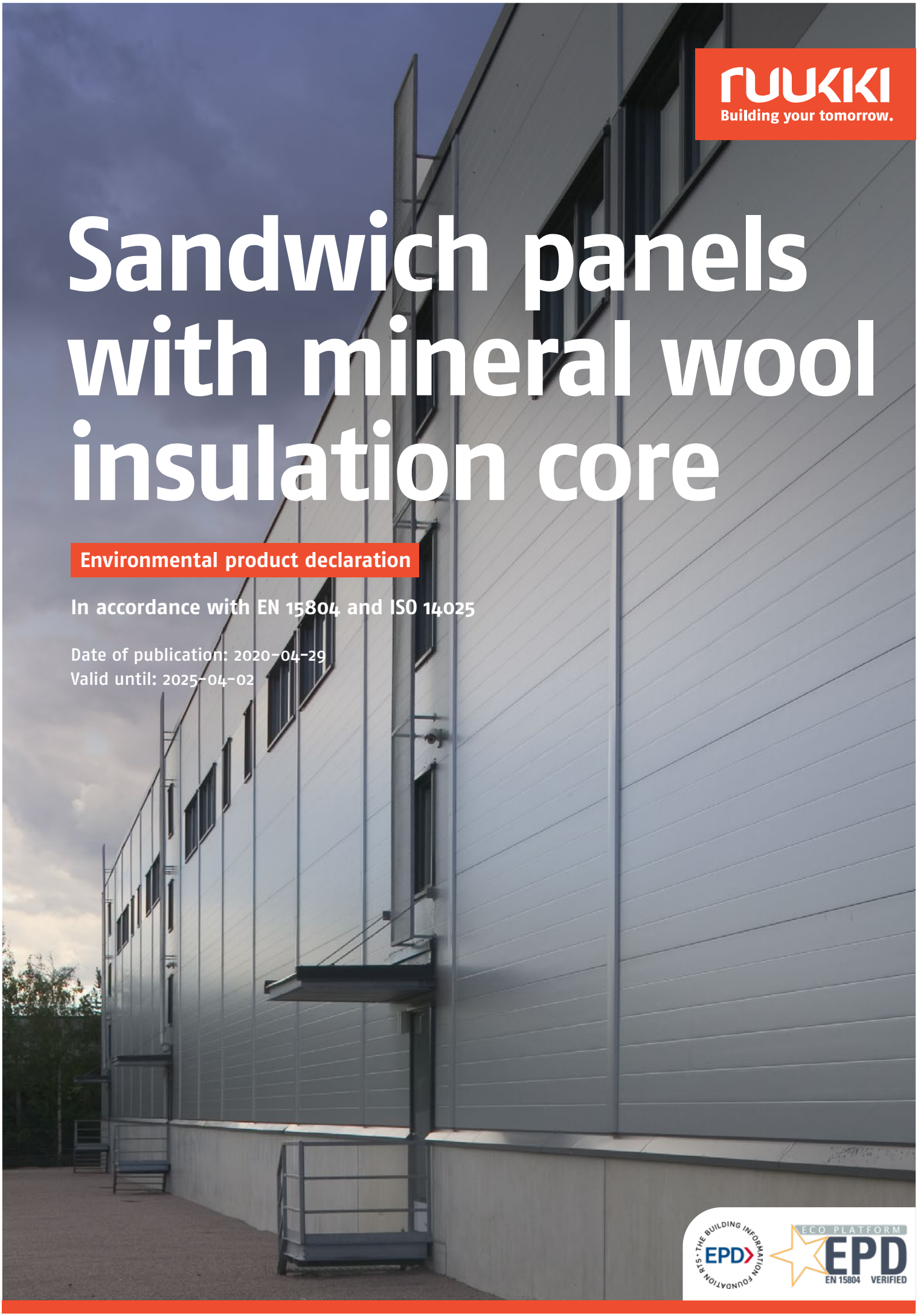

Ruukki
Building your tomorrow.

Sandwich panels with mineral wool insulation core

Environmental product declaration

In accordance with EN 15804 and ISO 14025

Date of publication: 2020-04-29
Valid until: 2025-04-02

EPD · THE BUILDING INFORMATION FOUNDATION · RTS

ECO PLATFORM EPD EN 15804 VERIFIED

Registration number in RTS EPD

Declaration No. RTS_51_20

EcoPlatform reference number:

00001200

Laura Sariola
Committee Secretary

Markku Hedman
RTS General Director

General information

Owner of the declaration	Ruukki Construction Oy, Panuntie 11 00620 Helsinki. www.ruukki.com Terhi Leiviskä, terhi.leiviska@ruukki.com
Product	Sandwich panels with steel facings and mineral wool core
Manufacturer	Ruukki Construction Oy, Panuntie 11 00620 Helsinki
Manufacturing sites	Alajärvi (Finland) and Oborniki (Poland)
Product applications	External walls and partition structures
Declared unit	1 m^2 sandwich panel
LCA performed by	Karin Lindeberg, Diego Peñaloza IVL Swedish Environmental Research Institute, Valhallavägen 81 00127 Stockholm. www.ivl.se
Verified by	Anastasia Sipari Bionova Oy, Hämeentie 7 A 00500 Helsinki. www.bionova.fi
Product category rules	RTS PCR (English version 14.6.2018)
Program operator, publisher	Building Information Foundation RTS, Malminkatu 16 A 00100 Helsinki. http://epd.rts.fi

This environmental product declaration covers the environmental impacts of sandwich panels manufactured by Ruukki in Alajärvi (Finland) and Oborniki (Poland). The EPD contains several different sandwich panels: SPA E LIFE, SPA E LIFE ENERGY, SPA E, SPA E ENERGY, SPA I, SPB WE, SPB WE ENERGY, SPB WEB and SPB WEB ENERGY.

According to supplier notifications, none of the product components contains substances restricted under REACH or included on the candidate list of Substances of Very High Concern (SVHC).

The declaration has been prepared in accordance with EN 15804:2012+A1:2013 and ISO 14025 standards and the additional requirements stated in the RTS PCR (English version 14.6.2018). This declaration covers the life cycle stages from cradle to gate with options.

The EPD of construction products may not be comparable if they do not comply with EN 15804 and seen in a building context.

Verified according to the requirements of EN 15804+A1 (product group rules)
Independent verification of the declaration, according to EN ISO 14025:2010

☒ External ☐ Internal

Third party verifier:

Anastasia Sipari / Bionova Oy
Verified 2.4.2020

Product

APPLICATION

Sandwich panels are cost-effective prefabricated elements for use in façades, compartment structures, partition walls, ceilings and roofs. Typical applications include industrial and commercial buildings, sports facilities, warehouses and power plants. The panels can be used in food industry construction and demanding clean room applications. An optimal insulation core is selected based on customer needs, ensuring excellent thermal insulation properties, even for thin panels. Moreover, the panels have a high sound reduction index and excellent fire resistance, making them an outstanding material for fire partitions.

Steel construction products can positively affect the overall assessment of buildings for LEED and BREEAM certification. For more information, visit at www.ruukki.com.

TECHNICAL INFORMATION

Sandwich panels are manufactured in different thicknesses with mineral wool (MW) insulation core. Our selection of sandwich panels also includes energy panels with extremely low air leakage rates. The term energy refers to airtight energy efficient panel structures that is guaranteed by joint tightness. Ruukki energy panels are produced with special attention paid to production quality control and minimal engineering tolerances to achieve panel structures airtightness and energy efficiency. Also in the installation, special energy sealant material is used to guarantee high-class joint tightness in the panel structures.

The steel facings of sandwich panels shall be regularly inspected and maintained. The colour-coated steel is washable and easy to care for, and it can be repainted to prolong its useful life. Detailed technical information on products can be found on the Ruukki website at www.ruukki.com.

Ruukki has the right to use CE marking for sandwich panels (EN 14509). By affixing CE marking to a product, the manufacturer indicates that the product conforms to all relevant legislative requirements, in particular to health, safety and environmental protection requirements.

Figure 1. An example of an SPA panel with a mineral wool insulation core.

Product materials

Sandwich panels consist of an insulating core bonded between two colour-coated steel sheets or between two stainless steel sheets. Panel facings are mainly made of hot-dip galvanised steel sheeting. Steel is an alloy of mainly iron and carbon, with small amounts of alloying elements. These elements improve the chemical and physical properties of steel such as strength, durability and corrosion resistance. The alloying elements of steel are closely linked to its chemical matrix. The steel density is 7 850 kg/m^3. The zinc coating quantity is 275 g/m^2, but lower zinc quantities may also be used, depending on end use application.

The steel sheets used in the panels are typically coated with Hiarc or polyester on the external facing side and with polyester on the reverse internal facing of the panel. Additionally, we offer special coatings and stainless steel options depending on the application and special weather resistance requirements.

There are two mineral wool options: glass or stone wool. Sandwich panels with a mineral wool core are available in thicknesses ranging from 80 to 230 mm. Due to their non-combustible core material; sandwich panels with a mineral wool core provide excellent fire safety. The nominal density of the mineral wool ranges from 58 to 120 kg/m^3. A polyurethane adhesive is used to bond the mineral wool core to the steel facings.

Ruukki LIFE panels utilise LIFE-PAN glass wool, an insulation material produced from recycled glass by the fine fiberising fibre technique method. Ruukki LIFE panels are produced with special attention paid to environmental considerations aspects – in practice, this means minimising raw material consumption, utilising an optimal amount of recycled material, and optimising transportation, for example. The recycled material content of the glass wool used is over 70%.

INFORMATION ON RELEASE OF DANGEROUS SUBSTANCES

Soil and water impacts during the product use phase have not been studied, since harmonized testing methods of European product standards are not available. Indoor emission impacts of the product have been tested for sandwich panels SPA with mineral wool core and they hold an M1 Emission Classification of Building Materials certificate.

Product composition

Ruukki actively tracks and anticipates future changes in environmental, safety and chemical legislation and complies with valid EU chemical regulations, such as REACH (1907/2006/EC) and CLP (1272/2008/EC). By monitoring the list of Substances of Very High Concern (SVHC) and other legislative requirements, we ensure that products meet legal and customer requirements. According to supplier notifications, none of the product components contains substances restricted under REACH or included on the candidate list (SVHC).

Table 1 shows product composition of the sandwich panels with mineral wool core. The product composition of energy sandwich panel is equivalent in weight and raw material content compared to other panels in the specific product group.

Table 1. Product composition of the sandwich panels with mineral wool core

Product group	Product specification	Thickness (mm)	Weight (kg/m²)	Material content (% in weight)		
				Colour-coated steel (Hiarc and polyester)	Insulation	Adhesive
Sandwich panel SPA LIFE with glass wool core, insulation density 58 kg/m³	SPA E LIFE and SPA E LIFE ENERGY; steel facings 0.5/0.6 mm	150	17.8	48.5	48.9	1.8
		200	20.7	41.7	56.0	1.5
		230	22.4	38.5	59.5	1.4
Sandwich panel SPA with stone wool core, insulation density 85 kg/m³	SPA E, SPA E ENERGY and SPA I; steel facings 0.5/0.6 mm	100	17.6	46.7	50.6	1.9
		150	21.9	37.3	60.6	1.5
Sandwich panel SPA with stone wool core, insulation density 110 kg/m³	SPA E, SPA E ENERGY and SPA I; steel facings 0.5/0.6 mm	230	34.4	25.5	73.5	0.9
Sandwich panel SPB with stone wool core, insulation density 85 kg/m³	SPB WE, SPB WE ENERGY, SPB WEB and SPB WEB ENERGY; steel facings 0.5/0.6 mm	100	17.6	49.9	48.3	1.8
		160	22.7	38.7	59.9	1.4
		200	26.1	33.6	65.1	1.2
Origin of raw material				**EU**	**EU**	**EU**

Production

Sandwich panels that conform to this environmental product declaration are manufactured at Ruukki's plants in Alajärvi (Finland) and Oborniki (Poland). The choice of production site depends on product requirements and construction site location, for example. Prefabrication of sandwich panel structures results in minimum waste at the construction site.

Production process of sandwich panels with mineral wool core is described in Figure 2.

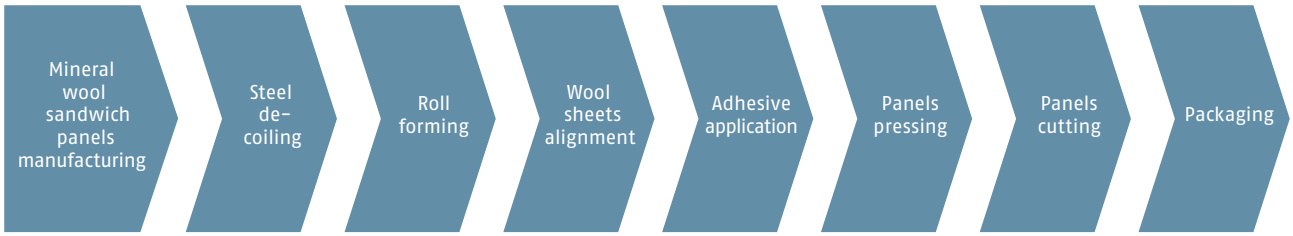

Figure 2. Sandwich panel production process

Information of energy in sandwich panel manufacturing phase (A3) is described in Table 2.

Table 2. Energy in sandwich panel manufacturing (A3)

Parameter	Value	Data quality
A3 Electricity information and CO_2 emissions kg CO_2 equiv. / kWh for Finnish production	0.171	Thinkstep dataset (2016) for Electricity grid mix in Finland
A3 Electricity information and CO_2 emissions kg CO_2 equiv. / kWh for Polish production	0.916	Thinkstep dataset (2016) for Electricity grid mix in Poland

Colour-coated and cold-rolled steel made at SSAB´s Hämeenlinna or Kankaanpää (Finland) sites is used in sandwich panel manufacturing. Hot-rolled steel manufactured at SSAB´s Raahe steel mill (Finland) from iron ore is used as the raw material for cold-rolled and colour-coated steel. The amount of total scrap steel used in hot-rolled steel is approximately 20% including pre- and post-consumer scrap.

When scrap steel is used instead of virgin raw materials in iron production, the carbon dioxide emissions originating from steel production decrease accordingly. Steel-making at SSAB Raahe uses scrap material from SSAB's own production processes and material sourced from the scrap steel market. For reasons of process technology, the content of scrap steel in blast-furnace-based steel production cannot exceed around 30%. In addition, the amount of scrap steel in steel production is limited due to its availability. Once steel has been made, it can be recycled endlessly without weakening its properties.

Ruukki uses also steel from suppliers that manufacture steel from recycled steel scrap. The electric arc steel manufacturing method can use up to 100% of scrap steel in the process.

PACKAGING

The products are wrapped to protect them during handling and transport. A typical package consists of a wooden pallet, plastic straps, a plastic stretch wrap, corner pads made of cardboard or steel, plank wood and cardboard. Panel facings are protected with plastic wrap (PE) to protect the steel facings from mechanical damage during loading, unloading, storage and installation.

All packaging materials are recyclable as material or alternatively utilised as waste to energy (WtE). Packaging materials are sorted at construction sites according to local regulations and customer preferences.

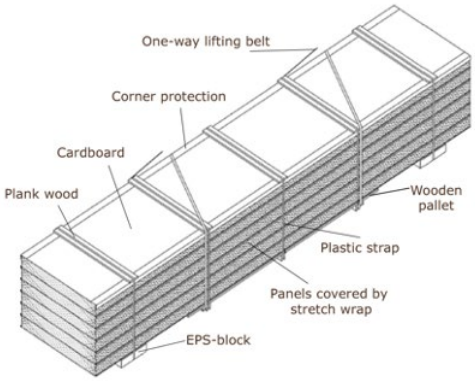

Figure 3. Standard package for sandwich panels

TRANSPORTATION

Raw materials are mostly transported to production sites by road. Finished products are transported by truck and ship. Ruukki's logistics unit is responsible for most of the transportation of raw materials and products. Logistics aims to optimise transport, maximise payloads and combine transport as efficiently as possible.

Environmental impacts for transport of finished product to the building site (A4), have been calculated based on the weighted average of the market shares and yearly production volume of each production unit. Table 3 describes parameters for the A4 transport scenario.

Table 3. Technical information on transport (A4) from production to the building site

Parameter	Value
Fuel type and consumption of vehicle used for transport	Truck: maximum load capacity 32 t and average diesel consumption 0.34 l/km. Specific transport emissions 0.02 kg CO_2/tkm Ship: maximum load capacity 10 000 t and average LFO consumption 69.2 l/km. Specific transport emissions 0.014 kg CO_2/tkm
Distance (km)	Average transport distance 504 km
Capacity utilization (%)	86% for truck and 70% for ship
Bulk density of transported products (kg/m^3)	Bulk density varies depending on product type and thickness
Volume capacity utilization factor	1

End-of-life recycling and waste processing

Waste materials from construction, repair and demolition are sorted and steel scrap is cycled back to the steel industry by the scrap trade. Scrap steel has a strong market position: an average of 95% of the steel removed from buildings at the end of their life cycle is used in the production of new steel.

Ruukki's mineral wool sandwich panels can be recycled and it is recommend that panels are sent to a reclamation facility where steel can be separated from the insulation core. Undamaged sandwich panels can be reused in less demanding applications. Damaged sandwich elements can be dismantled – steel is an important and fully recyclable raw material in new construction – and the clean mineral wool can be granulated and used in the manufacture of mineral blowing wool and, subject to certain restrictions, in the production of insulation wool, for example. Mineral wool is non-combustible and unsuitable for composting, but otherwise its disposal is not restricted. Tables 4.1–4.3 describe the scenarios for the end-of-life processing.

Table 4.1 The end-of-life process description for sandwich panels SPA E LIFE with glass wool core

Process flow	Unit	Sandwich panels SPA LIFE with glass wool core Thickness (mm)		
		150	200	230
Collection process specified by type	kg collected separately	17.8 kg (100%)	20.7 kg (100%)	22.4 kg (100%)
	kg collected with mixed construction waste	–	–	–
Recovery system specified by type	kg for reuse	–	–	–
	kg for recycling	8.2 kg (46%)	8.2 kg (40%)	8.2 kg (37%)
	kg for energy recovery	–	–	–
Disposal specified by type	kg product or material for final deposition	9.6 kg (54%)	12.5 kg (60%)	14.2 kg (63%)
Assumptions for scenario development	units as appropriate	Waste sandwich panels are transported 150 km by truck to recycling facility with a truck capacity utilization of 45%		

Table 4.2 The end-of-life process description for sandwich panels SPA with stone wool core

Process flow	Unit	Sandwich panels SPA with stone wool core Thickness (mm)		
		100	150	230
Collection process specified by type	kg collected separately	17.6 kg (100%)	21.9 kg (100%)	34.4 kg (100%)
	kg collected with mixed construction waste	–	–	–
Recovery system specified by type	kg for reuse	–	–	–
	kg for recycling	8.3 kg (47%)	8.2 kg (37%)	8.3 kg (24%)
	kg for energy recovery	–	–	–
Disposal specified by type	kg product or material for final deposition	9.3 kg (53%)	13.7 kg (63%)	26.1 kg (76%)
Assumptions for scenario development	units as appropriate	Waste sandwich panels are transported 150 km by truck to recycling facility with capacity utilization of 45%		

Table 4.3 The end-of-life process description for sandwich panels SPB with stone wool core

Process flow	Unit	Sandwich panels SPB with stone wool core Thickness (mm)		
		100	160	200
Collection process specified by type	kg collected separately	17.6 kg (100%)	22.7 kg (100%)	26.1 kg (100%)
	kg collected with mixed construction waste	–	–	–
Recovery system specified by type	kg for reuse	–	–	–
	kg for recycling	8.3 kg (47%)	8.3 kg (37%)	8.2 kg (31%)
	kg for energy recovery	–	–	–
Disposal specified by type	kg product or material for final deposition	9.3 kg (53%)	14.4 kg (63%)	17.9 kg (69%)
Assumptions for scenario development	units as appropriate	Waste sandwich panels are transported 150 km by truck to recycling facility with capacity utilization of 45%		

No hazardous waste is formed from sandwich panels. The European recycling classification codes for Ruukki's Sandwich panel after use are as follows:

- for steel parts, 17 04 05 (iron and steel) and
- for insulation materials, 17 06 04 (excluding insulation materials mentioned in 17 06 01 and 17 06 03).

LCA calculation information

This environmental product declaration covers the following life cycle stages: A1 Raw material supply, A2 Transport, A3 Manufacturing and A4 Transportation of the product to construction site and end-of-life modules, C1 Deconstruction, C2 Transport end-of-life, C3 Waste processing and C4 Disposal, as well as module D benefits and loads beyond the system boundary; see Figure 4. The benefits of steel recycling in module D are calculated based on a recycling rate of 95% for steel.

The sandwich panel accessories, like fasteners, sealing materials and flashings, used in the installation phase (A5) are not included in the life cycle assessment.

System boundaries (X=included, MND=Module not declared, MNR=Module not relevant)

Product stage			Construc-tion stage	Use stage								End of life stage				Beyond the life cycle		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	MNR	MNR	X
Raw material supply	Transport	Manufacturing	Transport	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Mandatory modules
Mandatory as per the RTS PCR section 6.2.1 rules and terms
Optional modules based on scenarios

Figure 4. System boundaries of life cycle assessment (LCA)

DATA QUALITY

Life cycle inventory data has been collected from the Alajärvi and Oborniki production sites from 2018 production. Steel made at the SSAB steel mill in Raahe (Finland) and European steel are used in sandwich panel structures. The steel data is from 2017. For insulation materials, producer-specific data and generic data from Gabi 9 software is used. No data is more than 10 years old. Gabi 9 software was used to calculate the environmental impact categories.

CUT-OFF CRITERIA

Life cycle inventory data for a minimum of 99% of total material and energy input flows have been included in the life cycle analysis.

ALLOCATION

Physical allocation was applied for different types of sandwich panels based on yearly production volumes (kg).

Environmental profile

All environmental impact values apply to 1 m^2 sandwich panels. Tables 5-7 show the environmental indicators based on the life cycle assessment of sandwich panels of a specific panel type and thickness.

Reading example in environmental profile tables: 7.97E-02 = $7.97*10^{-2}$ = 0.0797

Table 5.1. Environmental profile for sandwich panels SPA 150E LIFE and SPA 150E LIFE ENERGY

Sandwich panel weight 17.8 kg/m², U-value 0.25		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	35.3	0.276	7.97E-02	0.290	2.10E-02	0.293	-12.1
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	3.42E-06	4.43E-17	6.33E-15	4.74E-17	6.81E-17	9.92E-16	-7.39E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	0.154	9.04E-04	1.16E-04	7.65E-04	1.48E-04	1.01E-03	-5.24E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	3.80E-02	2.19E-04	1.84E-05	1.87E-04	3.54E-05	1.26E-04	-2.10E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	1.19E-02	-1.29E-04	1.04E-05	-2.74E-04	1.63E-05	8.08E-05	-1.21E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	2.47E-03	1.82E-08	6.17E-08	2.04E-08	2.35E-08	5.27E-08	-9.32E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	473	3.73	0.665	3.89	0.404	2.24	-173
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	210	0.194	1.20	0.226	2.98E-02	0.302	-7.89
Use of renewable primary energy resources used as raw material	MJ	12.3	0	0	0	0	0	0
Total use of renewable primary energy resources	MJ	222	0.194	1.20	0.226	2.98E-02	0.302	-7.89
Use of non-renewable primary energy used as energy carrier	MJ	504	3.74	1.08	3.90	0.420	2.34	-191
Use of non-renewable primary energy used as raw material	MJ	8.28	1.75E-04	0	2.05E-04	1.53E-05	9.85E-06	-2.77E-05
Total use of non-renewable primary energy resources	MJ	512	3.74	1.08	3.90	0.420	2.34	-191
Use of secondary material	kg	4.77	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.75E-09	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	6.02E-08	0	0	0	0	0	0
Net use of fresh water	m^3	0.180	3.28E-04	3.53E-04	3.83E-04	1.25-04	1.21E-03	-7.03E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.609	1.86E-07	1.11E-09	2.18E-07	1.31E-08	3.71E-08	0
Non-hazardous waste disposed	kg	1.03	2.73E-04	1.33E-03	3.17E-04	8.50E-05	9.56	0
Radioactive waste disposed	kg	8.82E-03	0	0	0	0	2.73E-05	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	2.04	0	8.19	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

Table 5.2. Environmental profile for sandwich panels SPA 200E LIFE and SPA 200E LIFE ENERGY

Sandwich panel weight 20.7 kg/m², U-value 0.19		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	38.6	0.321	9.27E-02	0.338	2.10E-02	0.338	-12.1
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	3.67E-06	5.15E-17	7.36E-15	5.53E-17	6.81E-17	1.26E-15	-7.39E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	0.186	1.05E-03	1.35E-04	8.93E-04	1.48E-04	1.29E-03	-5.24E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	4.85E-02	2.55E-04	2.14E-05	2.18E-04	3.54E-05	1.57E-04	-2.10E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	1.40E-02	-1.50E-04	1.21E-05	-3.20E-04	1.63E-05	1.04E-04	-1.21E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	2.75E-03	2.11E-08	7.18E-08	2.38E-08	2.35E-08	6.94E-08	-9.32E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	526	4.33	0.773	4.54	0.404	2.90	-173
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	271	0.226	1.95	0.264	2.98E-02	0.388	-7.89
Use of renewable primary energy resources used as raw material	MJ	16.4	0	0	0	0	0	0
Total use of renewable primary energy resources	MJ	287	0.226	1.95	0.264	2.98E-02	0.388	-7.89
Use of non-renewable primary energy used as energy carrier	MJ	557	4.35	1.39	4.55	0.420	3.02	-191
Use of non-renewable primary energy used as raw material	MJ	11.0	2.03E-04	0	2.39E-04	1.53E-05	9.65E-06	-2.77E-05
Total use of non-renewable primary energy resources	MJ	568	4.35	1.39	4.55	0.420	3.02	-191
Use of secondary material	kg	6.25	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.74E-09	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	6.02E-08	0	0	0	0	0	0
Net use of fresh water	m^3	0.233	3.82E-04	4.10E-04	4.46E-04	1.25E-04	1.17E-03	-7.03E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.609	2.16E-07	1.29E-09	2.54E-07	1.31E-08	4.87E-08	0
Non-hazardous waste disposed	kg	1.12	3.17E-04	1.55E-03	3.70E-04	8.50E-05	12.5	0
Radioactive waste disposed	kg	9.15E-03	0	0	0	0	3.64E-05	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	2.38	0	8.20	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

Table 5.3. Environmental profile for sandwich panels SPA 230E LIFE and SPA 230E LIFE ENERGY

Sandwich panel weight 22.4 kg/m², U-value 0.16		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	40.7	0.348	0.101	0.367	2.10E-02	0.370	-12.1
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	3.89E-06	5.58E-17	7.98E-15	6.01E-17	6.81E-17	1.43E-15	-7.39E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	0.206	1.14E-03	1.46E-04	9.71E-04	1.48E-04	1.46E-03	-5.24E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	5.48E-02	2.76E-04	2.32E-05	2.37E-04	3.54E-05	1.77E-04	-2.10E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	1.53E-02	-1.63E-04	1.32E-05	-3.48E-04	1.63E-05	1.18E-04	-1.21E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	2.94E-03	2.29E-08	7.78E-08	2.59E-08	2.35E-08	7.96E-08	-9.32E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	556	4.70	0.838	4.93	0.405	3.31	-173
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	306	0.245	2.11	0.287	2.99E-02	0.442	-7.89
Use of renewable primary energy resources used as raw material	MJ	18.9	0	0	0	0	0	0
Total use of renewable primary energy resources	MJ	325	0.245	2.11	0.287	2.99E-02	0.442	-7.89
Use of non-renewable primary energy used as energy carrier	MJ	592	4.71	1.51	4.95	0.420	3.44	-191
Use of non-renewable primary energy used as raw material	MJ	12.7	2.20E-04	0	2.60E-04	1.53E-05	9.72E-06	-2.77E-05
Total use of non-renewable primary energy resources	MJ	605	4.71	1.51	4.95	0.420	3.44	-191
Use of secondary material	kg	7.16	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.76E-09	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	6.01E-08	0	0	0	0	0	0
Net use of fresh water	m^3	0.263	4.14E-04	4.44E-04	4.85E-04	1.25E-04	1.19E-03	-7.04E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.608	2.34E-07	1.40E-09	2.77E-07	1.31E-08	5.58E-08	0
Non-hazardous waste disposed	kg	1.17	3.44E-04	1.68E-03	4.02E-04	8.51E-05	14.2	0
Radioactive waste disposed	kg	9.36E-03	0	0	0	0	4.19E-05	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	2.59	0	8.20	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

Table 6.1 Environmental profile for sandwich panels SPA 100E, SPA 100E ENERGY and SPA 100I

Sandwich panel weight 17.6 kg/m², U-value 0.41		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	38.6	0.273	7.89E-02	0.286	2.00E-02	0.322	-11.5
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	2.64E-06	4.38E-17	6.26E-15	4.68E-17	6.48E-17	9.40E-16	-7.03E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	8.44E-02	8.94E-04	1.15E-04	7.56E-04	1.41E-04	9.53E-04	-4.99E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	1.25E-02	2.16E-04	1.82E-05	1.85E-04	3.37E-05	1.20E-04	-2.00E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	6.86E-03	-1.28E-04	1.03E-05	-2.71E-04	1.55E-05	7.15E-05	-1.15E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	1.53E-03	1.80E-08	6.10E-08	2.01E-08	2.23E-08	5.09E-08	-8.87E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	421	3.68	0.657	3.84	0.385	2.09	-165
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	60.5	0.192	1.66	0.224	2.84E-02	0.527	-7.51
Use of renewable primary energy resources used as raw material	MJ	5.24	0	0	0	0	4.09E-02	0
Total use of renewable primary energy resources	MJ	65.7	0.192	1.66	0.224	2.84E-02	0.568	-7.51
Use of non-renewable primary energy used as energy carrier	MJ	422	3.70	1.18	3.85	0.400	4.11	-182
Use of non-renewable primary energy used as raw material	MJ	24.5	1.73E-04	0	2.02E-04	1.46E-05	0.267	-2.64E-05
Total use of non-renewable primary energy resources	MJ	447	3.70	1.18	3.85	0.400	4.38	-182
Use of secondary material	kg	0.986	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.52E-09	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	5.72E-08	0	0	0	0	0	0
Net use of fresh water	m^3	2.87E-02	3.24E-04	3.49E-04	3.78E-04	1.19E-04	1.26E-03	-6.70E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.579	1.84E-07	1.10E-09	2.15E-07	1.25E-08	3.45E-08	0
Non-hazardous waste disposed	kg	2.82	2.70E-04	1.32E-03	3.13E-04	8.10E-05	9.32	0
Radioactive waste disposed	kg	9.23E-03	0	0	0	0	0	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	1.92	0	8.25	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

Table 6.2 Environmental profile for sandwich panels SPA 150E, SPA 150E ENERGY and SPA 150I

Sandwich panel weight 21.9 kg/m², U-value 0.26		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	45.7	0.340	9.81E-02	0.358	1.99E-02	0.343	-11.5
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	2.63E-06	5.44E-17	7.79E-15	5.86E-17	6.44E-17	1.32E-15	-6.99E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	9.84E-02	1.11E-03	1.42E-04	9.47E-04	1.40E-04	1.34E-03	-4.96E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	1.55E-02	2.69E-04	2.27E-05	2.31E-04	3.35E-05	1.63E-04	-1.99E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	7.62E-03	-1.59E-04	1.29E-05	-3.39E-04	1.54E-05	1.01E-04	-1.14E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	1.53E-03	2.24E-08	7.60E-08	2.58E-08	2.22E-08	7.48E-08	-8.82E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	476	4.58	0.818	4.81	0.382	3.00	-164
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	76.9	0.239	2.06	0.280	2.82E-02	0.765	-7.46
Use of renewable primary energy resources used as raw material	MJ	7.82	0	0	0	0	4.03E-02	0
Total use of renewable primary energy resources	MJ	84.7	0.239	2.06	0.280	2.82E-02	0.805	-7.46
Use of non-renewable primary energy used as energy carrier	MJ	469	4.60	1.47	4.83	0.397	5.98	-181
Use of non-renewable primary energy used as raw material	MJ	36.4	2.15E-04	0	2.53E-04	1.45E-05	0.263	-2.62E-05
Total use of non-renewable primary energy resources	MJ	506	4.60	1.47	4.83	0.397	6.24	-181
Use of secondary material	kg	1.32	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.49E-09	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	5.69E-08	0	0	0	0	0	0
Net use of fresh water	m^3	3.05E-02	4.04E-04	4.34E-04	4.73E-04	1.18E-04	1.24E-03	-6.65E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.576	2.28E-07	1.37E-09	2.70E-07	1.24E-08	5.06E-08	0
Non-hazardous waste disposed	kg	3.83	3.35E-04	1.64E-03	3.92E-04	8.05E-05	13.7	0
Radioactive waste disposed	kg	1.00E-02	0	0	0	0	0	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	2.39	0	8.24	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

Table 6.3 Environmental profile for sandwich panels SPA 230E, SPA 230E ENERGY and SPA 230I

Sandwich panel weight 34.4 kg/m², U-value 0.17		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	66.6	0.534	9.89E-02	0.572	2.13E-02	0.534	-12.3
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	2.38E-06	8.55E-17	1.22E-14	9.36E-17	6.92E-17	2.35E-15	-7.51E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	0.258	1.75E-03	2.24E-04	1.51E-03	1.50E-04	2.39E-03	-5.33E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	3.47E-02	4.23E-04	3.56E-05	3.69E-04	3.59E-05	2.82E-04	-2.13E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	1.53E-02	-2.50E-04	2.02E-05	-5.41E-04	1.66E-05	1.84E-04	-1.23E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	1.64E-03	3.51E-08	1.19E-07	4.03E-08	2.38E-08	3.96E-08	-9.47E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	824	7.20	1.28	7.68	0.411	5.50	-176
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	109	0.375	3.24	0.447	3.03E-02	0.730	-8.01
Use of renewable primary energy resources used as raw material	MJ	0	0	0	0	0	0	0
Total use of renewable primary energy resources	MJ	109	0.375	3.24	0.447	3.03E-02	0.730	-8.01
Use of non-renewable primary energy used as energy carrier	MJ	899	7.23	2.31	7.71	0.427	5.71	-194
Use of non-renewable primary energy used as raw material	MJ	0	3.38E-04	0	4.05E-04	1.55E-05	2.11E-04	-2.81E-05
Total use of non-renewable primary energy resources	MJ	899	7.23	2.31	7.71	0.427	5.71	-194
Use of secondary material	kg	5.99	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.82E-09	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	6.12E-08	0	0	0	0	0	0
Net use of fresh water	m^3	0.166	6.34E-04	6.81E-04	7.56E-04	1.27E-04	2.54E-03	-7.14E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.619	3.59E-07	2.15E-09	4.13E-07	1.33E-08	9.48E-08	0
Non-hazardous waste disposed	kg	8.47	5.27E-04	2.57E-03	6.27E-04	8.64E-05	26.1	0
Radioactive waste disposed	kg	2.84E-02	0	0	0	0	0	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	3.75	0	8.25	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

Table 7.1 Environmental profile for sandwich panels SPB100WE, SPB100WE ENERGY, SPB100WEB and SPB100WEB ENERGY

Sandwich panel weight 17.6 kg/m², U-value 0.41		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	38.7	0.273	7.89E-02	0.292	2.14E-02	0.269	-12.3
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	2.72E-06	4.38E-17	6.26E-15	4.78E-17	6.93E-17	9.00E-16	-7.52E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	0.128	8.94E-04	1.15E-04	7.71E-04	1.50E-04	9.13E-04	-5.33E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	1.58E-02	2.16E-04	1.82E-05	1.88E-04	3.60E-05	1.15E-04	-2.14E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	1.06E-02	-1.28E-04	1.03E-05	-2.76E-04	1.66E-05	6.85E-05	-1.23E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	7.22E-04	1.80E-08	6.10E-08	2.06E-08	2.39E-08	4.87E-08	-9.48E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	468	3.68	0.657	3.92	0.411	2.01	-176
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	51.8	0.192	1.66	0.228	3.04E-02	0.232	-8.02
Use of renewable primary energy resources used as raw material	MJ	0	0	0	0	0	4.01E-02	0
Total use of renewable primary energy resources	MJ	51.8	0.192	1.66	0.228	3.04E-02	0.272	-8.02
Use of non-renewable primary energy used as energy carrier	MJ	494	3.70	1.18	3.94	0.427	1.83	-195
Use of non-renewable primary energy used as raw material	MJ	0	1.73E-04	0	2.07E-04	1.56E-05	0.263	-2.82E-05
Total use of non-renewable primary energy resources	MJ	494	3.70	1.18	3.94	0.427	2.09	-195
Use of secondary material	kg	2.08	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.21E-11	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	5.33E-10	0	0	0	0	0	0
Net use of fresh water	m^3	8.55E-02	3.24E-04	3.49E-04	3.86E-04	1.27E-04	1.20E-03	-7.15E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.266	1.84E-07	1.10E-09	2.20E-07	1.34E-08	3.31E-08	0
Non-hazardous waste disposed	kg	3.36	2.70E-04	1.32E-03	3.20E-04	8.65E-05	9.34	0
Radioactive waste disposed	kg	1.00E-02	0	0	0	0	0	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	1.11	0	8.26	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

Table 7.2 Environmental profile for sandwich panels SPB160WE, SPB160WE ENERGY, SPB160WEB and SPB160WEB ENERGY

Sandwich panel weight 22.7 kg/m², U-value 0.24		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	46.8	0.352	0.102	0.377	2.14E-02	0.345	-12.3
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	2.73E-06	5.64E-17	8.08E-15	6.17E-17	6.93E-17	1.34E-15	-7.52E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	0.168	1.15E-03	1.48E-04	9.96E-04	1.50E-04	1.37E-03	-5.34E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	2.13E-02	2.79E-04	2.35E-05	2.43E-04	3.60E-05	1.66E-04	-2.14E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	1.28E-02	-1.65E-04	1.33E-05	-3.57E-04	1.66E-05	1.03E-04	-1.23E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	7.25E-04	2.32E-08	7.87E-08	2.66E-08	2.39E-08	7.66E-08	-9.49E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	573	4.75	0.848	5.07	0.411	3.07	-176
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	69.5	0.247	2.14	0.295	3.04E-02	0.371	-8.03
Use of renewable primary energy resources used as raw material	MJ	0	0	0	0	0	4.02E-02	0
Total use of renewable primary energy resources	MJ	69.5	0.247	2.14	0.295	3.04E-02	0.411	-8.03
Use of non-renewable primary energy used as energy carrier	MJ	609	4.77	1.52	5.08	0.427	2.93	-195
Use of non-renewable primary energy used as raw material	MJ	0	2.23E-04	0	2.67E-04	1.56E-05	0.264	-2.82E-05
Total use of non-renewable primary energy resources	MJ	609	4.77	1.52	5.08	0.427	3.19	-195
Use of secondary material	kg	3.18	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.20E-11	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	5.33E-10	0	0	0	0	0	0
Net use of fresh water	m^3	0.115	4.18E-04	4.50E-04	4.99E-04	1.27E-04	1.20E-03	-7.16E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.266	2.37E-07	1.42E-09	2.84E-07	1.34E-08	5.19E-08	0
Non-hazardous waste disposed	kg	4.88	3.48E-04	1.70E-03	4.13E-04	8.65E-05	14.4	0
Radioactive waste disposed	kg	1.38E-02	0	0	0	0	0	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	1.43	0	8.26	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

Table 7.3 Environmental profile for sandwich panels SPB200WE, SPB200WE ENERGY, SPB200WEB and SPB200WEB ENERGY

Sandwich panel weight 26.1 kg/m², U-value 0.20		Life cycle stage						
Environmental impacts	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP Global warming potential	kg CO_2 equiv.	52.2	0.405	0.117	0.434	2.13E-02	0.392	-12.3
ODP Depletion potential of the stratospheric ozone layer	kg CFC-11 equiv.	2.70E-06	6.49E-17	9.29E-15	7.10E-17	6.92E-17	1.63E-15	-7.51E-07
AP Acidification potential of soil and water sources	kg SO_2 equiv.	0.195	1.33E-03	1.70E-04	1.15E-03	1.50E-04	1.67E-03	-5.33E-02
EP Eutrophication potential	kg $(PO_4)^{3-}$ equiv.	2.50E-02	3.21E-04	2.70E-05	2.80E-04	3.59E-05	2.00E-04	-2.13E-02
POCP Photochemical ozone creation potential	kg ethene equiv.	1.43E-02	-1.90E-04	1.53E-05	-4.10E-04	1.65E-05	1.27E-04	-1.23E-02
ADP Abiotic depletion potential of resources – element	kg Sb equiv.	7.23E-04	2.67E-08	9.05E-08	3.05E-08	2.38E-08	9.51E-08	-9.47E-06
ADP Abiotic depletion potential of resources – fossil fuel	MJ	642	5.46	0.975	5.82	0.411	3.77	-176
Resource use and primary energy	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy used as energy carrier	MJ	81.4	0.284	2.46	0.339	3.03E-02	0.968	-8.01
Use of renewable primary energy resources used as raw material	MJ	0	0	0	0	0	3.98E-02	0
Total use of renewable primary energy resources	MJ	81.4	0.284	2.46	0.339	3.03E-02	1.01	-8.01
Use of non-renewable primary energy used as energy carrier	MJ	683	5.48	1.75	5.84	0.427	3.66	-194
Use of non-renewable primary energy used as raw material	MJ	0	2.56E-04	0	3.07E-04	1.55E-05	0.261	-2.81E-05
Total use of non-renewable primary energy resources	MJ	683	5.48	1.75	5.84	0.427	3.92	-194
Use of secondary material	kg	3.92	0	0	0	0	0	0
Use of renewable secondary fuels	MJ	4.20E-11	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ	5.32E-10	0	0	0	0	0	0
Net use of fresh water	m^3	0.134	4.81E-04	5.17E-04	5.73E-04	1.27E-04	1.19E-03	-7.14E-02
Waste categories	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.266	2.72E-07	1.63E-09	3.26E-07	1.33E-08	6.43E-08	0
Non-hazardous waste disposed	kg	5.90	4.00E-04	1.95E-03	4.75E-04	8.65E-05	17.9	0
Radioactive waste disposed	kg	1.63E-02	0	0	0	0	0	0
Output flows	**Unit**	**A1–A3 Total**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for reuse	kg	0	0	0	0	0	0	0
Materials for recycling	kg	1.65	0	8.24	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported electrical energy	MJ	0	0	0	0	0	0	0
Exported thermal energy	MJ	0	0	0	0	0	0	0

References

RTS PCR Protocol: PCR published by the Building Information Foundation RTS sr,
PT 18 RT EPD Committee (English version, 14.6.2018)

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

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations – Principles and procedures

European Chemical Agency ECHA, Candidate list of Substances of Very High Concern for authorization. Available at www.echa.europa.eu/candidate-list-table

M1, Emission Classification of Building Materials, The Building Information Foundation RTS sr. Available at https://cer.rts.fi/en/

LCA report: Information for the Environmental Product Declaration of Ruukki Sandwich panels. IVL Swedish Research Institute, February 2020

We make steel-based products for walls and roofs, for both commercial buildings and private homes. We're a supplier of high-quality products, systems and solutions, developed sustainably and to live up to the highest demands on durability in harsh conditions.

CR1.005/EN/06.2020/LSB

RAUTA
RELIABLE SOLUTIONS

This publication is accurate to the best of our knowledge and understanding. Although every effort has been made to ensure accuracy, the company does not assume any responsibility for any errors or decisions, or any direct, indirect or consequential damage caused by incorrect application of the this information. We reserve the right to make changes. Always see original standards for accurate comparison. For latest technical updates, please visit **www.ruukki.com.**

RUUKKI

Ruukki Construction Oy, Panuntie 11, FI-00620 Helsinki,
+358 (0) 20 59 150, www.ruukki.com