Profiloversigt

Følgende profiler fra Knauf er omfattet af den efterfølgende Environmental Product Declaration (EPD).

Article name	Weight	Unit
TSK-2 70	2,57	kg/m
TSK-2 95	2,77	kg/m
TSK-2 120	2,96	kg/m
TSK-2 DD 70	2,22	kg/m
TSK-2 DD 95	2,42	kg/m
TSK-2 DD 120	2,61	kg/m
SK 45	0,66	kg/m
SK 70	0,77	kg/m
SK 95	0,88	kg/m
SK 120	0,99	kg/m
SKP 45	0,67	kg/m
SKP 70	0,78	kg/m
SKP 95	0,88	kg/m
SKP 120	1,00	kg/m
SKP 145	1,16	kg/m
S45	0,74	kg/m
TSKA	0,34	kg/m
L285	3,36	kg/m
FLV 25/100-0.7	1,00	kg/m

ENVIRONMENTAL PRODUCT DECLARATION

Steel profile systems

from Knauf Danogips GmbH

In accordance with ISO 14025 and EN 15804

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-02178
Publication date:	2021-01-04
Valid until:	2025-01-04

KNAUF DANOGIPS

EPD®

EPD Profile

EPD Owner

Knauf Danogips GmbH
Sara Ervasti Senior product- and sustainability specialist
+46 44 28-7810
sara.ervasti@knauf.se
Fyrgatan, 296 80 Åhus, Sweden

EPD Programme

The International EPD® System

EPD International AB
Box 210 60
SE-100 31 Stockholm
Sweden

www.environdec.com
info@environdec.com

EPD Producer

DGE Mark och Miljö
Box 258
391 23 Kalmar

Third party Verifier

Pär Lindman, Miljögiraff AB
Approved by: The International EPD® System

Product category rules (PCR): The International EPD System PCR for Construction Products and Construction Services 2012:01, version 2.33.

Independent third-party verification of the declaration and data, according to ISO 14025:2006:
☐ EPD process certification ☒ EPD verification

The EPD owner has the sole ownership, liability, and responsibility for the EPD. 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.

Company information

Description of the organisation

The Knauf Group is a family-run, global company with 220 production sites worldwide and one of Europe's leading manufacturers of construction products, producing mainly products made of cement, lime and plaster and thermal insulating materials. In Sävsjö and Åhus, Sweden, Knauf Danogips develops, produces and sells steel profile systems for constructions in a wide range of construction applications. Knauf Danogips GmbH is certified according to SS EN ISO 9001:2015, SS EN ISO 14001:2015 and OHSAS 18001:2007.

Name and location of production site

Knauf Danogips' steel profile systems are produced at their production site in Sävsjö, Sweden and distributed from their production site in Åhus, Sweden.

EPD Product information

Product name and identification: This EPD covers steel profile systems produced by Knauf Danogips GmbH at the facility in Sävsjö, Sweden. A list over these products is attached in Appendix A.

Product description: Steel profile systems are construction products used as e.g. beams, struts and attachments and come in different varieties to meet different performance requirements. Properties such as load-bearing, acoustic insulation and mechanical properties vary between different systems. The steel profile systems from Knauf Danogips are made of zinc-coated steel sheets, cut and bent to attain the right dimensions and characteristics. Some profiles additionally have a polyethylene sheet attached. The functional unit is modelled to represent an average of all products in the product category of steel profile systems from Knauf. Figure 1 shows an illustration of one of the products covered by this EPD.

UN CPC code: 42190

Figure 1. Illustration of one of the products within the product category Steel profile systems, for which this EPD is valid.

LCA information

Functional unit / declared unit: The declared unit is 1 kg of steel profile systems from Knauf.

Reference service life: 50 years

Time representativeness: The specific data for the products and mass flows used for this EPD is from 2020. All specific and generic data used for modelling are representative for the past five years or more recently.

Geographical scope: The end-of-life scenario for the products has been calculated for scenarios in Sweden.

Database(s) and LCA software used: The LCA software SimaPro 9.1.0 was used for this study, with data from the database Ecoinvent 3.5

Description of system boundaries: All life cycle stages from raw material extraction to the transportation of the finished product to the construction site are included, plus the end of life scenario. The scope is therefore a Cradle-to-gate with options; stages A1-A4, B1-B7, C1-C4.

Excluded lifecycle stages: A5 was excluded, since data was not available for this stage.

Standards:
The LCA is performed in accordance with the requirements of the following standards:

- ISO 14040:2006
- ISO 14044:2006
- EN 15804:2012+A1:2013
- PCR for Construction Products and Construction Services 2012:01(2.33).

More information:
In accordance with the PCR, more than 95% of total inflows of mass and energy has been included in this Life Cycle Inventory. None of the raw materials used in the products hold SVHCs (Substances of Very High Concern).

If demolition of the effete product is conducted with care, the product could be reused. The recyclability of the packaging is 100%.

For more information about the EPD owner, visit www.knaufdanogips.se.

For more information about the EPD Programme, visit www.environdec.com

For more information about the EPD producer, visit www.dge.se.

For more information about the underlying LCA study, contact the LCA practitioner Helena Lindh (helena.lindh@dge.se).

Figure 2. The concept of Life Cycle Assessment.

System diagram

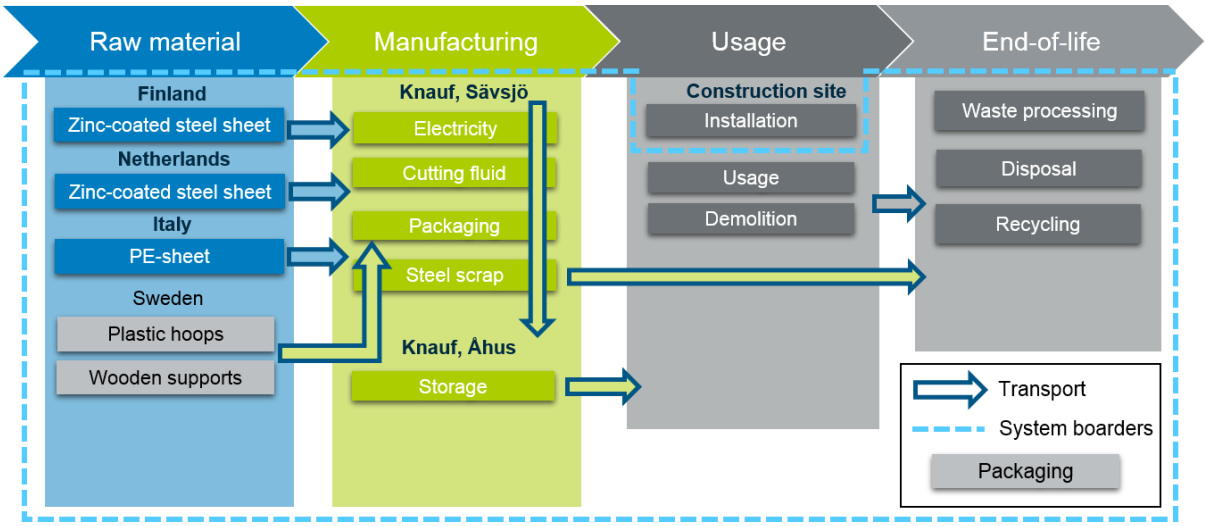

Figure 3. Flow diagram of the product life cycle, beginning with raw material collection through extraction, followed by manufacturing, usage and end-of life. Each step of the life cycle is described in further detail below.

Table 1. Table declaring the life cycle stages included in the EPD. X= included in the EPD, MND=Module Not Declared

Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
Raw materials	Transport	Manufacturing	Transport	Construction-Installation	Use stage	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse-recovery-recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	X	X	X	X	X	X	X	X	X	X	X	MND

Description of life cycle stages A1-A3: Raw material extraction and supply, transport and manufacture

Table 2. Description of life cycle stages A1, A2 and A3, covering the upstream and core processes of the product life cycle.

Stage	Description
A1 Raw materials	Extraction and processing of raw material occurring upstream from the manufacturing process, including the energy generation needed for these processes (extraction, refining and transport of energy from primary energy sources). Recycling processes of secondary materials from a previous product system that are used in the manufacturing process are also included, however processes that are part of the waste processing in the previous product system are excluded, referring to the polluter-pays principle.
A2 Transport	The external transportation of raw materials to the manufacturing site. The modelling includes transportation with truck, train and ship with processes for each supplier.
A3 Manufacturing	The manufacturing process, including the use of packaging materials and treatment of waste generated in this process up to the end-of-waste state or disposal of final residues, including any packaging not leaving the factory gate with the product. Production and transport of manufacturing fuels to the manufacturing site is included, as well as the recycling process of purchased recycled material, and recycled material transported to the manufacturing site.

Description of life cycle stage A4: Transport from production gate to construction site

Table 3. Description of life cycle stage A4 – the first downstream process of the product life cycle

Stage	Parameter	Value
A4 Transport from production gate to customer	Vehicle type used for transport	42-ton sized truck, EURO 6 emission class.
	Vehicle load capacity	28 ton
	Gross vehicle weight	34 ton
	Fuel type and consumption	Diesel: 0,01699 kg/tonkm
	Distance to customer	An average distance of 350 km is assumed
	Capacity utilization factor	0,71

Description of life cycle stage B1-B7: Usage stages

During the seven usage stages of the products' life cycle, they need neither maintenance, repair, replacement, refurbishment nor use energy or water. Hence, there is no contribution to the life cycle impact of the product from this life cycle stage.

Description of life cycle stage C1-C4: End of life stages

The End-of-life scenario used in this EPD is presented in Table 5. However, if demolition of the effete product is conducted with care, the product could be reused. Additionally, the packaging materials are 100% recyclable.

Table 4. Description of life cycle stages C1-C4, covering the final downstream processes i.e. the end of life stages of the product life cycle.

Stage	Description	Parameter	Value
C1 Deconstruction	Deconstruction including demolition of the product from the construction, including initial on-site sorting of the materials. Propane fueled building machine, 0,0359 MJ/kg assumed.	Collection process specified by type	95% collected separately for metal recycling 5% collected with mixed construction waste
C2 Transport	Transportation of the discarded product to a recycling site, and transportation of waste to final sorting yard or disposal	Assumptions for scenario development	units as appropriate
C3 Waste processing	Collection of waste fractions from deconstruction, as well as processing of material flows intended for reuse, recycling and energy recovery	Recovery system specified by type	0% for re-use 95% for recycling 0% for energy recovery *Packaging:* *80% for energy recovery* *20% for recycling*
C4 Disposal	Waste disposal, including physical pre-treatment and management of the disposal site, as well as emissions from the disposal	Disposal specified by type	5% for landfill

Environmental performance

Knauf steel profile systems

Environmental impact

Table 5. The results from the LCA showing the environmental impacts from the steel profile systems during the different life cycle stages.

Impact Category	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
AP	kg SO_2 eq.	5,27E-03 97,7%	7,08E-05 1,3%	0,00E+00 0,0%	7,92E-06 0,1%	3,12E-05 0,6%	6,51E-06 0,1%	8,10E-06 0,2%	**5,40E-03**
EP	kg PO_4^{3-} eq.	6,69E-04 95,2%	1,52E-05 2,2%	0,00E+00 0,0%	1,49E-06 0,2%	6,54E-06 0,9%	3,79E-06 0,5%	6,51E-06 0,9%	**7,03E-04**
GWP	kg CO_2 eq.	2,42E+00 98,0%	2,59E-02 1,0%	0,00E+00 0,0%	3,12E-03 0,1%	8,72E-03 0,4%	1,03E-03 0,0%	1,07E-02 0,4%	**2,47E+00**
POCP	kg C_2H_4 eq.	5,31E-04 98,7%	4,07E-06 0,8%	0,00E+00 0,0%	8,87E-07 0,2%	1,43E-06 0,3%	2,22E-07 0,0%	2,44E-07 0,0%	**5,38E-04**
ADPE	kg Sb eq.	9,14E-05 99,9%	5,07E-08 0,1%	0,00E+00 0,0%	1,20E-09 0,0%	2,61E-08 0,0%	1,62E-09 0,0%	1,10E-09 0,0%	**9,14E-05**
ADPF	MJ	2,63E+01 97,7%	4,25E-01 1,6%	0,00E+00 0,0%	4,02E-02 0,1%	1,32E-01 0,5%	1,14E-02 0,0%	1,46E-02 0,1%	**2,69E+01**
ODP	kg CFC-11 eq.	1,07E-08 58,6%	5,20E-09 28,4%	0,00E+00 0,0%	4,91E-10 2,7%	1,61E-09 8,8%	1,13E-10 0,6%	1,73E-10 0,9%	**1,83E-08**

AP	Acidification potential	**ADPE**	Abiotic depletion potential - Elements
EP	Eutrophication potential	**ADPF**	Abiotic depletion potential – Fossil resources
GWP	Global warming potential (100a)	**ODP**	Depletion potential of the stratospheric ozone layer
POCP	Formation potential of tropospheric ozone		

Knauf steel profile systems

Use of resources

Table 6. The results from the LCA showing the resource consumption from Knauf's steel profile systems throughout the life cycle.

Resource use	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
PERE	MJ	1,34E+00	4,58E-03	0,00E+00	3,08E-04	1,41E-03	3,32E-03	2,70E-04	**1,35E+00**
PERM	MJ	1,81E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,81E-01**
PERT	**MJ**	1,52E+00	4,58E-03	0,00E+00	3,08E-04	1,41E-03	3,32E-03	2,70E-04	**1,53E+00**
PENRE	MJ	1,78E+01	4,33E-01	0,00E+00	4,07E-02	1,34E-01	2,06E-02	1,50E-02	**1,84E+01**
PENRM	MJ	4,52E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**4,52E-01**
PENRT	**MJ**	1,82E+01	4,33E-01	0,00E+00	4,07E-02	1,34E-01	2,06E-02	1,50E-02	**1,89E+01**
SM	**kg**	8,17E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**8,17E-02**
RSF	**MJ**	1,17E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,17E-05**
NRSF	**MJ**	1,12E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**1,12E-04**
FW	**m^3**	2,61E-03	9,31E-05	0,00E+00	3,91E-06	2,27E-05	5,92E-06	4,01E-05	**2,77E-03**

PERE	Renewable primary energy as energy carrier	**SM**	Use of secondary material
PERM	Renewable primary energy used as material	**RSF**	Use of renewable secondary fuels
PERT	Total renewable primary energy use	**FW**	Net use of fresh water
PENRE	Non-renewable primary energy as energy carrier		
PENRM	Non-renewable primary energy used as material		
PENRT	Total non-renewable primary energy use		

Waste production and output flows

Knauf steel profile systems

Waste production

Table 7. The results from the LCA showing the waste production from the steel profile systems during the different life cycle stages.

Wastes	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
HWD	kg	3,30E-02	1,41E-06	0,00E+00	0,00E+00	3,33E-07	0,00E+00	0,00E+00	**3,30E-02**
NHWD	kg	1,50E-01	2,63E-02	0,00E+00	0,00E+00	6,06E-03	0,00E+00	4,95E-02	**2,32E-01**
RWD	kg	4,86E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**4,86E-04**

HWD Hazardous waste disposed **NHWD** Non-hazardous waste disposed **RWD** Radioactive waste disposed

Output flows

Table 8. The results from the LCA showing the output flows from the steel profile systems during the different life cycle stages.

Output flows	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	TOTAL
CFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**
MFR	kg	1,28E-03	4,52E-04	0,00E+00	0,00E+00	1,04E-04	9,42E-01	0,00E+00	**9,44E-01**
MER	kg	8,71E-04	6,31E-04	0,00E+00	1,85E-05	1,49E-04	0,00E+00	2,01E-02	**2,17E-02**
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	**0,00E+00**

CFR Components for re-use **MER** Materials for energy recovery
MFR Materials for recycling **EE** Exported energy

References

General Programme Instructions of the International EPD® System. Version 3.0.

EN 15804:2012+A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

The International EPD System PCR for Construction Products and CPC 54 Construction Services 2012:01, version 2.33

ISO 14040. (2006). *Environmental Management – Life cycle assessment – Principles and framework (SS-EN ISO 14040:2006).* Stockholm, Sweden.: Swedish Standards Institute (SIS förlag AB).

ISO 14044. *Environmental Management – Life cycle assessment – Requirements and guidelines (SS-EN ISO 14044:2006).* Stockholm, Sweden: Swedish Standards Institute (SIS förlag AB).

Lindh, H. & Kjellberg, N. (2020) *Knauf Steel profile systems - LCA*. Life Cycle Assessment made for Knauf Danogips GmbH by DGE Mark & Miljö

Michael Ioelovish (2018) Energy Potential of Natural, Synthetic Polymers and Waste Materials – A Review. Academ J Polym Sci. 1(1):555553.

Phyllis2, database for physio-chemical compositions. Created by TNO, a Dutch Techcentre for life sciences, co-funded by the EU 7th Framework Programme. Available at: https://phyllis.nl/Browse

Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. *The ecoinvent database version 3 (part I): overview and methodology*. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230.
Available at: http://link.springer.com/10.1007/s11367-016-1087-

Appendix A

Table A1 lists the steel profile system products from Knauf Danogips for which this EPD is valid.

Table A1. The steel profile system products covered by this EPD.

Products covered in this EPD
Skena SK
Skena SKP
Skena SKT
Skena med urklipp SKU
Förstärkningsskena FSK
Förstärkningsskena FSKP
Standardregel R
Akustikregel AR
Multiregel MR
Dörregel DR
Hörnregel HR
Hörnregel med tätlister HRT
Förstärkningsregel FR
Vinkelprofil H
Vinkelprofil HP
T-skarv
Hörnskydd HSK
L-profil LP
Pelarhörnlist PHL
Primärprofil P
Sekundärprofil S
Akustikprofil AP
Primär-/sekundärprofil CD-2
CD-1 tvärprofil för CD-taksystem
Skena YSK
Ytterväggsskena polyetenklädd YSKP
Ytterväggsregel YR
Ytterväggsregel polyetenklädd YRP
Ytterväggsregel karm YRK
Påsalningsprofil PZ
Påsalningsprofil PU
Avväxlingsprofil AV

EPD®

www.environdec.com