Environmental Product Declaration
according to ISO 14025 and EN 15804

MRPI
milieu relevante product informatie

This declaration is for:
Senso Natural Resin Flooring

Provided by:
Senso Gietvloeren (Dutch Design Group)

SENSO
THINK UNITED

program operator
Stichting MRPI®
publisher
Stichting MRPI®
www.mrpi.nl

MRPI® registration
1.1.00102.2020
EPD registration
00001121
date of first issue
05-02-2020
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05-02-2025

ECO PLATFORM
EPD
EN 15804   VERIFIED

PROGRAM OPERATOR
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COMPANY INFORMATION

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THINK UNITED

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PRODUCT
Senso Natural Resin Flooring

MRPI® REGISTRATION
1.1.00102.2020

EPD REGISTRATION
00001121

DATE OF ISSUE
05-02-2020

EXPIRY DATE
05-02-2025

DECLARED UNIT/FUNCTIONAL UNIT
1 kilogram

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by **Anne Kees Jeeninga, Advieslab Jeeninga.**
The LCA study has been done by **Gert-Jan Vroege en Martijn van Hövell, SGS Search Consultancy.**
The certificate is based on an LCA-dossier according to ISO14025 and NEN-EN15804+A1. It is verified according to the 'EPD-MRPI® verification protocol May 2017.v3.1'. EPD's of construction products may not be comparable if they do not comply with NEN-EN15804+A1. 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.

VISUAL PRODUCT

DESCRIPTION OF PRODUCT

Senso floors are made from vegetable oil, resin and filler material. The floors are cast and placed on surfaces for utility- and residential buildings. The floor is coloured with pigments.

MORE INFORMATION

www.sensovloeren.nl and
www.sensofloors.co.uk

DEMONSTRATION OF VERIFICATION
CEN standard EN15804 serves as the core PCR[a]
Independent verification of the declaration and data, according to EN ISO 14025:2010:
internal: external: X
(where appropriate[b]) Third party verifier:
Anne-Kees Jeeninga, Advieslab Jeeninga
[a] Product Category Rules [b] Optional for B-to-B communication, mandatory for B-to-C communication (see EN ISO 14025:2010, 9.4).

DETAILED PRODUCT DESCRIPTION

Senso cast floors are made from hydrogenated castor oil, resin and a filler material. In addition, a variety of pigments can be added which enables the floor to be produced in almost any colour. Moreover, mixtures in different colours can be combined while applying the floor, which can give the floor a concrete look.

Two components are prepared by Herculan and stored in steel cans. After mixing the two components at the building site, the floor can be applied. This process involves pouring and equalizing the mixture over the floor so as to create a smooth surface. After the floor is hardened, a protective PU coating can be applied.

It should be noted that the natural resin floors require an equalized surface for efficient material use. Nevertheless, the materials and effort of equalizing the subfloor is not included in this EPD.

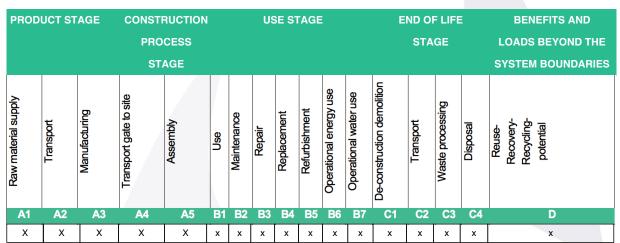The reference service life of a natural resin floor is 15 years.

COMPONENT (> 1%)	[kg / %]
Composition classified	----

(*) > 1% of total mass

SCOPE AND TYPE

Senso flooring systems, has commissioned SGS Search to perform a life cycle assessment (LCA) of their seamless natural resin floors. The objective of this study is to publish third party verified data about the environmental performance of Senso cast floors in an ECO-platform EPD. It concerns a cradle to grave study. The following standards are followed: NEN EN 15804 [1], ISO14040 [2], ISO 14044 [3] and ISO 14025 [4]. To date, no Product Category Rules for cast floors are available. This EPD is not comparable with EPDs from other construction products that do not comply with the EN 15804.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE 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	x	x	x	x	x	x	x	x	x	x	x

X = Module assessed

MNA = Module not assessed

REPRESENTATIVENESS

Scope and type

The geographical location is the Netherlands and the product is manufactured by Herculan in Meerkerk, the Netherlands. Background database used for the calculations is Ecoinvent version 3.4 in combination with the SimaPro 9.0 LCA software. The EPD is based on a "Cradle to Grave" LCA study. The EPD is a specific EPD for a specific product.

Representativeness

Senso offers natural resin floors in many colours. This EPD, however, is based on an LCA where a red pigment is used. This pigment is modelled with a process for an average inorganic chemical. The LCA model is not sensitive for changes in the pigment and presumed can be that this EPD is representative for all colours natural resin floors Senso offers.

Environmental impact per declared unit

Functional unit is 1 kg seamless natural resin floor and can be scaled to various thicknesses. On average a Senso floor has a thickness of 2,8 – 3 mm, this results in approximately 3 kg/m3. Scaling is explained in more detail under the heading scaling. Results are presented in the table below per life cycle phase.

ENVIRONMENTAL IMPACT per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb-eq.	1.06 E -5	5.60 E -8	1.72 E -7	1.08 E -5	4.16 E -7	4.50 E -7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.31 E -7	3.75 E -8	3.95 E -8	1.41 E -9	-1.18 E -7
ADPF	MJ	3.41 E +1	2.87 E -1	1.61 E +0	3.60 E +1	1.11 E +0	3.43 E +0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.86 E +0	2.00 E -1	3.42 E -1	2.50 E -2	-6.95 E +0
GWP	kg CO2-eq.	2.18 E +0	1.90 E +0	1.40 E -1	4.22 E +0	7.63 E -2	2.33 E -1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49 E -1	1.32 E -2	3.30 E -1	4.87 E -3	-4.52 E -1
ODP	kg CFC11-eq.	1.86 E -7	3.51 E -9	9.65 E -9	1.99 E -7	1.31 E -8	6.37 E -9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.82 E -9	2.43 E -9	3.28 E -9	2.69 E -10	-5.33 E -8
POCP	kg ethene-eq.	1.02 E -3	3.20 E -6	6.81 E -5	1.10 E -3	1.32 E -5	6.15 E -5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.16 E -5	2.30 E -6	6.75 E -6	9.59 E -7	-1.26 E -4
AP	kg SO2-eq.	2.38 E -2	7.08 E -5	4.94 E -4	2.44 E -2	2.40 E -4	1.30 E -3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.51 E -4	5.71 E -5	1.94 E -4	7.18 E -6	-1.29 E -3
EP	kg (PO4)3--eq.	6.48 E -3	1.24 E -5	7.09 E -5	6.57 E -3	3.75 E -5	2.77 E -4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.82 E -5	1.05 E -5	6.19 E -5	1.32 E -6	-3.09 E -4
Toxicity indicators (Dutch market)																			
HTP	kg DCB-eq.	1.39 E +0	7.34 E -3	5.77 E -2	1.46 E +0	2.46 E -2	5.02 E -2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25 E -2	5.27 E -3	6.08 E -2	5.15 E -4	-1.25 E -1
FAETP	kg DCB-eq.	8.88 E -2	2.09 E -4	1.41 E -3	9.05 E -2	6.58 E -4	3.59 E -3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.51 E -4	1.55 E -4	1.74 E -2	9.27 E -6	-1.90 E -3
MAETP	kg DCB-eq.	7.60 E +1	7.79 E -1	3.86 E +0	8.07 E +1	2.49 E +0	6.52 E +0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67 E +0	5.58 E -1	1.01 E +2	3.30 E -2	-3.28 E +0
TETP	kg DCB-eq.	7.50 E -3	2.60 E -5	5.22 E -4	8.05 E -3	1.12 E -4	3.86 E -4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.88 E -4	1.87 E -5	4.07 E -4	1.60 E -6	-6.11 E -4
Environmental Cost Indicator (Dutch market)																			
ECI	Euro	4.06 E -1	2.15 E -3	1.58 E -2	4.24 E -1	7.81 E -3	2.53 E -2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06 E -2	1.56 E -3	3.41 E -2	3.40 E -4	-4.35 E -2

ADPE = Abiotic Depletion Potential for non-fossil resources

ADPF = Abiotic Depletion Potential for fossil resources

GWP = Global Warming Potential

ODP = Depletion potential of the stratospheric ozone layer

POCP = Formation potential of tropospheric ozone photochemical oxidants

AP = Acidification Potential of land and water

EP = Eutrophication Potential

HTP = Human Toxicity Potential

FAETP = Fresh water aquatic ecotoxicity potential

MAETP = Marine aquatic ecotoxicity potential

TETP = Terrestrial ecotoxicity potential

ECI = Environmental Cost Indicator

www.mrpi.nl: 1.1.00102.2020 Senso Natural Resin Flooring

RESOURCE USE per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	1.74 E +0	4.14 E -3	8.48 E -1	2.59 E +0	1.86 E -2	1.79 E -1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.29 E -1	2.79 E -3	1.85 E -2	7.96 E -4	2.67 E -1
PERM	MJ	1.08 E +1	0.00	3.02 E -2	1.08 E +1	0.00	2.70 E -1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.03 E +1
PERT	MJ	1.25 E +1	4.14 E -3	8.78 E -1	1.34 E +1	1.86 E -2	4.49 E -1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.29 E -1	2.79 E -3	1.85 E -2	7.96 E -4	-9.99 E +0
PENRE	MJ	2.94 E +1	3.11 E -1	1.80 E +0	3.16 E +1	1.20 E +0	3.95 E +0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.35 E +0	2.16 E -1	3.94 E -1	2.74 E -2	1.79 E +0
PENRM	MJ	9.99 E +0	0.00	2.80 E -2	1.00 E +1	0.00	2.50 E -1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-9.49 E +0
PENRT	MJ	3.94 E +1	3.11 E -1	1.83 E +0	4.16 E +1	1.20 E +0	4.20 E +0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.35 E +0	2.16 E -1	3.94 E -1	2.74 E -2	-7.70 E +0
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m3	7.93 E -2	5.54 E -5	9.32 E -4	8.03 E -2	2.26 E -4	5.70 E -3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66 E -3	3.88 E -5	8.95 E -4	2.78 E -5	-1.97 E -3

INA = Indicator Not Assessed

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

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	3.26 E -5	1.76 E -7	8.57 E -6	4.13 E -5	8.99 E -7	1.32 E -6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.97 E -6	1.25 E -7	9.85 E -7	2.08 E -8	-3.38 E -5
NHWD	kg	2.63 E -1	1.58 E -2	1.49 E -2	2.94 E -1	3.43 E -2	1.60 E -2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.59 E -3	1.24 E -2	4.66 E -2	1.00 E -1	-1.35 E -2
RWD	kg	4.53 E -5	1.99 E -6	2.35 E -6	4.96 E -5	7.43 E -6	2.06 E -6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.30 E -6	1.37 E -6	1.16 E -6	1.54 E -7	-5.76 E -6
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00 E -2
MFR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.75 E -1
EEE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.18 E +0
ETE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.48 E +0

INA = Indicator Not Assessed

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

CALCULATION RULES

Cut off rules

All relevant and known processes and materials have been included. The following modules and processes have been excluded from the system boundary:

• Maintenance and operation of support equipment except those included in Ecoinvent background processes;

• Capital goods and infrastructure (except those included in Ecoinvent background processes).

There is no reason to believe that relevant in- or outputs are excluded from this study.

Data collection and quality

Data is retrieved from a Bill of Materials (BoM) supplied by Senso and Herculan. There are no inconsistencies found in the data and there is no reason to believe that data is incomplete or not reliable. Data for energy consumption of the year 2018 is used for the LCA study and allocated by mass of produce.
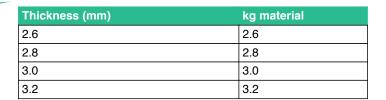
All suppliers of raw materials were asked for LCA data based on EN15804. Nevertheless, none of the suppliers had any data of this kind available and neither detailed process information. Hence, processes are modelled with generic data.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Scaling

Results are presented in kilograms and can be scaled according to the thickness of the floor. The applied thickness of the floor is on average 2,8 – 3 mm. Production waste scales with the weight and thus the thickness of the floor. The protective coating is calculated for a thickness of 3 mm. Nevertheless, the contribution of the coating is minimal and will not cause deviations of more than 1% when scaled in the range of possibilities.

Thickness (mm)	kg material
2.6	2.6
2.8	2.8
3.0	3.0
3.2	3.2

A1. Raw materials supply

This module considers the extraction and processing of all raw materials used in the Senso natural resin floors manufacturing process, as well as waste processing of production waste up to the end-of-waste state.

A2. Transport of raw materials to manufacturer

This includes the transport of the raw materials to the manufacturing facility via road, boat and/or train.

A3. Manufacturing

This module covers the manufacturing process of Senso natural resin floors and includes all processes linked to production such as storing, mixing, packing and internal transportation. Use of electricity and fuels production are taken into account as well as direct emissions from production

process. The manufacturing of production equipment and infrastructure is not included in the system boundary, unless it is included in Ecoinvent background processes. Packaging-related flows in the production process are included in the manufacturing module.

The manufacturing process takes place at one production site. For upstream (raw material processes) and downstream processes (waste processing) generic data is used when no specific data is obtained.

A4. Transport to customers/ building site
Products are transported to costumers with a small truck. Since customers are located throughout the country (the Netherlands) an average distance of 150 km is assumed.

A5. Construction and installation process
This module includes the mixing process at the building site, production and packaging waste as well as the transport and processing of waste up to the end-of-waste state. Moreover, the protective coating for the floor is included in this phase as auxiliary material.

B1-7. Use phase
The product as assessed for this EPD does not require maintenance during the use phase.

C1. De-construction demolition
Senso floors are removed by cutting lanes with a plunge saw. For this process the energy consumption of the saw is calculated for an average floor based on experiences from Senso.

C2. Transport to waste treatment
This module includes transport to the recycling facility. Considering the product is applied in buildings throughout the country, average transport distances of 50, 50 and 100 km are used for recycling, incineration and landfill respectively.

C3. Waste processing
In the end-of-life phase the product can be recycled, incinerated or send to landfill. A conservative end of waste scenario in which 85% is recycled, 5% is incinerated and 10% is sent to landfill is assumed.

In this phase the micronization process is included as preparation for recycling. In addition the incineration process is included. It should be mentioned that the incineration process happens at an incineration plant in the Netherlands which all have the R1 status. Thus, heat and electricity production from this process are declared in module D.

C4. Disposal
In this phase the landfill process is included.

D. Benefits and loads beyond the system boundaries
Avoided production of material due to recycling as well as avoided electricity and heat production from incineration are included in this module.

In the end-of-life scenario for this product 85% of the material will be recycled. The recycled material

can replace the part filler material in the production of the floor mixtures and avoided production of the filler material is calculated as such. For the material that is incinerated the average efficiency of waste incineration plants in the Netherlands is used i.e. 18% electricity and 31% heat. For the avoided energy consumption energy form biomass and fossil resources are distinguished.

DECLARATION OF SVHC

None of the substances contained in the product are listed in the "Candidate List of Substances of Very High Concern for authorisation", or they do not exceed the threshold with the European Chemicals Agency.

REFERENCES

• EN 15804:2012+A1:2014 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
• ISO, 2006. "Environmental management. Life cycle assessment - Principles and framework". ISO 14040:2006.
• ISO, 2006. "Environmental management. Life cycle assessment – Requirements and Guidelines". ISO 14044:2006.
• ISO, 2000. "Environmental labels and declarations – Type III environmental declarations", ISO/TR 14025:2000.

REMARKS

None