Environmental
Product
Declaration
According to ISO14025 and EN15804+A2

This declaration is for:
KLP® Hybrid Polymer Sleeper Type 201

Provided by:
Lankhorst Engineered Products B.V.

program operator
Stichting MRPI®
publisher
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www.mrpi.nl

MRPI® registration
1.1.00668.2024
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COMPANY INFORMATION

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MRPI® REGISTRATION

1.1.00668.2024

DATE OF ISSUE

17-10-2024

EXPIRY DATE

17-10-2029

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Gert-Jan Vroege, Eco Intelligence. The LCA study has been done by Bob Roijen, SGS INTRON B.V. The certificate is based on an LCA-dossier according to EN15804+A2. It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPD's of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

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Managing Director MRPI

PRODUCT

KLP® Hybrid Polymer Sleeper Type 201

DECLARED UNIT/FUNCTIONAL UNIT

1m

DESCRIPTION OF PRODUCT

The KLP® Hybrid Polymer Sleeper Type 201 is a 100% recycled polymer sleeper with steel rebar encased, suitable for installation in main track and switches and crossings. This sleeper is available in single lengths up to 5.2 metres.

VISUAL PRODUCT

MORE INFORMATION

https://www.lankhorstrail.com

DEMONSTRATION OF VERIFICATION
CEN standard EN15804 serves as the core PCR(a)
Independent verification of the declaration an data according to ISO14025 and EN15804+A2 internal: external: x
Third party verifier: Gert-Jan Vroege, Eco Intelligence
[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

The KLP® Hybrid Polymer Sleeper Type 201 is a railway sleeper produced from 100% post consumer and post-industrial polymer with steel reinforcement bars encased, using a proprietary injection moulding production process. This hybrid material composition results in a sleeper with high bending stiffness, low thermal expansion and an expected service life of over 50 years.

The sleeper is suitable for installation in plain line track as well as in switches and crossings, available in single lengths up to 5.2 metres.

Cross-section size (mm): 260x150
Reference unit: m
Mass (kg): 39,80
Length (mm): 1000

Material	Amount	Unit
Recycled plastics and additives	85	%
Steel	15	%
Wooden dunnage	125	g/FU
Polyester strapping	75,4	g/FU
Metal buckles	1,07	g/FU

SCOPE AND TYPE

The EPD follows the European standard EN 15804:2012+A2:2019, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

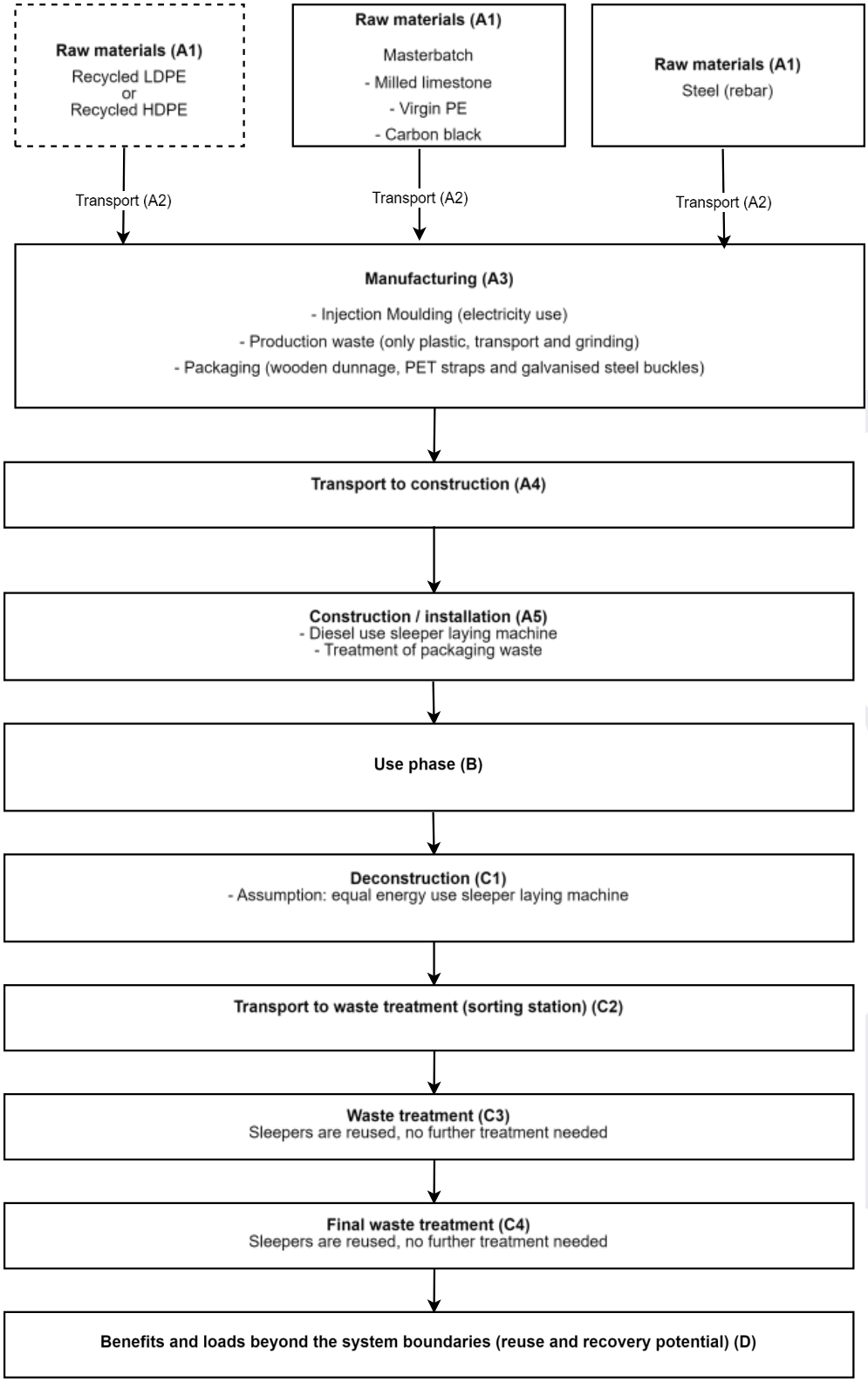
This means that the underlying standards ISO 14040:2006/AMD 1:2020 “Environmental management – Life cycle analysis – Principles and framework” and ISO 14044:20065/AMD 2:2020 “Environmental management. Life cycle assessment – Requirements and Guidelines” have been followed.

These standards are also based on ISO 21930:2017 “Sustainability in building construction – Environmental declaration of building products” and ISO 14025:2006 “Environmental labels and declarations – Type III environmental declarations”.

This is a product specific EPD for sleepers produced by Lankhorst in Sneek (NL) and supplied internationally.

The LCA calculations were made using Simapro and Ecoinvent v3.6 software. In the LCA calculations ecoinven infrastructure processes are included and ecoinvent long-term emissions are excluded.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USER STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to 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	X	X	X	ND	ND	ND	ND	ND	ND	X	X	X	X	X
X= Modules Assessed ND= Not Declared																


Raw materials (A1)
Recycled LDPE
or
Recycled HDPE
Raw materials (A1)
Masterbatch
- Milled limestone
- Virgin PE
- Carbon black
Raw materials (A1)
Steel (rebar)
Transport (A2)
Transport (A2)
Transport (A2)
Manufacturing (A3)
- Injection Moulding (electricity use)
- Production waste (only plastic, transport and grinding)
- Packaging (wooden dunnage, PET straps and galvanised steel buckles)
Transport to construction (A4)
Construction / installation (A5)
- Diesel use sleeper laying machine
- Treatment of packaging waste
Use phase (B)
Deconstruction (C1)
- Assumption: equal energy use sleeper laying machine
Transport to waste treatment (sorting station) (C2)
Waste treatment (C3)
Sleepers are reused, no further treatment needed
Final waste treatment (C4)
Sleepers are reused, no further treatment needed
Benefits and loads beyond the system boundaries (reuse and recovery potential) (D)

ENVIRONMENT IMPACT per functional unit or declared unit (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	7,04 E+00	7,41 E-01	1,89 E+00	9,67 E+00	8,10 E-01	5,09 E-01	0,00 E+00	ND	ND	ND	ND	ND	ND	1,64 E-01	2,69 E-01	0,00 E+00	0,00 E+00	-5,43 E+00
GWP-fossil	kg CO2 eq.	7,03 E+00	7,40 E-01	2,09 E+00	9,86 E+00	8,10 E-01	3,03 E-01	0,00 E+00	ND	ND	ND	ND	ND	ND	1,64 E-01	2,69 E-01	0,00 E+00	0,00 E+00	-5,41 E+00
GWP-biogenic	kg CO2 eq.	-6,22 E-03	3,42 E-04	-2,01 E-01	-2,07 E-01	3,74 E-04	2,06 E-01	0,00 E+00	ND	ND	ND	ND	ND	ND	4,57 E-05	1,24 E-04	0,00 E+00	0,00 E+00	-1,90 E-02
GWP-luluc)	kg CO2 eq.	7,85 E-03	2,71 E-04	3,16 E-03	1,13 E-02	2,97 E-04	1,55 E-05	0,00 E+00	ND	ND	ND	ND	ND	ND	1,30 E-05	9,84 E-05	0,00 E+00	0,00 E+00	-6,09 E-03
ODP	kg CFC11 eq.	7,18 E-07	1,63 E-07	1,67 E-07	1,05 E-06	1,79 E-07	3,65 E-08	0,00 E+00	ND	ND	ND	ND	ND	ND	3,55 E-08	5,93 E-08	0,00 E+00	0,00 E+00	-5,87 E-07
AP	mol H+ eq.	3,90 E-02	4,29 E-03	1,64 E-02	5,97 E-02	4,70 E-03	1,80 E-03	0,00 E+00	ND	ND	ND	ND	ND	ND	1,72 E-03	1,56 E-03	0,00 E+00	0,00 E+00	-3,29 E-02
EP-freshwater	kg PO4 eq.	3,56 E-04	7,47 E-06	1,42 E-04	5,06 E-04	8,17 E-06	6,92 E-07	0,00 E+00	ND	ND	ND	ND	ND	ND	5,98 E-07	2,71 E-06	0,00 E+00	0,00 E+00	-2,73 E-04
EP-marine	kg N eq.	8,14 E-03	1,51 E-03	2,34 E-03	1,20 E-02	1,65 E-03	7,96 E-04	0,00 E+00	ND	ND	ND	ND	ND	ND	7,59 E-04	5,49 E-04	0,00 E+00	0,00 E+00	-6,67 E-03
EP-terrestrial	mol N eq.	8,97 E-02	1,67 E-02	3,03 E-02	1,37 E-01	1,82 E-02	8,72 E-03	0,00 E+00	ND	ND	ND	ND	ND	ND	8,33 E-03	6,05 E-03	0,00 E+00	0,00 E+00	-7,65 E-02
POCP	kg NMVOC eq.	3,29 E-02	4,76 E-03	8,42 E-03	4,61 E-02	5,21 E-03	2,39 E-03	0,00 E+00	ND	ND	ND	ND	ND	ND	2,29 E-03	1,73 E-03	0,00 E+00	0,00 E+00	-2,56 E-02
ADP-minerals & metals	kg Sb eq.	6,83 E-05	1,88 E-05	3,53 E-04	4,40 E-04	2,05 E-05	3,64 E-07	0,00 E+00	ND	ND	ND	ND	ND	ND	2,52 E-07	6,80 E-06	0,00 E+00	0,00 E+00	-2,60 E-04
ADP-fossil	MJ, net calorific value	1,13 E+02	1,12 E+01	2,77 E+01	1,52 E+02	1,22 E+01	2,35 E+00	0,00 E+00	ND	ND	ND	ND	ND	ND	2,26 E+00	4,05 E+00	0,00 E+00	0,00 E+00	-8,21 E+01
WDP	m3 world eq. Deprived	4,00 E+00	4,00 E-02	1,24 E+00	5,28 E+00	4,37 E-02	3,81 E-03	0,00 E+00	ND	ND	ND	ND	ND	ND	3,03 E-03	1,45 E-02	0,00 E+00	0,00 E+00	-2,76 E+00

GWP-total = Global Warming Potential total
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 Exceedence
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 Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals = Abiotic Depletion Potential for non-fossil resources [2]
ADP-fossil = Abiotic Depletion for fossil resources potential [2]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ENVIRONMENT IMPACT per functional unit or declared unit (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	6,62 E-07	6,65 E-08	1,47 E-07	8,76 E-07	7,27 E-08	4,62 E-08	0,00 E+00	ND	ND	ND	ND	ND	ND	4,55 E-08	2,41 E-08	0,00 E+00	0,00 E+00	-4,88 E-07
IRP	kBq U235 eq.	4,44 E-01	4,68 E-02	7,54 E-02	5,66 E-01	5,12 E-02	9,97 E-03	0,00 E+00	ND	ND	ND	ND	ND	ND	9,69 E-03	1,70 E-02	0,00 E+00	0,00 E+00	-3,01 E-01
ETP-fw	CTUe	1,48 E+02	9,96 E+00	9,97 E+01	2,58 E+02	1,09 E+01	1,49 E+00	0,00 E+00	ND	ND	ND	ND	ND	ND	1,36 E+00	3,61 E+00	0,00 E+00	0,00 E+00	-1,45 E+02
HTP-c	CTUh	6,54 E-08	3,23 E-10	4,71 E-09	7,05 E-08	3,53 E-10	8,73 E-11	0,00 E+00	ND	ND	ND	ND	ND	ND	4,77 E-11	1,17 E-10	0,00 E+00	0,00 E+00	-4,00 E-08
HTP-nc	CTUh	1,83 E-06	1,09 E-08	1,06 E-07	1,95 E-06	1,19 E-08	1,72 E-09	0,00 E+00	ND	ND	ND	ND	ND	ND	1,17 E-09	3,95 E-09	0,00 E+00	0,00 E+00	-1,10 E-06
SQP	----	3,25 E+01	9,68 E+00	4,91 E+01	9,14 E+01	1,06 E+01	3,53 E-01	0,00 E+00	ND	ND	ND	ND	ND	ND	2,89 E-01	3,51 E+00	0,00 E+00	0,00 E+00	-3,90 E+01

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]
- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	2,46 E-04	2,83 E-05	6,57 E-04	9,31 E-04	3,09 E-05	6,44 E-06	0,00 E+00	ND	ND	ND	ND	ND	ND	6,16 E-06	1,03 E-05	0,00 E+00	0,00 E+00	-5,25 E-04
NHWD	kg	1,80 E+00	7,08 E-01	6,45 E-01	3,15 E+00	7,75 E-01	2,79 E-02	0,00 E+00	ND	ND	ND	ND	ND	ND	2,68 E-03	2,57 E-01	0,00 E+00	0,00 E+00	-1,80 E+00
RWD	kg	4,29 E-04	7,33 E-05	6,66 E-05	5,69 E-04	8,02 E-05	1,61 E-05	0,00 E+00	ND	ND	ND	ND	ND	ND	1,57 E-05	2,66 E-05	0,00 E+00	0,00 E+00	-3,06 E-04
CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	ND	ND	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MFR	kg	7,44 E-02	0,00 E+00	1,00 E-02	8,44 E-02	0,00 E+00	1,11 E-02	0,00 E+00	ND	ND	ND	ND	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-4,78 E-02
MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	ND	ND	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,32 E-01	0,00 E+00	ND	ND	ND	ND	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
ETE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,17 E-01	0,00 E+00	ND	ND	ND	ND	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

RESOURCE USE per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	8,64 E+00	1,40 E-01	5,69 E+01	6,57 E+01	1,53 E-01	1,44 E-02	0,00 E+00	INA	INA	INA	INA	INA	INA	1,22 E-02	5,07 E-02	0,00 E+00	0,00 E+00	-3,56 E+01
PERM	MJ	3,04 E-06	0,00 E+00	0,00 E+00	3,04 E-06	0,00 E+00	0,00 E+00	0,00 E+00	INA	INA	INA	INA	INA	INA	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-1,72 E-06
PERT	MJ	8,64 E+00	1,40 E-01	5,69 E+01	6,57 E+01	1,53 E-01	1,44 E-02	0,00 E+00	INA	INA	INA	INA	INA	INA	1,22 E-02	5,07 E-02	0,00 E+00	0,00 E+00	-3,56 E+01
PENRE	MJ	1,21 E+02	1,19 E+01	2,96 E+01	1,62 E+02	1,30 E+01	2,49 E+00	0,00 E+00	INA	INA	INA	INA	INA	INA	2,40 E+00	4,30 E+00	0,00 E+00	0,00 E+00	-8,78 E+01
PENRM	MJ	9,90 E-07	0,00 E+00	0,00 E+00	9,90 E-07	0,00 E+00	0,00 E+00	0,00 E+00	INA	INA	INA	INA	INA	INA	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-5,61 E-07
PENRT	MJ	1,21 E+02	1,19 E+01	2,96 E+01	1,62 E+02	1,30 E+01	2,49 E+00	0,00 E+00	INA	INA	INA	INA	INA	INA	2,40 E+00	4,30 E+00	0,00 E+00	0,00 E+00	-8,78 E+01
SM	kg	3,84 E+01	0,00 E+00	0,00 E+00	3,84 E+01	0,00 E+00	0,00 E+00	0,00 E+00	INA	INA	INA	INA	INA	INA	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-2,18 E+01
RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	INA	INA	INA	INA	INA	INA	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	INA	INA	INA	INA	INA	INA	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
FW	m3	1,12 E-01	1,36 E-03	4,13 E-02	1,55 E-01	1,49 E-03	1,88 E-04	0,00 E+00	INA	INA	INA	INA	INA	INA	1,16 E-04	4,93 E-04	0,00 E+00	0,00 E+00	-8,11 E-02

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

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	Kg C	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
BCCpa	kg C	0,00 E+00	0,00 E+00	0,00 E+00	5,61 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

The life cycle phases that have been modelled are confined by system boundaries, which determine which stages and processes in the life cycle are included.

Product Stage (A1-A3)

The main constituents of the sleepers are recycled plastic and steel. A small amount additives is blended with the main constituents for colour, UV stability and processing.

The raw materials are blended, heated and moulded into a sleeper. The process consumes electricity. Infrastructure processes for the production of the sleepers were included based on Ecoinvent process: Extrusion, plastic pipes {RER}| extrusion, plastic pipes | Cut-off.

A small amount of production waste is produced which is disposed of to plastic recyclers.

Products are cooled using water contained within a closed loop system.

Transport to Construction (A4)

For the purposes of the LCA the default transportation scenario according to the “assessment method” was used which assumed the sleepers were transported 150 km by truck.

Construction process (A5)

Only the diesel use for a mechanised sleeper laying machine was included in the construction process stage (A5) and estimated to be 0,05 l diesel per sleeper. According Environmental life-cycle assessment of railway track beds. Kiani, Mohamad, Parry, Tony and Heather, Ceney. s.l. : Engineering Sustainability, 2008, Engineering Sustainability the diesel use of the sleeper laying machine is 5 l/hr, the speed of the machine is 14 hr/km and 1500 sleepers per km.

This module also includes the end-of-life treatment of packaging. The EoL scenario for packaging is:
- for wood: 10% landfill, 85% incineration and 5% recycling
- for polyester strapping: 10% landfill, 85% incineration and 5% recycling
- for metal buckles: 5% landfill and 95% recycling.

Use phase (B)

There are no environmental burdens to be expected during the use phase of the sleepers since no (during normal use) no maintenance or replacements are to be expected.

End of Life Stage (C1-D)

It was assumed that the sleepers are removed from the construction at end of life. It was assumed that the energy use for this process was equal to the energy use in the construction phase (C1). The sleepers would be transported to a sorting station which was calculated with the default scenario from the assessment method (50 km by truck) (C2). At the end of service life, it is already the intention of Lankhorst's customers that all sleepers will be reused, ideally in railways. No further processing is needed, after being transported to the recycling station the end-of-waste point is reached. The beneficial effect of reuse is included in Module D using a quality factor (0,67) based on the default value for plastic recycling in the ‘processendatabase”.

To enable users of the EPD to make project-specific calculations for transport to the application, transport by truck and ferry is also included. The unit is 1 kgkm. The contribution of transport can be calculated by multiplying the environmental profiles with the mass of the sleepers and the transport distance.

Indicator	Unit	Lorry (1 kgkm)	Ferry (1 kgkm)	Container ship (1 kgkm)
GWP-total	[kg CO2 eq.]	1,35E-04	1,10E-04	9,42E-06
GWP-fossil	[kg CO2 eq.]	1,35E-04	1,10E-04	9,42E-06
GWP-biogenic	[kg CO2 eq.]	0,00E+00	0,00E+00	0,00E+00
GWP-luluc)	[kg CO2 eq.]	4,95E-08	6,84E-08	6,51E-09
ODP	[kg CFC11 eq.]	2,98E-11	2,21E-11	1,89E-12
AP	[mol H+ eq.}	7,83E-07	3,60E-06	3,06E-07
EP-freshwater	[kg PO4 eq.]	1,36E-09	4,20E-10	3,86E-11
EP-marine	[kg N eq.]	2,76E-07	8,98E-07	7,52E-08
EP-terrestrial	[mol N eq.]	3,04E-06	9,98E-06	8,37E-07
POCP	[kg NMVOC eq.]	8,68E-07	2,58E-06	2,17E-07
ADP-minerals&metals	[kg Sb eq.]	3,42E-09	7,37E-10	7,00E-11
ADP-fossil	[MJ, net calorific value]	2,04E-03	1,40E-03	1,20E-04
WDP	[m3 world eq. Deprived]	7,28E-06	1,85E-06	1,76E-07
PM	Disease incidence	1,21E-11	3,32E-12	2,89E-13
IRP	kBq U235 eq.	8,53E-06	6,04E-06	5,16E-07
ETP-fw	CTUe	1,81E-03	8,87E-04	7,75E-05
HTTP-c	CTUh	5,89E-14	5,79E-14	5,34E-15
HTTP-nc	CTUh	1,98E-12	6,93E-13	6,19E-14
SQP	----	1,77E-03	1,87E-04	1,62E-05
PERE	[MJ]	2,55E-05	8,84E-06	8,11E-07
PERM	[MJ]	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	2,55E-05	8,84E-06	8,11E-07
PENRE	[MJ]	2,16E-03	1,49E-03	1,28E-04
PENRM	[MJ]	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	2,16E-03	1,49E-03	1,28E-04
SM	[kg]	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ}	0,00E+00	0,00E+00	0,00E+00
FW	[m3]	2,48E-07	6,76E-08	6,27E-09
HWD	[kg]	5,16E-09	1,25E-09	1,10E-10
NHWD	[kg]	1,29E-04	2,98E-06	2,79E-07
RWD	[kg]	1,34E-08	9,80E-09	8,37E-10
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	0,00E+00	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	0,00E+00

DECLARATION OF SVHC

No substances that are listed in the latest “Candidate List of Substances of Very High Concern for authorisation” are included in the product that exceed the limit for registration.

REFERENCES

•EN 15804:2012+A2:2019 en. - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products. 1 November 2019.
•ISO 14040:2006. Environmental management — Life cycle assessment — Principles and framework. 2006.
•ISO 14044:2006. Environmental management — Life cycle assessment — Requirements and guidelines. 2006.
•ISO 21930:2017. Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services. 2017.
•ISO 14026:2006. Environmental labels and declarations — Type III environmental declarations — Principles and procedures. 2006.
•Environmental life-cycle assessment of railway track beds. Kiani, Mohamad, Parry, Tony and Heather, Ceney. s.l. : Engineering Sustainability, 2008, Engineering Sustainability.
•SGS INTRON report: A153920/R20241876

REMARKS

None.