E-03	< 1%
TOTAL	6,45E-03	< 1%

The content of substances included in the Candidate List of Substances of Very High Concern (SVHC) in the products does not exceed 0.1 % of their weights.

Environmental Information

Sigma galvanised steel beam

Potential environmental impact – mandatory indicators according to EN 15804

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO2 eq.	2,38E+00	4,30E-02	5,76E-02	4,54E-03	2,45E-02	1,05E-04	-4,72E-01
GWP-biogenic	kg CO2 eq.	2,15E-02	4,37E-05	2,16E-05	4,62E-06	-4,20E-04	1,14E-07	4,19E-03
GWP-luluc	kg CO2 eq.	1,97E-03	1,55E-05	5,74E-06	1,63E-06	4,67E-05	9,95E-08	6,13E-05
GWP-total	kg CO2 eq.	2,40E+00	4,31E-02	5,76E-02	4,54E-03	2,41E-02	1,06E-04	-4,68E- 01
ODP	kg CFC-11 eq.	1,90E-07	1,03E-08	1,23E-08	1,08E-09	3,25E-09	4,26E-11	-1,60E-08
AP	mol H+ eq.	5,50E-02	1,83E-04	5,98E-04	1,89E-05	2,91E-04	9,90E-07	-1,41E-03
EP-freshwater	kg P eq	1,19E-03	2,67E-06	1,78E-06	2,83E-07	1,55E-05	9,64E-09	-2,06E-04
EP-marine	kg N eq.	3,77E-03	5,56E-05	2,65E-04	5,78E-06	6,60E-05	3,44E-07	-3,68E-04
EP-terrestrial	mol N eq.	2,24E-01	6,08E-04	2,90E-03	6,32E-05	7,40E-04	3,77E-06	-4,00E-03
POCP	Kg NMVOC eq.	1,07E-02	1,95E-04	7,98E-04	2,03E-05	2,04E-04	1,10E-06	-2,60E-03
ADPE	kg Sb eq.	1,48E-04	9,85E-08	2,96E-08	1,04E-08	2,90E-06	2,40E-10	1,01E-06
ADPF	MJ	2,90E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	2,94E-03	-3,73E+00
WDP	m3 world eq. deprived	1,17E+00	2,30E-03	1,24E-03	2,43E-04	4,46E-03	1,32E-04	-3,59E-02
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

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

Potential environmental impact – additional mandatory and voluntary indicators

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	2,31E+00	4,27E-02	5,70E-02	4,50E-03	2,42E-02	1,04E-04	-4,46E-01
PM	Disease incidence	5,94E-07	5,05E-09	1,60E-08	5,34E-10	3,91E-09	1,99E-11	-2,49E-08
IRP	kBqU235 eq.	2,10E-01	3,39E-03	3,56E-03	3,58E-04	3,47E-03	1,31E-05	3,54E-02
ETP-fw	CT Ue	1,09E+02	5,23E-01	4,62E-01	5,52E-02	1,24E+00	1,86E-03	-1,46E+01
HTP-c	CT Uh	2,38E-08	1,45E-11	1,79E-11	1,53E-12	4,18E-11	4,71E-14	6,70E-09
HTP-nc	CT Uh	9,00E-08	5,72E-10	3,35E-10	6,05E-11	1,83E-09	1,22E-12	-8,58E-09
SQP	dimensionles	8,40E+00	7,65E-01	1,01E-01	8,09E-02	6,24E-01	6,17E-03	-4,92E-01

Acronyms PM= Particulate Matter emissions; IRP= Ionizing radiation, human health; ETP-fw= Eco-toxicity – freshwater; HTP- c= Human toxicity, cancer effect; HTP-nc= Human toxicity, non-cancer effects; SQP= Land use related impacts/Soil quality;

Sigma painted steel beam

Potential environmental impact – mandatory indicators according to EN 15804

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO2 eq.	2,75E+00	4,30E-02	5,76E-02	4,54E-03	2,45E-02	5,16E-03	-4,72E-01
GWP-biogenic	kg CO2 eq.	1,17E-02	4,37E-05	2,16E-05	4,62E-06	-4,20E-04	5,60E-06	4,19E-03
GWP-luluc	kg CO2 eq.	1,07E-03	1,55E-05	5,74E-06	1,63E-06	4,67E-05	4,87E-06	6,13E-05
GWP-total	kg CO2 eq.	2,76E+00	4,31E-02	5,76E-02	4,54E-03	2,41E-02	5,17E-03	-4,68E-01
ODP	kg CFC-11 eq.	2,81E-07	1,03E-08	1,23E-08	1,08E-09	3,25E-09	2,09E-09	-1,60E-08

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

AP	mol H+ eq.	1,01E-02	1,83E-04	5,98E-04	1,89E-05	2,91E-04	4,85E-05	-1,41E-03
EP-freshwater	kg P eq	9,04E-04	2,67E-06	1,78E-06	2,83E-07	1,55E-05	4,72E-07	-2,06E-04
EP-marine	kg N eq.	2,30E-03	5,56E-05	2,65E-04	5,78E-06	6,60E-05	1,69E-05	-3,68E-04
EP-terrestrial	mol N eq.	2,43E-02	6,08E-04	2,90E-03	6,32E-05	7,40E-04	1,85E-04	-4,00E-03
POCP	Kg NMVOC eq.	1,07E-02	1,95E-04	7,98E-04	2,03E-05	2,04E-04	5,37E-05	-2,60E-03
ADPE	kg Sb eq.	6,35E-06	9,85E-08	2,96E-08	1,04E-08	2,90E-06	1,18E-08	1,01E-06
ADPF	MJ	3,40E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	1,44E-01	-3,73E+00
WDP	m3 world eq. deprived	9,64E-01	2,30E-03	1,24E-03	2,43E-04	4,46E-03	6,49E-03	-3,59E-02
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP- luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance;POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non- fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

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

Potential environmental impact – additional mandatory and voluntary indicators

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[2]	kg CO_2 eq.	2,67E+00	4,27E-02	5,70E-02	4,50E-03	2,42E-02	5,07E-03	-4,46E-01
PM	Disease incidence	1,53E-07	5,05E-09	1,60E-08	5,34E-10	3,91E-09	9,77E-10	-2,49E-08
IRP	kBq U235 eq.	1,49E-01	3,39E-03	3,56E-03	3,58E-04	3,47E-03	6,40E-04	3,54E-02
ETP-fw	CTUe	5,42E+01	5,23E-01	4,62E-01	5,52E-02	1,24E+00	9,10E-02	-1,46E+01
HTP-c	CTUh	2,27E-08	1,45E-11	1,79E-11	1,53E-12	4,18E-11	2,31E-12	6,70E-09
HTP-nc	CTUh	4,34E-08	5,72E-10	3,35E-10	6,05E-11	1,83E-09	5,99E-11	-8,58E-09

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

SQP	dimensionless	7,63E+00	7,65E-01	1,01E-01	8,09E-02	6,24E-01	3,03E-01	-4,92E-01

Acronyms: PM= Particulate Matter emissions; IRP= Ionizing radiation, human health; ETP-fw= Eco-toxicity – freshwater; HTP- c= Human toxicity, cancer effect; HTP-nc= Human toxicity, non-cancer effects; SQP= Land use related impacts/Soil quality;

Sigma painted and galvanised steel plate

Potential environmental impact – mandatory indicators according to EN 15804

Results per functional or declared unit

Indicator	Unit	Tot.A1-A3	A4	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq.	2,83E+00	4,30E-02	5,76E-02	4,54E-03	2,45E-02	5,16E-03	-3,10E-01
GWP-biogenic	kg CO2 eq.	2,06E-02	4,37E-05	2,16E-05	4,62E-06	-4,20E-04	5,60E-06	2,75E-03
GWP-luluc	kg CO2 eq.	1,10E-03	1,55E-05	5,74E-06	1,63E-06	4,67E-05	4,87E-06	4,03E-05
GWP-total	kg CO2 eq.	2,85E+00	4,31E-02	5,76E-02	4,54E-03	2,41E-02	5,17E-03	-3,07E-01
ODP	kg CFC-11 eq.	2,97E-07	1,03E-08	1,23E-08	1,08E-09	3,25E-09	2,09E-09	-1,05E-08
AP	mol H+ eq.	1,05E-02	1,83E-04	5,98E-04	1,89E-05	2,91E-04	4,85E-05	-9,30E-04
EP-freshwater	kg P eq	9,00E-04	2,67E-06	1,78E-06	2,83E-07	1,55E-05	4,72E-07	-1,36E-04
EP-marine	kg N eq.	2,34E-03	5,56E-05	2,65E-04	5,78E-06	6,60E-05	1,69E-05	-2,42E-04
EP-terrestrial	mol N eq.	2,47E-02	6,08E-04	2,90E-03	6,32E-05	7,40E-04	1,85E-04	-2,63E-03
POCP	Kg NMVOC eq.	1,05E-02	1,95E-04	7,98E-04	2,03E-05	2,04E-04	5,37E-05	-1,71E-03
ADPE	kg Sb eq.	7,67E-06	9,85E-08	2,96E-08	1,04E-08	2,90E-06	1,18E-08	6,62E-07
ADPF	MJ	3,56E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	1,44E-01	-2,45E+00
WDP	m3 world eq. eprived	1,12E+00	2,30E-03	1,24E-03	2,43E-04	4,46E-03	6,49E-03	-2,36E-02

Acronyms: GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP- luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance;POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

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

Potential environmental impact – additional mandatory and voluntary indicators

Results per functional or declared unit

Indicator	Unit	Tot.A1-A3	A4	C1	C2	C3	C4	D
GWP-GHG3	kg CO_2 eq.	2,75E+00	4,27E-02	5,70E-02	4,50E-03	2,42E-02	5,07E-03	-2,93E-01
PM	Disease incidence	1,58E-07	5,05E-09	1,60E-08	5,34E-10	3,91E-09	9,77E-10	-1,64E-08
IRP	kBq U235 eq.	1,75E-01	3,39E-03	3,56E-03	3,58E-04	3,47E-03	6,40E-04	2,32E-02
ETP-fw	CTUe	5,41E+01	5,23E-01	4,62E-01	5,52E-02	1,24E+00	9,10E-02	-9,62E+00
HTP-c	CTUh	3,04E-08	1,45E-11	1,79E-11	1,53E-12	4,18E-11	2,31E-12	4,40E-09
HTP-nc	CTUh	4,48E-08	5,72E-10	3,35E-10	6,05E-11	1,83E-09	5,99E-11	-5,64E-09
SQP	dimensionless	8,11E+00	7,65E-01	1,01E-01	8,09E-02	6,24E-01	3,03E-01	-3,23E-01
Acronyms	PM= Particulate Matter emissions; IRP= Ionizing radiation, human health; ETP-fw= Eco-toxicity – freshwater; HTP-c= Human toxicity, cancer effect; HTP-nc= Human toxicity, non-cancer effects; SQP= Land use related impacts/Soil quality;							

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

Sigma galvanised steel beam

Use of resources

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,60E+00	8,52E-03	4,44E-03	9,00E-04	5,25E-02	1,23E-03	1,26E-01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,60E+00	8,52E-03	4,44E-03	9,00E-04	5,25E-02	1,23E-03	1,26E-01
PENRE	MJ	3,56E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	1,44E-01	-2,45E+00
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	3,56E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	1,44E-01	-2,45E+00
SM	kg	4,39E-01	0,00E+00	4,39E-01	1,00E+00	2,70E-02	2,00E+00	2,48E-01
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	1,39E-01	3,21E-04	2,42E-04	3,39E-05	8,94E-04	3,93E-06	8,43E-03
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water							

Sigma painted steel beam

Use of resources

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,91E+00	8,52E-03	4,44E-03	9,00E-04	5,25E-02	2,51E-05	1,26E-01
PERM	MJ	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00
PERT	MJ	2,91E+00	8,52E-03	4,44E-03	9,00E-04	5,25E-02	2,51E-05	1,26E-01
PENRE	MJ	3,21E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	2,94E-03	-2,45E+00

PENRM	MJ	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00
PENRT	MJ	3,21E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	2,94E-03	-2,45E+00
SM	kg	4,39E-01	0,00E+00	0,00E+00	1,00E+00	0,00E+00	2,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	9,26E-02	2,97E-04	2,28E-04	3,14E-05	8,14E-04	1,89E-04	7,71E-03
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water							

Sigma painted steel plate

Use of resources

Results per functional or declared unit

Indicator	Unit	Tot.A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	2,02E+00	8,52E-03	4,44E-03	9,00E-04	5,25E-02	1,23E-03	1,92E-01
PERM	MJ	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00
PERT	MJ	2,02E+00	8,52E-03	4,44E-03	9,00E-04	5,25E-02	1,23E-03	1,92E-01
PENRE	MJ	3,40E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	1,44E-01	-3,73E+00
PENRM	MJ	0,00E+00	1,00E+00	2,00E+00	3,00E+00	4,00E+00	5,00E+00	6,00E+00
PENRT	MJ	3,40E+01	6,70E-01	7,90E-01	7,07E-02	3,38E-01	1,44E-01	-3,73E+00
SM	kg	5,97E-01	0,00E+00	9,48E-03	1,00E+00	8,63E-02	2,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	1,13E-01	2,99E-04	2,28E-04	3,15E-05	8,15E-04	1,89E-04	5,07E-03

Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Sigma galvanised steel beam

Waste production and output flows

Waste production

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	9,73E-04	1,62E-06	2,16E-06	1,71E-07	9,74E-07	4,45E-09	-6,27E-05
Non-hazardous waste disposed	kg	5,92E-01	6,26E-02	1,07E-03	6,62E-03	1,04E-02	2,00E-02	6,55E-02
Radioactive waste disposed	kg	8,35E-05	4,54E-06	5,45E-06	4,79E-07	1,99E-06	1,93E-08	7,00E-06

Output flows

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,80E-01[4]
Material for recycling	kg	6,63E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,80E-01
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	6,66E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

[4] Potential value estimated considering the characteristics of the analysed products. It is not based on real data.

Sigma painted steel beam

Waste production and output flows

Waste production

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1,69E-04	1,62E-06	2,16E-06	1,71E-07	9,74E-07	2,18E-07	-6,27E-05
Non-hazardous waste disposed	kg	5,79E-01	6,26E-02	1,07E-03	6,62E-03	1,04E-02	9,80E-01	6,55E-02
Radioactive waste disposed	kg	6,52E-05	4,54E-06	5,45E-06	4,79E-07	1,99E-06	9,45E-07	7,00E-06

Output flows

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,80E-01[5]
Material for recycling	kg	6,63E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,80E-01
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	6,66E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

[5] Potential value estimated considering the characteristics of the analysed products. It is not based on real data.

Sigma painted steel plate

Waste production and output flows

Waste production

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1,62E-04	1,62E-06	2,16E-06	1,71E-07	9,74E-07	2,18E-07	-4,12E-05
Non-hazardous waste disposed	kg	6,51E-01	6,26E-02	1,07E-03	6,62E-03	1,04E-02	9,80E-01	4,30E-02
Radioactive waste disposed	kg	7,18E-05	4,54E-06	5,45E-06	4,79E-07	1,99E-06	9,45E-07	4,60E-06

Output flows

Results per functional or declared unit								
Indicator	**Unit**	**Tot.A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,80E-01[6]
Material for recycling	kg	6,63E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,80E-01
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	6,66E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Sigma steel beam and plate

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in packaging	kg C	2,26E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

[6] Potential value estimated considering the characteristics of the analysed products. It is not based on real data.

Additional information

Steel is 100% recyclable and it can be recycled without loss of properties or performance. Moreover, the Structura system is conceived to limit the construction waste generating during the dismantling of the structure, therefore it can be potentially reused and readapted to a new location and use.

Differences versus previous versions

The impact of galvanised beams dropped from 2.92 kgCO_2e/kg to 2.40 kg CO_2e/kg, while that of painted plates fell from 3.53 to 2.85% thanks to a greater supply from second melting steelworks (for coil from 36% to 53%, for plates from 42% to 68%).

The percentage variation of the environmental impacts has not been analyzed as the database used has been modified.

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