CONSOLIS
STRÄNGBETONG RAIL

EPD®
THE INTERNATIONAL EPD® SYSTEM

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804

Railway sleepers SB35F and SBR25ML

Owner of the Declaration	Strängbetong Rail AB
Title	Environmental Product Declaration for Railway sleepers SB35F and SBR25ML
Programme holder	EPD International Ltd
Publisher	EPD International Ltd
Declaration number	S-P-01060
Issue date	2017-07-12
Valid to	2022-07-09

General information

Programme holder: The International EPD® system, following the General Program Instruction (ver 2.5 2015-05-11)	**Owner of the declaration:** Strängbetong Rail AB Svärdvägen 29 SE-182 33 Danderyd
Declaration number: S-P-01060	**Product** Sleeper SB35F / SBR25ML
This declaration is based on the Product Category Rules: CEN Standard EN 15804 as the core PCR	**Declared unit:** 1 sleeper
Issue date: 2017-07-12	**Place of production:** Långviksmon, Sweden Kungsör, Sweden
Valid to: 2022-07-09	**Manufacturer:** Strängbetong Rail AB
The study was carried out in accordance with: SS-EN ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations – Principles and procedures EN 15804:2012+A1:2013 Sustainability of constructions works – Environmental Product Declarations	**Geographical scope:** The sleepers produced at Strängbetong Rails factories in Sweden are mainly intended to be used in Sweden **Comparability:** EPD of constructions products may not be comparable if they do not comply with EN 15804. EPDs within the same product category from different programs may not be comparable.
Responsibility The owner of the declaration is responsible for the underlying information and the verification. The International EPD System is not responsible for information about the manufacturer or underlying data for LCA or verification.	**The EPD is developed by:** WSP Sweden AB

Strängbetong Rail AB

Strängbetong Rail AB (SBR) offers a wide range of prefabricated concrete product for infrastructure such as sleepers, foundations and level crossings for railways, subways and trams. SBR offers different type of sleepers designed for specific needs such as noise and vibration mitigation sleepers, smart sleepers, bearers for switches and much more.

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Strängbetong Rail is a part of the Consolis Group, a European leader in construction, public works and rail infrastructure, designing and manufacturing concrete products, www.consolis.com. Consolis Rail is a European leader in designing and manufacturing concrete precast railway infrastructure solutions: sleepers, bearers for switches ad crossings, catenary foundations and level crossings.

The head office is located in Stockholm and the factories are located in Långviksmon and Kungsör. SBR applies an Environmental Management System in accordance with ISO 14001:2015 and a Management system for Quality in line with ISO 9001:2015 (Certified by Bureau Veritas). The factory is also controlled and certified against SS-EN 13369:2013 completed with Swedish national requirements (BBC).

Programme operator and PCR

This EPD is certified within the International EPD® system, administrated by EPD International Ltd, as a subsidiary of the Swedish Environmental Institute (IVL), www.environdec.com.

The EPD has been prepared by WSP. It is made in accordance with the PCR for Construction products 2012:01 (ver 2.2) and is compliant with the European standard EN 15804.

Declared product

This EPD is valid for sleepers SB35F and SBR25ML, manufactured in Strängbetong Rail's factory in Långviksmon and sleepers SBR25ML manufactured in Kungsör. Declared units of this EPD is:

For SB35F 1 precast concrete sleeper, manufactured and transported to the formation layer of the Swedish Transport Administration.

For SBR25ML 1 precast concrete sleeper, manufactured, equipped with a Pandrol Fastclip fastening system, and transported to the store of the Swedish Transport Administration.

Validity

This EPD is valid for five years in accordance with the standard for construction products.

System boundaries

This EPD covers the steps A1-A3, construction of the product. The EPD does not cover the use stage and the end of life.

The product

Specification of the product

The products studied are precast concrete railway sleepers of the types SB35F and SBR25ML. Precast concrete sleepers are used for rail construction. The sleeper supports the rails in railroad tracks, to transfer loads to the track ballast, hold the rails upright and keep them spaced at the correct gauge.

SB35F is the standard sleeper for the Swedish railway infrastructure, managed by the Swedish Transport Administration. The sleeper holds axle-loads up to 35 tonnes and fulfills the requirements of heavy transport system. The sleepers are for example used for the mining lines in the North of Sweden. The LCA covers the monoblock sleeper only (does not include fastening system).

SBR25ML is Strängbetong Rails Main Line sleeper. The LCA for SBR25ML includes the rail fastening system.

Content declaration

The sleeper consists of pre-stressed concrete: reinforcement steel strands (PC-strands), cement and aggregates (sand and crushed stone). A plasticizer is added to increase the workability of the concrete. The composition of the sleepers are listed below.

Material	SB35F	SBR25ML Långviksmon	SBR25ML Kungsör
Cement	18 %	17 %	17 %
Crushed stone	43 %	44 %	75 %
Sand	33 %	32 %	-
Steel strands (PC-strand)	2,3 %	1,8 %	1,8 %
Plasticizer	0,14 %	0,14 %	0,14 %
Water	4 %	4 %	4 %
Fastening system	-	2,2 %	2,2 %
TOTAL WEIGHT (kg)	**278**	**257**	**257**

The ready sleeper is applied with a set of Pandrol fast-clip fastening system, consisting of:

- 4 pcs Cast shoulders (steel)
- 4 pcs Clips (steel)
- 4 pcs Toe insulators and collars (nylon)
- 2 pcs Rail pads (natural rubber)
- 4 pcs Seal plates (polypropylene)

Environment and health during manufacturing

Strängbetong Rail AB is third party verified by Bureau Veritas according to ISO 9001:2015 and ISO 14001:2015, and through Trans Q for Railway products. Strängbetong Rail is working actively with the working environment and acts in accordance with SAM (Systematiskt ArbetsMiljöarbete).

Flow chart

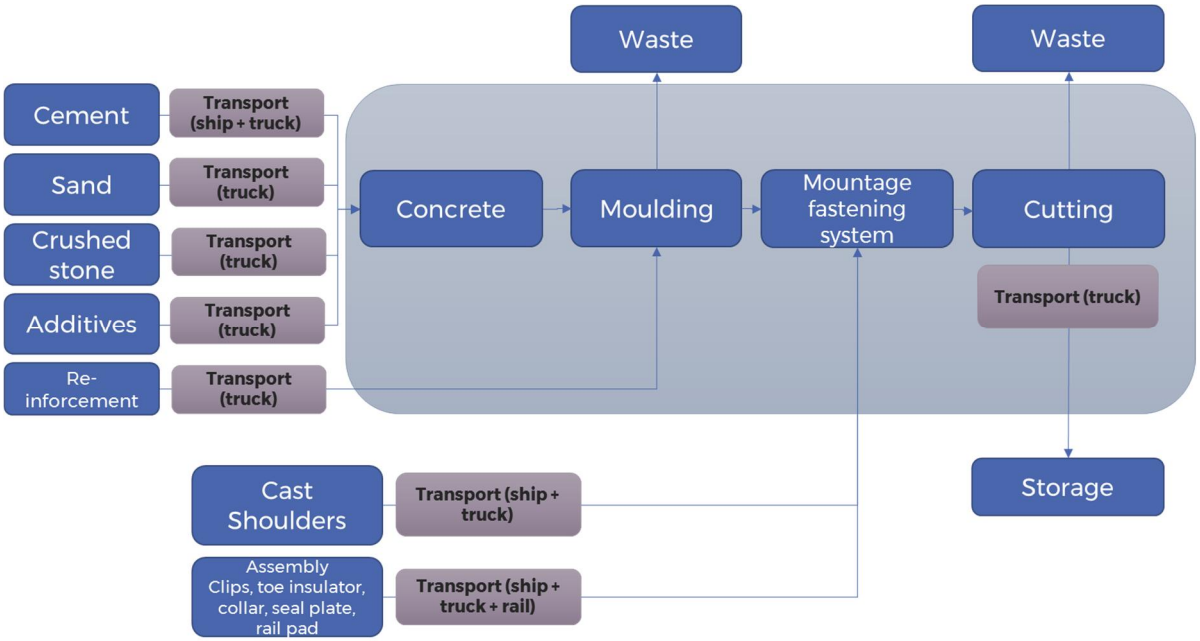

Figure 1 Process map for the sleeper SBR25ML, manufactured in Långviksmon. For the type SB35F the fastening systems are excluded from the LCA. For the sleeper SBR25ML manufactured in Kungsör the process is the same but no sand is used, only crushed stone

Technical information

SB35F

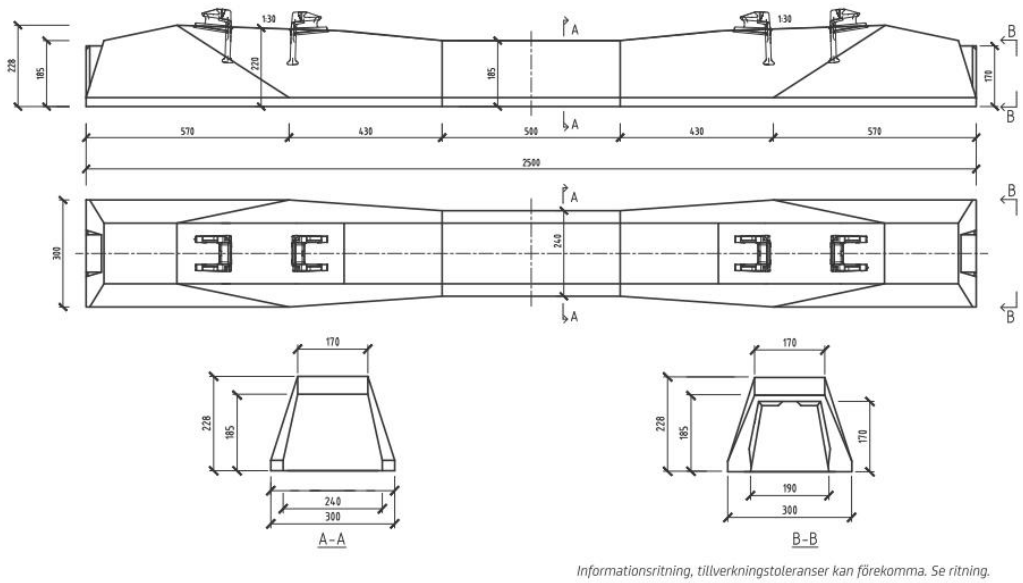

Figure 2 Drawing of sleeper SB35F - only for information, deviations in manufacturing might arise

Technical data	SB35F	Drawing	120786
Axle load	300 kN (max 350 kN)	Length	2500 mm
Max speed	200 km/h	Width	300 mm
Track gauge	1435 mm	Height	220 mm

Rail inclination	1:30	Weight including clips[1]	282 kg
Rail compatible	BV50 & UIC60	Life class	L50

SBR25ML

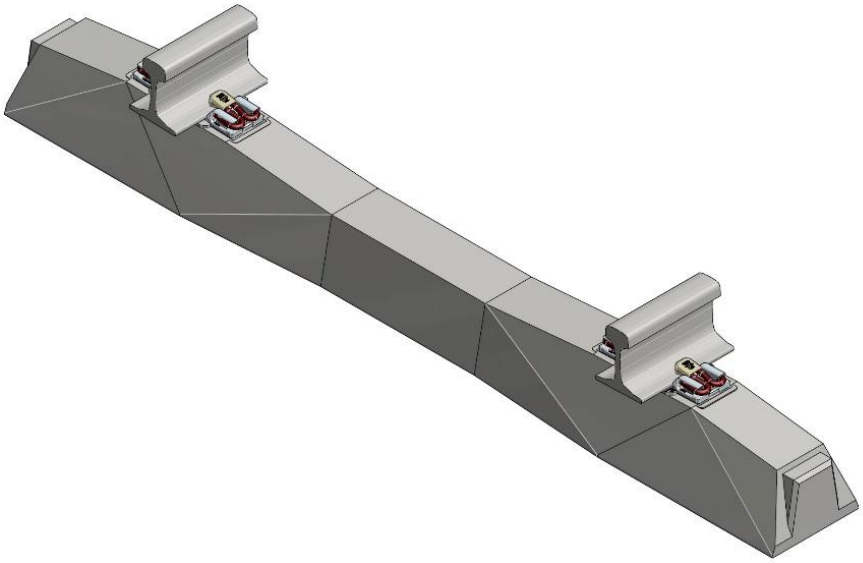

Figure 3 Sleeper SBR25ML with fastening systems (rails included for visualization purpose only, not included in this EPD)

Technical data	SBR25ML	Drawing	120801
Axle load	250 kN	Length	2500 mm
Max speed	250 km/h	Width	280 mm
Track gauge	1437 mm	Height	220 mm
Rail inclination	1:30	Weight including clips	257 kg
Rail compatible	BV50 & UIC60	Life class	L50

[1] NOTE Weight here reported including fastening system – the LCA is based on a sleeper without fastening system

LCA calculation rules

Declared unit

This EPD summarizes the results of three studies: for sleepers of the type SB35F, manufactured in the factory in Långviksmon; for the sleeper SBR25ML manufactured in Långviksmon and for the sleeper SBR25ML manufactured in Kungsör. Environmental impacts for SB35F are calculated for the concrete sleeper only while the results for SBR25ML also includes the fastening system. The study includes transportation to the formation layer of the Swedish Transport Administration.

System boundary

This EPD is “cradle to gate”, considering the modules A1, A2 and A3.

- A1 production of preliminary products
- A2 transport to the plant
- A3 Production including provision of energy, production of packaging as well as auxiliaries and consumables and waste treatment

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The production of sleepers take place in Långviksmon in northern Sweden and in Kungsör in the center of Sweden. Concrete and reinforcement steel are manufactured in Sweden; additional materials are produced mainly in Europe.

Estimates and assumptions

Data for production at the factory in Kungsör has not yet started. Values for the factory in Kungsör have been estimated based on the production in Långviksmon as the processes at the two plants are assumed to be similar.

Cut-off criteria

All raw materials submitted for the formulations and production data were taken into consideration. The manufacture of machinery, plant and other infrastructure required for production of the products under review were not taken into consideration in the LCA, in accordance with the PCR. Waste other than spillage has been neglected.

Data quality

Specific data has been used for the production of sleepers, based on environmental reports for the factories. Specific data has been used for the supply of cement, reinforcement steel and plasticizer, in terms of Environmental Product Declarations in line with the standard EN 15804.

Data for transports uses NTM.

Generic data is retrieved from the ecoinvent ver 3 database.

Period under review

Representative data were compiled in 2017 and represents the reference year 2016

Allocation

For heat and electricity use in the factories, allocation has been made based upon mass of production.

Comparability

Results presented in different EPD:s are only comparable if they are carried out in accordance with the same product category rules, in this case EN 15804, and if the context is taken into account.

Environmental performance-related information

The environmental performance section of the declaration is based on a lifecycle assessment (LCA) carried out by WSP in 2017.

Emissions to air – environmental impact

Parameter	Unit	SBR25ML (Långviksmon) A1-A3	SBR25ML (Kungsör) A1-A3	SB35F (without fastening) A1-A3
Global warming potential (GWP)	kg CO_2-eq	45,50	45,29	41,40
Ozone depletion potential (ODP)	kg CFC11-Eq	$9{,}76 \cdot 10^{-07}$	$9{,}26 \cdot 10^{-07}$	$4{,}10 \cdot 10^{-07}$
Acidification potential (AP)	kg SO_2-eq	0,138	0,132	0,0862
Eutrophication potential (EP)	kg PO_4^{3-}-Eq	0,028	0,027	0,0124
Photochemical ozone creation potential (POCP)	kg ethen-eq	0,009	0,009	0,0055
Abiotic depletion potential for non-fossil resources (ADP-elements)	kg Sb-eq	0,0001	0,0001	$8{,}50 \cdot 10^{-07}$
Abiotic depletion potential for fossil resources (ADP-fossil fuels)	MJ	303,9	284,8	188,8

Use of resources

Parameter	Unit	SBR25ML (Långviksmon) A1-A3	SBR25ML (Kungsör) A1-A3	SB35F (without fastening) A1-A3
Renewable primary energy as energy carrier	MJ	96,65	105,25	111,3
Renewable primary energy resources as raw materials	MJ	3,952	3,803	1,817
Total use of renewable primary energy resources	MJ	100,6	109,1	113,1
Non-renewable primary energy as energy carrier	MJ	277,9	268,4	143,2
Non-renewable primary energy as raw material	MJ	6,483	6,502	1,874
Total use of non-renewable primary energy	MJ	284,3	274,9	145,1
Use of secondary material	kg	10,88	10,94	13,70
Use of renewable secondary fuels	MJ	30,33	30,68	33,87
Use of non-renewable secondary materials	MJ	37,12	37,55	0
Net use of fresh water	m^3	0,151	0,153	0,0526

Output flows and waste

Parameter	Unit	SBR25ML (Långviksmon) A1-A3	SBR25ML (Kungsör) A1-A3	SB35F (without fastening) A1-A3
Hazardous waste disposed	kg	0,041	0,036	0,0013
Non-hazardous waste disposed	kg	0,364	0,417	0,3690
Radioactive waste disposed	kg	0,008	0,008	0,0085
Components for re-use	kg	0	0	0
Materials for recycling	kg	$1{,}38 \cdot 10^{-08}$	$1{,}38 \cdot 10^{-08}$	0
Materials for energy recovery	kg	0,0002	0	0
Exported energy	MJ per energy carrier	0	0	0

Interpretation

The largest contribution to the greenhouse gas emissions stem from the input of steel and cement. For the sleepers that have been studied with fastening systems included, the contribution from cement lies around 65 % and the steel at 11 %. For the other sleeper type the contribution is a bit higher (78 % and 16 % respectively). Transports make up about 2-5 % of the greenhouse gas emissions and almost one third of acidifying emissions, while the factories give rise to only ca 1 %.

Programme related information and mandatory statements

Data from different EPD:s may not be comparable if they don't comply with the standard EN 15804. EPD:s from different EPD programmes might not be comparable.

CEN standard FprEN 15804 serves as the core PCR (product Category Rules) PCR review was conducted by the Technical Committee (TC) of the International EPD Consortium (IEC). See www.environdec.com for more information and contact for IEC.	
Independent verification of the declaration, according to EN ISO 14025:2010	
□ Internal	**X External**
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