nora systems GmbH

Programme holder
Institut Bauen und Umwelt e.V. (IBU)

Publisher
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Declaration number
EPD-NOR-20180125-ICA1-EN

Issue date
06/12/2018

Valid to
05/12/2023

noraplan® 913, resilient floor covering from rubber – according to EN 1817 (Resilient floor coverings – Specification for homogeneous and heterogeneous smooth rubber floor coverings)
nora systems GmbH
1. General Information

nora systems GmbH
Programme holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

noraplan® 913
Owner of the declaration
nora systems GmbH
Höhnerweg 2-4
69469 Weinheim (Bergstrasse)
Germany

Declarer number
EPD-NOR-20180125-ICA1-EN

This declaration is based on the product
category rules:
Floor coverings, 02/2018
(PCR checked and approved by the SVR)

Issue date
06/12/2018

Valid to
05/12/2023

Scope:
Product line noraplan® 913
Rubber floor coverings continuously vulcanised
in sheets in various colours and designs.
This declaration is an Environmental Product
Declaration according to ISO 14025 describing
the specific environmental performance of the mentioned
construction products produced in Germany
(Weinheim/Bergstraße).

The owner of the declaration shall be liable for the
underlying information and evidence; the IBU shall not
be liable with respect to manufacturer information, life
cycle assessment data and evidences.

Verification
The standard /EN 15804/ serves as the core PCR
Independent verification of the declaration and data
according to /ISO 14025:2010/

[ ] internally [x] externally

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Dipl. Ing. Hans Peters
(Head of Board IBU)

Dr. Frank Werner
(Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition
In this Environmental Product Declaration (EPD),
resilient rubber floor coverings of the nora systems
GmbH product line noraplan® 913 are modelled.

Specific characteristics of the noraplan® 913 coverings
are:

- manufacturing method: continuously vulcanised rubber floor coverings in sheets
- covering structure: single-layer
- composition: natural and synthetic rubber, minerals from natural sources, colour pigments, and processing aids

noraplan® 913 are placed on the market in the
EU/EFTA (with the exception of Switzerland) according
Regulation (EU) No. 305/2011 (CPR). The products
have a declaration of performance taking into
consideration /EN 14041/: Resilient, textile, laminate and modular multilayer floor coverings - Essential characteristics and the CE-marking.

For the product line noraplan® 913 further standards apply:

- /DIN EN 1817/: Resilient floor coverings - Specification for homogeneous and heterogeneous smooth rubber floor coverings
- /DIN EN 14521/: Resilient floor coverings - Specification for smooth rubber floor coverings with or without foam backing with a decorative layer
- /DIN EN ISO 10874/: Resilient, textile and laminate floor coverings - Classification
2.2 Application

For use and application the respective national provisions apply. Floor coverings are classified according to /DIN EN ISO 10874/.

Floor coverings for high performance in domestic and professional use:

- Residential:
- Commercial:
- Industrial:

2.3 Technical Data

Excerpt of technical data sheets: (available at www.nora.com)

<table>
<thead>
<tr>
<th>Technical properties</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product thickness /DIN EN ISO 24346/</td>
<td>2</td>
<td>mm</td>
</tr>
<tr>
<td>Grammage /DIN EN ISO 23997/</td>
<td>3.36</td>
<td>g/m²</td>
</tr>
<tr>
<td>Product Form rolls and tiles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of manufacture continuously</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Layer thickness (Top layer)</td>
<td>-</td>
<td>mm</td>
</tr>
<tr>
<td>Hardness /DIN ISO 7619/</td>
<td>92</td>
<td>Shore A</td>
</tr>
<tr>
<td>Abrasion resistance at 5 N load /DIN ISO 4649/ (Verfahren A)</td>
<td>150</td>
<td>mm³</td>
</tr>
<tr>
<td>Improvement in footfall sound absorption /DIN EN ISO 10140-3/</td>
<td>6</td>
<td>dB</td>
</tr>
<tr>
<td>Anti-slip properties /DIN 51130/</td>
<td>R9</td>
<td>with smooth surface</td>
</tr>
<tr>
<td>Anti-slip properties /DIN 51130/</td>
<td>R10</td>
<td>with structured surface</td>
</tr>
</tbody>
</table>

Beside the declared floor covering with 2.0 mm thickness it is also available with 3.0 mm. For this product version the improvement in footfall sound absorption /DIN 10140-3/ is 8 dB. This floor covering is also applicable according to /EN ISO 10874/: industrial (class 43).

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to /EN 14041/:

Resilient, textile, laminate and modular multilayer floor coverings - Essential characteristics

2.4 Delivery status

The delivery takes place as metre goods in rolls of 1.22 m width and different lengths, or as tiles of ~ 610 x 610 mm, loose on pallets (semi-finished products). The backs of the coverings are sanded over their entire surface and have arrows indicating the installation direction.

2.5 Base materials / Ancillary materials

Simplified formulation of noraplan® 913

| Polymers (natural and synthetic rubber):                  | 27%   |
| Minerals (siliceous earth/silicic acid):                  | 53%   |
| Titanium dioxide and various other pigments:              | 11%   |
| Auxiliary substances and vulcanisation system:            | 9%    |

The auxiliary substances used are waxes and antioxidants; the vulcanisation system is based on sulphur as cross linking agent, vulcanisation accelerators and zinc compounds.

1) This product contains substances listed in the candidate list (/REACH/ 16.11.2018) exceeding 0.1 percentage by mass: no

2) This product contains other CMR substances in categories 1A or 1B which are not in the candidate list, exceeding 0.1 percentage by max: no

3) For the manufacturing of the declared product biocides, flame retardants or plasticisers are not used.

2.6 Manufacture

The production stages are weighing, mixing, and stretching of the unvulcanised blanks on a calender. The following vulcanisation is continuously executed on production lines with steam heated drum or double belt presses, where under high pressure and at a temperature of approximately 180°C sheets of 1.22 m width are produced. After the vulcanising machine, the sheets are backside sanded and either wound into rolls or, for tiles, cut to length and die-cut. The mass per unit area is 3.36 kg/m².

nora systems GmbH purchases the total electrical energy for production and administration at the site Weinheim from renewable energy sources of the Ørsted Offshore-Windparks in the Danish North and Baltic sea. Respective evidence is available at IBU.

Thermal energy is generated centrally and in heating boilers from natural gas.

The quality and energy management of nora systems GmbH is certified according to /DIN EN ISO 9001/ and /DIN EN ISO 50001/.

2.7 Environment and health during manufacturing

Regular measurements prove that all binding occupational exposure limit values for chemicals are consistently met, or rather, considerably under-run. In the high noise identified areas of heavy machines, hearing protection is used. The lifting of loads (raw materials) is facilitated in many ways through appropriate lifting assistances.

Since 2000, the environmental management system (existing since 1996) is certified to /ISO 14001/: Environmental management systems.

2.8 Product processing/Installation

The installation of the floor covering is based on the technical regulations of /DIN 18365/: Construction contract procedures (VOB) - Part C: General technical specifications in construction contracts (ATV) – Flooring work. Suitable subfloors are made of screed – according to VOB Part C, /DIN 18365/: Floorcovering Work, hard poured asphalt according to /DIN 18354/: Asphalt flooring work, chipboards, plywood, etc. Before installing rubber floor coverings, the subfloor generally has to be levelled.

The application of the adhesives over the entire surface is done in accordance with the installation recommendations of the nora systems GmbH, using adhesives and further auxiliary material approved and
suitable for noraplan® 913 rubber floor coverings (available e.g. at www.nora.com).

When selecting the installation materials the requirements of the basic award criteria of the Blue Angel – “Low-Emission Floor Covering Adhesive and other Installation Materials” (/RAL-UZ 113/) should be observed, alternatively GEV-EMICODE EC1plus. These specifications ensure excellent health protection due to minimised emissions. In addition, the instructions of the laying material manufacturers are generally to be followed. When working with laying auxiliary material, the latest version of the German standard /TRGS 610/ is to be complied with. Cutting should be used for energy recovery.

Initial cleaning and initial polishing may only be carried out after the bonding phase of the adhesive, i.e. at the earliest 48 hours after installation.

2.9 Packaging
The rolled material is wrapped on cardboard cores made of recycled cardboard (the cardboard cores are taken back and re-used). The outer packaging is made of recyclable paper. The individual rolls are assembled vertically on wooden europool pallets (exchange system) and sealed in recyclable polyethylene foil.

2.10 Condition of use
Because of their dense and closed surface and the “nora cleanguard®” finish, noraplan® 913 floor coverings usually don't need to be coated. The coverings are permanently resilient, they remain dimensionally stable when bonded and have good ergonomic properties.

2.11 Environment and health during use
Because of their dense surface, noraplan® 913 rubber floor coverings don't have to be coated during the entire period of use.

nora floor coverings meet the requirements of the German "Blue Angel" according to the Basic Award Criteria (/RAL-UZ 120/) for resilient floor coverings and the Finnish /M1 - Emission Classification/ of Building Materials.

In particular, the requirements on emissions of the AgBB scheme and the significant stricter requirement of the Blue Angel ensure to avoid any impact on health due to emissions of noraplan® 913.

2.12 Reference service life
A calculation of the reference service life according to /ISO 15686/ is not possible. According to manufacturers' estimation a technical service life of at least 30 years is possible. Due to their very high abrasion resistance and their single-layer structure (rubber through and through), the floor coverings hardly wear down even when extensively used. When used in the designated areas of application and under the usage conditions commonly associated, they stay fully functional and visually appealing during the indicated useful life.

2.13 Extraordinary effects
Fire
noraplan® 913 is according /DIN EN 13501-1/ hardly inflammable (bonded Bfl-s1) and toxicologically safe in the event of fire according to /DIN 53436-1/ und /DIN 53436-2/.

Fire protection

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building material class (bonded)</td>
<td>Bfl-s1</td>
</tr>
<tr>
<td>DIN EN 13501-1/</td>
<td></td>
</tr>
</tbody>
</table>

Water
Resistant to water exposure to the extent to what is typical for indoor use. Not suitable for real wet areas (e.g. showers, wading pools, etc.)

Mechanical destruction
not relevant.

2.14 Re-use phase
For noraplan® rubber floor coverings there are basically the following options for a re-use phase:

- Material recycling (e.g. granulating and processing into landing mats, industrial or stable mats, and coverings of sports areas or silent asphalt)
- Thermal recycling (e.g. use as substitute fuel in thermal power plants)
- full material and thermal recycling for energy recovery in the cement industry. Use of stored thermal energy as well as use of mineral filler as raw material.

2.15 Disposal
The manufacturer recommends introducing the products after their use stage into thermal recycling (secondary fuel for waste incineration) or utilization as secondary fuel and secondary raw material (mineral fillers) in the cement industry (material and thermal recycling). /EWC-No./ e.g. 17 02 03.

2.16 Further information
Further information under www.nora.com

3. LCA: Calculation rules

3.1 Declared Unit
The reference unit is 1 m² of floor covering. The values of module A1-A3 refer to 1 m² produced. This EPD represents a product declaration, i.e. the production and disposal of off-cuts during installation stage are assigned to module A5. The combined modules A1-
A3, A4 and A5 refer to a reference unit of 1 m² installed.

The material for subfloor preparation and adhesive bonding, needed during installation, is not considered. Information on the complete floor structure can be found in Environmental Product Declarations based to the PCR „Dispersion adhesives and primers for floor coverings“ and „Mineral factory-made mortar“.

### Declared unit

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declared unit</td>
<td>1</td>
<td>m²</td>
</tr>
<tr>
<td>Conversion factor to 1 kg</td>
<td>0.298</td>
<td></td>
</tr>
</tbody>
</table>

3.2 **System boundary**

Type of EPD: from cradle to gate with options

The analysis of the product life cycle includes the following stages:

- Production stage A1-A3: Consideration of production of the basic materials and the manufacturing of the floor covering incl. packaging material (input of waste paper for paper/cardboard production).
- Transport A4: Assumption for the transport of the products to the construction site.
- Installation A5: Production, transport and incineration of the off-cut material, incineration of off-cut material (gained energy is declared in D as avoided environmental burden), disposal of the packaging (incineration of PE film). The pretreatment of the underground surface (prime coat, levelling compound, adhesive) is not considered. This treatment depends on the building and the application and need to be specified for the particular case.
- Use stage B2: Scenario for maintenance/cleaning according to the manufacturer’s recommendation (see 4.)
- End-of-Life stage C1, C2, C3: Scenario for the incineration of the floor covering incl. removal from the building and transport to the waste incineration plant (gained energy is declared in D as avoided environmental burden).
- Benefits for the next product system D: Extraction for electrical and thermal energy from the waste incineration process of the product, the off-cuts and the packaging material.

Contributions of waste flows are considered in the modules where they occur.

3.3 **Estimates and assumptions**

The datasets for the upstream chain of the basic material production are taken from the /GaBi database/. Inventories of some materials are not completely available and so are partly approximated by datasets on similar chemicals or estimated by consolidation of existing datasets and literature research.

The assumptions about the cleaning scenario are described in chapter 4. scenarios.

3.4 **Cut-off criteria**

All data from the production data acquisition, i.e. on all raw material used as per formulation, are considered. The information available for one auxiliary material is not sufficient for generating an approximation of the supply chain. The mass proportion is below 0.3%; a particular ris while producing this substance is not known. This substance is neglected in the calculation.

Transport expenditures are taken into account for all essential basic materials, the dispatch of the products and the end-of-life scenario. Transport processes for packaging materials are neglected.

With the LCA calculation, the production waste resulting directly from production, the electrical and thermal energy needed, and the packaging materials, are taken into account.

Machines, facilities and infrastructure used in the manufacture are ignored. Thus, even material and energy flows with a proportion of less than 1% are considered. Thus, no input or output flows are neglected, which may contribute to the impact assessment significantly.

3.5 **Background data**

For life cycle modelling of the considered products, the /GaBi 8/ Software System for Life Cycle Engineering, developed by thinkstep AG, is used. Upstream data specific information that is not available are taken from the /GaBi 8/ database.

3.6 **Data quality**

The primary data collected from the manufacturer are based on annual quantities, or are projected from measurements on the specific facilities of the year 2017.

The /GaBi 6/ database contains datasets for some of the basic materials used in the respective formulations. Last update of the database was 2018.

Further datasets on the upstream chain of the basic material production are approximated with datasets on similar chemicals or are estimated by consolidation of existing datasets and literature information.

The requirements on technological, geographical and temporal representativeness are fulfilled.

3.7 **Period under review**

The collection of manufacturing data from 2017 serves as the data basis.

3.8 **Allocation**

Allocation of upstream data

For all refinery products, allocation by mass and net calorific value has been applied. The manufacturing route of every refinery product is modelled and the product-specific effort associated with their production is calculated. For other materials’ inventory used in the production process calculation the most suitable

Allocation in the foreground data
The production process does not deliver any co-products. The applied software model does not contain any allocation.

The total production of nora systems GmbH include further products beside the declared product family. The values for thermal and electrical energy as well as for operating materials are assigned respectively while data collection on the site. Allocation keys are mass, area, pieces or retention time in the plant.

Allocation for waste materials
Production waste is fed into an energy recovery process. The energy gained is looped back in the module A1-A3. The quality of the thermal energy can be considered equal to the thermal energy needed for production processes.

The calculation of emissions from the waste incineration plant follows a partial stream consideration for the combustion process, according to the specific composition of the incinerated material.

A waste incineration plant with an R1-value lower than 0.6 is assumed. The environmental burdens of the incineration process of installation off-cut and the product in the end-of-life scenario are assigned to the system (A5, C3): resulting energy gain for thermal and electrical energy are declared in module D.

The avoided environmental burdens are considered according to European average data for electrical and thermal energy generated from natural gas.

3.9 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

The used background database has to be mentioned. The software /GaBi 8/ is used. As database for background data the /GaBi database service pack 36/ is applied.

4. LCA: Scenarios and additional technical information

The following technical information serves as basis for the declared modules. The values refer to the declared unit of 1m².

Transport to the construction site (A4)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litres of fuel (truck)</td>
<td>0.00662</td>
<td>l/100km</td>
</tr>
<tr>
<td>Transport distance (truck)</td>
<td>1000</td>
<td>km</td>
</tr>
<tr>
<td>Litres of fuel (boat)</td>
<td>0.00135</td>
<td>l/100km</td>
</tr>
<tr>
<td>Transport distance (boat)</td>
<td>500</td>
<td>km</td>
</tr>
</tbody>
</table>

Installation (A5)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material loss</td>
<td>5</td>
<td>%</td>
</tr>
</tbody>
</table>

Maintenance (B2)
Dependend on use area based on /EN ISO 10874/, dependend on the manufacturers’ technical service life and the expected stress for the flooring, the service life can be determined case specifically. The effects on module B2 need to be calculated according to the actual service life, in order to achieve the total enviromental impact.

Cleaning of the floor covering depends on the use of the premises. For a typical application (e.g. school building), the following manufacturer’s recommendations are considered in this declaration:

- Intensive machine cleaning (single-disc machine with a suitable red pad / soft brush and an aqua-vacuum cleaner), once a year, with a suitable cleaning agent. The surface of the floor covering must be free of any dirt residues.
- In order to achieve a uniform and compact protective film, the floor covering should be polished once a month with a suitable polishing pad or polishing brush.
- Routine cleaning should be done manually, thrice weekly, with suitable microfibre covers and suitable wash polishes.

Further cleaning recommendations are available at www.nora.com. Cleaning agents with a pH-value higher than 12 are not to be used.

The following values refer to a cleaning scenario of 1 year.

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information on maintenance</td>
<td>see</td>
<td>-</td>
</tr>
<tr>
<td>Electricity consumption</td>
<td>0.074</td>
<td>kWh</td>
</tr>
<tr>
<td>Water consumption</td>
<td>16</td>
<td>l</td>
</tr>
<tr>
<td>Cleaning agent</td>
<td>181 g</td>
<td></td>
</tr>
</tbody>
</table>

Reference Service Life

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference service life</td>
<td>30</td>
<td>a</td>
</tr>
</tbody>
</table>

End-of-life (C1-C4)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy recovery</td>
<td>3.36</td>
<td>kg</td>
</tr>
</tbody>
</table>

Re-use, Recyclingpotential (D), relevant data for scenarios
Module D covers the energy gain of the incineration processes form A5 (off-cut of flooring installation, packaging waste) and C3 (incineration of the floor covering). A waste incineration plant with an R1-value > 0.6 is assumed.
5. LCA: Results

The characterisation factors of the publication of CML in the version April 2013 apply. The characterisation factors comply with the requirements of /EN 15804+A1/.

The values of the indicators in module B2 "Maintenance" refer to a time period of 1 year.

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² noraplan®913

<table>
<thead>
<tr>
<th>Parameter</th>
<th>A1-A3</th>
<th>A4</th>
<th>A5</th>
<th>B2</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>GWP [kg CO₂-Eq]</td>
<td>5.87E+0</td>
<td>1.82E-1</td>
<td>4.64E-1</td>
<td>3.99E-1</td>
<td>4.15E-2</td>
<td>7.88E-3</td>
<td>2.48E+0</td>
<td>-9.57E-1</td>
</tr>
<tr>
<td>ODP [kg CFC11-Eq]</td>
<td>1.90E-8</td>
<td>7.00E-15</td>
<td>9.80E-10</td>
<td>5.07E-11</td>
<td>1.84E-13</td>
<td>3.27E-16</td>
<td>3.64E-14</td>
<td>-2.10E-12</td>
</tr>
<tr>
<td>AP [kg SO₂-Eq]</td>
<td>3.28E-2</td>
<td>1.07E-3</td>
<td>1.76E-4</td>
<td>9.41E-4</td>
<td>1.08E-4</td>
<td>1.73E-5</td>
<td>1.83E-4</td>
<td>-1.50E-3</td>
</tr>
<tr>
<td>EP [kg PO₄³⁻-Eq]</td>
<td>5.93E-3</td>
<td>1.50E-4</td>
<td>3.16E-4</td>
<td>1.86E-4</td>
<td>1.07E-5</td>
<td>4.15E-6</td>
<td>3.46E-5</td>
<td>-1.66E-4</td>
</tr>
<tr>
<td>POCP [kg ethane-Eq]</td>
<td>2.18E-3</td>
<td>-7.28E-5</td>
<td>1.10E-4</td>
<td>2.97E-4</td>
<td>7.38E-6</td>
<td>5.68E-2</td>
<td>1.56E-2</td>
<td>-1.26E-4</td>
</tr>
<tr>
<td>ADPE [kg Scb-Eq]</td>
<td>1.41E-4</td>
<td>1.34E-8</td>
<td>7.30E-6</td>
<td>7.14E-8</td>
<td>2.11E-8</td>
<td>6.42E-10</td>
<td>5.72E-9</td>
<td>-2.61E-7</td>
</tr>
<tr>
<td>ADPF [MJ]</td>
<td>1.25E+2</td>
<td>2.43E+0</td>
<td>6.98E+0</td>
<td>7.54E+0</td>
<td>4.46E-1</td>
<td>1.07E+1</td>
<td>3.31E+3</td>
<td>-3.32E+1</td>
</tr>
</tbody>
</table>

### RESULTS OF THE LCA - RESOURCE USE: 1 m² noraplan®913

<table>
<thead>
<tr>
<th>Parameter</th>
<th>A1-A3</th>
<th>A4</th>
<th>A5</th>
<th>B2</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERE [MJ]</td>
<td>2.90E+1</td>
<td>1.13E-1</td>
<td>2.13E+0</td>
<td>4.22E-1</td>
<td>2.85E-1</td>
<td>5.61E-3</td>
<td>1.22E+1</td>
<td>-3.25E+0</td>
</tr>
<tr>
<td>PERM [MJ]</td>
<td>1.21E+1</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>-1.21E+1</td>
<td>0.00E+0</td>
</tr>
<tr>
<td>PERT [MJ]</td>
<td>4.11E+1</td>
<td>1.13E-1</td>
<td>2.13E+0</td>
<td>4.22E-1</td>
<td>2.85E-1</td>
<td>5.61E-3</td>
<td>8.56E-2</td>
<td>-3.25E+0</td>
</tr>
<tr>
<td>PENRE [MJ]</td>
<td>9.91E+1</td>
<td>2.44E+0</td>
<td>6.78E+0</td>
<td>8.09E+0</td>
<td>7.58E-1</td>
<td>1.08E-1</td>
<td>2.98E+1</td>
<td>-1.68E+1</td>
</tr>
<tr>
<td>PENRM [MJ]</td>
<td>2.89E+1</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
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<td>0.00E+0</td>
<td>-2.89E+1</td>
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</tr>
<tr>
<td>PENRT [MJ]</td>
<td>1.28E+2</td>
<td>2.44E+0</td>
<td>6.78E+0</td>
<td>8.09E+0</td>
<td>7.58E-1</td>
<td>1.08E-1</td>
<td>3.96E+1</td>
<td>-1.68E+1</td>
</tr>
<tr>
<td>SM [kg]</td>
<td>8.46E-2</td>
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<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
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<tr>
<td>FMR [MJ]</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
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<tr>
<td>FNR [MJ]</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
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</tr>
<tr>
<td>FW [m³]</td>
<td>1.11E+0</td>
<td>2.08E-4</td>
<td>5.77E-2</td>
<td>2.09E-3</td>
<td>3.84E-4</td>
<td>1.03E-5</td>
<td>5.00E-3</td>
<td>-4.43E-3</td>
</tr>
</tbody>
</table>

### RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² noraplan®913

<table>
<thead>
<tr>
<th>Parameter</th>
<th>A1-A3</th>
<th>A4</th>
<th>A5</th>
<th>B2</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C3</th>
<th>C3</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWD [kg]</td>
<td>4.60E-5</td>
<td>1.13E-7</td>
<td>2.38E-6</td>
<td>4.14E-4</td>
<td>3.99E-10</td>
<td>5.67E-9</td>
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<td>-6.94E-9</td>
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<tr>
<td>NHWD [kg]</td>
<td>2.48E-5</td>
<td>1.76E-4</td>
<td>1.32E-1</td>
<td>2.78E-2</td>
<td>5.34E-4</td>
<td>8.64E-6</td>
<td>6.83E-2</td>
<td>-7.21E-3</td>
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</tr>
<tr>
<td>RW [kg]</td>
<td>1.47E-3</td>
<td>4.84E-5</td>
<td>7.74E-5</td>
<td>2.22E-4</td>
<td>1.24E-4</td>
<td>2.24E-5</td>
<td>2.54E-5</td>
<td>-1.43E-3</td>
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</tr>
<tr>
<td>CRU [kg]</td>
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<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td></td>
</tr>
<tr>
<td>MFR [kg]</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>2.15E-1</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td></td>
</tr>
<tr>
<td>MER [kg]</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td></td>
</tr>
<tr>
<td>EEE [MJ]</td>
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<td>0.00E+0</td>
<td>2.40E-1</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
<td>0.00E+0</td>
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<td>3.85E+0</td>
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</tr>
<tr>
<td>EET [MJ]</td>
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<td>4.30E-1</td>
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<td>0.00E+0</td>
<td>0.00E+0</td>
<td>6.90E+0</td>
<td></td>
</tr>
</tbody>
</table>

The product contains renewable raw materials. In the manufacturing of the declared unit of 1m² of the product noraplan® 913 1.04 kg CO₂ are sequestered. This bound carbon is emitted in the EoL as CO₂ emission.
6. LCA: Interpretation

The environmental impact of the life cycle of nora floor coverings is mainly determined by the production of the basic materials (A1). The impact of the manufacturing at nora system referring to the category GWP is significant; else the influence on the total production phase is low.

Beside, the maintenance referring to the total use stage is an important factor. The calculation depends strongly on the assumption for the cleaning scenario.

The negative values in module D describe the energy gain of the incineration of packaging material (A5), the off-cuts of the installation (A5) and the product in the end-of-life scenario (C3).

This EPD is an update of the EPD from the year 2013. The results are tending to be lower. This is based on various factors:
- updated and new generated background data
- increase of the production yield at nora systems
- purchase of electrical energy for production and administration at the site Weinheim from the Ørsted Offshore-Windparks in the Danish North and Baltic sea.

Compared to the GPW of the EPD from the year 2013, a significant reduction in module A1-A3 could be achieved, due to the above mentioned reasons.

7. Requisite evidence

7.1 VOC emissions - Germany
The product has been audited for emissions at the approved test house Eurofins Product Testing A/S, Galten, Denmark (Test report no. G05680) and at SGS Institut Fresenius GmbH, Taunusstein in respect to volatile N-nitrosamines (test report no. 2028015-01).

7.2 VOC emissions - Finland
noraplan® 913 floorcoverings comply also with the Finnish /M1 - Emission Classification/ of Building Materials (tested by Työterveyslaitos, Helsinki, Finland, test report no. 348409).

7.3 VOC emissions - IRK
Additionally the following relevant values are met, derived from the guidelines values for indoor air, according to the German Indoor Air Hygiene Commission (IRK):
- styrene ≤ 30 µg/m³
- naphthaline ≤ 2 µg/m³

(Eurofins Product Testing A/S, Galten, Denmark, test report no. 392-2018-00178301_B_DE)

8. References

/IBU 2016/
IBU (2016): General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V., Version 1.1 Institut Bauen und Umwelt e.V., Berlin. www.ibu-epd.de

/ISO 14025/
DIN EN /ISO 14025:2011-10/, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

/EN 15804/
/TRGS 610/
/TRGS 610:2011-01/: Substitutes, substitution of working methods for solvent based primer and adhesives for floorings