ENVIRONMENTAL-PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	nora systems GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-NOR-2022004-IBA2-EN
Issue date	15.02.2022
Valid to	14.02.2027

norament® 928 ed

nora Systems GmbH

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

www.ibu-epd.com | https://epd-online.com



1. General Information

nora Systems GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-NOR-2022004-IBA2-EN

This declaration is based on the product category rules:

Floor coverings, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

15.02.2022

Valid to

14.02.2027

Dipl.-Ing Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)

Dr. Martina Bender
(Managing Director Institut Bauen und Umwelt e.V.)

norament® 928 ed

Owner of the declaration

nora systems GmbH
Höhnerweg 2-4
69469 Weinheim
Germany

Declared product / declared unit

1m² resilient floor
covering (A1- A3: 1m² produced,
A1- A5: 1m² installed)

Scope:

Product line norament®
928 ed, high pressure pressed homogeneous floor coverings made from rubber in
various colors and designs.

Declaration according
to ISO 14025 and EN 15804 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.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804 bezeichnet*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Matthias Klingler,
(Independent verifier)

2. Product

2.1 Product description/Product definition

In this Environmental
Product Declaration (EPD), resilient electrostatically dissipative rubber floor coverings of the
nora systems GmbH product line
norament® 928 ed with different designs and surface structures but same
rubber recipes are modelled.
For the product line norament® ed standards apply:

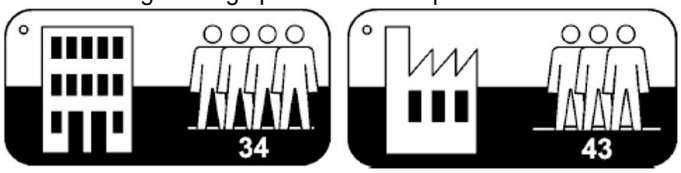
- *EN 12199:2020:* Resilient
  floor coverings - Specifications for homogeneous and heterogeneous relief
  rubber floor coverings; depending on style *DIN EN 1817*: Resilient floor
  coverings -Specification for homogeneous and heterogeneous smooth rubber floor
  coverings
- *ISO 10874:2009:*
  Resilient, textile and laminate
  floor coverings – Classification
- *EN 1081:2021:* Resilient,
  laminate and modular multilayer floor coverings - Determination of the
  electrical resistance

For the
placing on the market of the product in the European Union/European Free Trade
Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No.
305/2011 (CPR) applies. The product needs a declaration of performance taking
into consideration *EN 14041:2018-5, Resilient, textile, laminate and modular multilayer floor coverings - Essential
characteristics* and the CE-marking.
For the
application and use the respective national provisions apply.

2.2 Application

Electrostatically dissipative norament® 928 ed
floorings offer optimum ESD protection of electronic devices and equipment. It
protects against electrical shock and is resisting most oils and greases.
Floor coverings are classified according to *ISO 10874*.

Floor coverings for high performance in professional use:



2.3 Technical Data

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

Constructional data

Name	Value	Unit
Product thickness	3.5	mm
Grammage	4800	g/m²
Product Form	tiles	-
Type of manufacture	pressed	-
Improvement in footfall sound absorption EN ISO 10140-3	10	dB
Anti-slip properties DIN 51130	R9	
Electrical resistance EN ISO 1081	E6-9xE7	Ohm
Hardness	84	A Shore
Abrasion resistance at 5 N load (ISO 4649 (method A))	90	mm³

Beside the here
declared 3,5 mm thick flooring, this product is available in 4 mm thickness.

Performance
data of the product in accordance with the declaration of performance with
respect to its essential characteristics according to *EN 14041:2018-05, Resilient, textile,
laminate and modular multilayer floor coverings - Essential characteristics.*

2.4 Delivery status

The delivery takes place as tiles with dimensions of
1002 x 1002 mm.

The backs of the coverings are sanded and have arrows indicating the
installation direction.

2.5 Base materials/Ancillary materials

Simplified recipe norament® 928 ed:

Name	Value	Unit
Polymers (synthetic rubber):	40	%
Mineral Fillers:	39	%
Various color pigments:	8	%
Auxiliary substances and vulcanization system:	13	%

The auxiliary substances used are waxes and antioxidants; the vulcanization system is based on Sulphur as cross-linking agent and vulcanization accelerators.

1) “This
product/article/at least one partial article contains substances listed in the
candidate list (date: 17.01.2022) exceeding 0.1 percentage by mass: **no**”.

2) “This
product/article/at least one partial article contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1
percentage by mass: **no**”

3) “Biocide
products were added to this construction product or it has been treated with
biocide products (this then concerns a treated product as defined by the (EU)
Ordinance on Biocide Products No. 528/2012): **no**”

2.6 Manufacture

After weighing and mixing of the rubber compounds of the different components, the blanks undergo moulding on the calendar. Vulcanization (crosslinking with sulfur) is done in high pressure multi presses
with a pressing power of approximately 1,200 tonnes and at a temperature of 170
ºC. Due to the high pressure, a dense, closed vulcanization skin is formed on the surface. The vulcanized tiles are sanded over their entire rear surface and die cut to the exact final dimensions. The resulting product is tiles of one
square meter and a weight of 4,8 kg.

The quality and energy management of nora systems GmbH is certified
according to *ISO 9001*.

2.7 Environment and health during manufacturing

The lifting of loads (raw materials) is facilitated in
many ways through appropriate lifting assistances.

nora systems GmbH purchases the total electrical
energy for production and administration at the siteWeinheim from
renewable energy sources. Respective evidence is available at IBU.

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

Since 2000, the environmental management system (existing since 1996) is certified to *ISO 14001*, further an energy management system
according to *ISO 50001* is established.

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 norament® 928 ed rubber floor coverings (available at www.nora.com).

To assure full dissipative behavior a dissipative adessive according *ISO 22637* with a resistance of $R<3x10^5$ Ohm is required.

When selecting the installation materials the requirements of the basic award criteria of the Blauer Engel– “Low-Emission Floor Covering Adhesive and other Installation Materials” (*DE-UZ
113*) should be observed, alternatively *GEV-EMICODE EC1 PLUS*. These specifications ensure excellent health protection due to minimized 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.

Cuttings should be used for energy recovery.

A wet or damp cleaning
may only be carried out after the adhesive has bonded, i. e. after approx. 48 hours at the erliest.

2.9 Packaging

Delivery on wooden europool pallets (exchange system), sealed in
recyclable polyethylene foil.

2.10 Condition of use

Because of their dense and closed surface and the “nora cleanguard®” finish, norament® floor coverings 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

Since nora floor coverings do not have to be coated
during their service life, there is no major use of chemicals during the usage
phase, apart from mild cleaning agents.

nora floor coverings meet the
requirements of the German Blauer Engel according to the Basic Award Criteria
(*DE-UZ 120*) for resilient floor coverings and the Finnish *M1 - Emission Classification* of Building Materials to avoid any impact on health due to
emissions of norament® 928 ed.

2.12 Reference service life

A calculation of the reference service life according
to *ISO 15686* is not possible.
According to manufacturers' estimation technical service life of at least 40 years is possible.

Due to their very high abrasion resistance and 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.
Description of the influences on the ageing of the product when applied in accordance with the rules of technology.

2.13 Extraordinary effects

Fire

norament® 928 ed is hardly inflammable (C_{fl}-s1) according to *EN 13501-1*
and toxicologically safe in the event of fire according to *DIN 53436-1 und DIN 53436-2*.

Fire protection

Name	Value
Building material class	Cfl
Smoke gas development	s1

Water

Resistant to water exposure of 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 norament® 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-code* e.g.19 12 04.

2.16 Further information

No further information.

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 the 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 on the PCR „Dispersion adhesives and primers for floor coverings“ and „Mineral factory-made mortar”.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
conversion factor (Product weight)	4.8	-
Layer thickness	3,5	mm

For IBU core EPDs (where clause 3.6 is part of the EPD): for average EPDs, an estimate of the robustness of the LCA values must be made, e.g. concerning variability of the production process, geographical representativeness and the influence of background data and preliminary products compared to the environmental impacts caused by actual production.

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 single auxiliary materials is not sufficient for generating an approximation of the supply chain. The mass proportion is about 1 %; a particular risk 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 about 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 10* Software System for Life Cycle Engineering, developed by Sphera Solutions GmbH, is used. Upstream data specific Information that is not available are taken from the *GaBi 2021.2* database.

3.6 Data quality

Datasets were, if available, taken from the above mentioned *GaBi 2021.2* database.
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 fullfilled.

3.7 Period under review

The collection of manufacturing data from 2020 serves as the data basis.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

3.9 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 rules are applied. Information on single LCIs is documented on GaBi database 2021 LCI documentation (sphera.com).
Allocation in the foreground data
The production process does not deliver any coproducts.
The applied software model does not contain any allocation.
The total production of nora systems GmbH include further products besides 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 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 higher 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.

3.10 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.

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic carbon

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

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	0.013	kg C
Biogenic carbon content in accompanying packaging	0.0027	kg C

The following technical scenario information is required for the declared modules and optional for non-declared modules. Modules for which no information is declared can be deleted; additional information can also be listed if necessary.

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

A5 is not declared including the disposal of the packaging material on the construction site, the amounts of packaging materials included in the LCA calculations must be declared as technical scenario information for Module A5.

Transport to the construction site (A4)

Name	Value	Unit
Litres of fuel (truck)	0.00662	l/100km
Transport distance (truck)	1000	km
Litres of fuel (ship)	0.00135	l/100km
Transport distance (ship)	500	km

Installation in the building (A5)

For the installation of 1 m²
flooring, more than 1 m² flooring is necessary, dependent on the room geometry.

A material loss of 5 % is assumed.

Name	Value	Unit
Material loss	0.24	kg

Maintenance (B2)

Dependent on use area based on *ISO 10874*, dependent 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 environmental 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.

Name	Value	Unit
Water consumption	0.016	m^3
Auxiliary	0.181	kg
Electricity consumption	0.074	kWh

In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. In addition, it shall be stated that the RSL applies for the reference conditions only.

The same holds for a service life declared by the manufacturer. Corresponding information related to in-use conditions needs not be provided if a service life taken from the list on service life by BNB is declared.

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	50	a
Life Span according to the manufacturer	40	a

End of Life (C1-C4)

Name	Value	Unit
Energy recovery	4.8	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

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

Note:

EP-freshwater:
This indicator has been calculated as “kg P eq” as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml).

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

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

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	X	X	MND	X	MNR	MNR	MNR	MND	MND	X	X	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² norament ed

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	D
GWP-total	kg CO_2 eq	2.1E+01	2.65E-01	1.4E+00	3.55E-01	4.01E-02	1.16E-02	5.62E+00	-2.15E+00
GWP-fossil	kg CO_2 eq	2.08E+01	2.63E-01	1.38E+00	3.45E-01	3.98E-02	1.15E-02	5.62E+00	-2.13E+00
GWP-biogenic	kg CO_2 eq	9.08E-02	0	1.64E-02	1.02E-02	3.38E-04	0	2.32E-04	-1.07E-02
GWP-luluc	kg CO_2 eq	1.03E-01	1.88E-03	5.24E-03	4.9E-05	5.63E-05	9.39E-05	6.31E-05	-1.48E-03
ODP	kg CFC11 eq	1.62E-08	4.87E-17	8.13E-10	2.69E-11	9.52E-16	2.27E-18	5.74E-16	-2.45E-14
AP	mol H^+ eq	6.01E-02	1.96E-03	3.14E-03	1.01E-03	8.27E-05	3.46E-05	5.49E-04	-2.8E-03
EP-freshwater	kg P eq	7.89E-05	6.9E-07	4E-06	1.09E-05	1.07E-07	3.41E-08	1.44E-07	-2.8E-06
EP-marine	kg N eq	1.52E-02	6.36E-04	8.02E-04	2.19E-04	1.97E-05	1.57E-05	1.43E-04	-7.94E-04
EP-terrestrial	mol N eq	1.76E-01	7.03E-03	9.32E-03	1.93E-03	2.06E-04	1.75E-04	2.57E-03	-8.5E-03
POCP	kg NMVOC eq	5.11E-02	1.53E-03	2.66E-03	1E-03	5.33E-05	3.12E-05	4.07E-04	-2.23E-03
ADPE	kg Sb eq	3.22E-04	2.13E-08	1.61E-05	6.3E-08	1.17E-08	1.02E-09	8.81E-09	-3.56E-07
ADPF	MJ	4.12E+02	3.45E+00	2.09E+01	8.05E+00	7.07E-01	1.53E-01	9.2E-01	-3.7E+01
WDP	m^3 world eq deprived	5.22E-01	2.18E-03	5.54E-02	5.37E-02	6.38E-03	1.07E-04	4.81E-01	-1.64E-01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² norament ed

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	D
PERE	MJ	3.1E+01	1.77E-01	1.72E+00	4.56E-01	3.26E-01	8.8E-03	9.23E-01	-8.42E+00
PERM	MJ	8.43E-01	0	-1.03E-01	0	0	0	-7.4E-01	0
PERT	MJ	3.19E+01	1.77E-01	1.62E+00	4.56E-01	3.26E-01	8.8E-03	1.83E-01	-8.42E+00
PENRE	MJ	3.2E+02	3.47E+00	2.11E+01	8.05E+00	7.07E-01	1.54E-01	9.29E+01	-3.7E+01
PENRM	MJ	9.21E+01	0	-2.04E-01	0	0	0	-9.19E+01	0
PENRT	MJ	4.12E+02	3.47E+00	2.09E+01	8.05E+00	7.07E-01	1.54E-01	9.21E-01	-3.7E+01
SM	kg	7.92E-02	0	3.96E-03	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	7.15E-02	2.04E-04	4.28E-03	1.39E-03	3.17E-04	1.01E-05	1.13E-02	-8.22E-03

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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2:
1 m² norament ed

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	D
HWD	kg	2.23E-04	1.65E-10	1.12E-05	4.14E-04	1.87E-10	8.09E-12	1.61E-10	-8.33E-09
NHWD	kg	4.11E+00	5.22E-04	2.15E-01	1.8E-02	5.02E-04	2.41E-05	1.69E-01	-1.74E-02
RWD	kg	3.59E-03	6.01E-06	1.83E-04	2.06E-04	1.05E-04	2.79E-07	4.91E-05	-2.71E-03
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	1E-01	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	5.3E-01	0	0	0	8.71E+00	0
EET	MJ	0	0	9.49E-01	0	0	0	1.56E+01	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m² norament ed

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	D
PM	Disease incidence	6.09E-07	2.52E-08	3.21E-08	1.29E-08	6.98E-10	2.03E-10	5.22E-09	-2.4E-08
IR	kBq U235 eq	5.5E-01	8.78E-04	2.81E-02	1.3E-01	1.73E-02	4.07E-05	7.65E-03	-4.44E-01
ETP-fw	CTUe	4.38E+02	2.56E+00	2.21E+01	2.76E+00	2.97E-01	1.14E-01	4.91E-01	-7.79E+00
HTP-c	CTUh	6.11E-09	5.12E-11	3.11E-10	8.93E-11	8.42E-12	2.3E-12	3.42E-11	-3.53E-10
HTP-nc	CTUh	4.34E-07	2.92E-09	2.2E-08	1.56E-08	3.18E-10	1.34E-10	1.37E-09	-1.39E-08
SQP	SQP	2.12E+01	1.05E+00	1.13E+00	2.12E-01	2.23E-01	5.26E-02	2.59E-01	-5.76E+00

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”.This impact category deals mainly with the eventual impact of low dose ionizingradiation on human health of the nuclear fuel cycle. It does not consider effects due to possiblenuclear accidents, occupational exposure nor radioactive waste disposal in undergroundfacilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.
Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as theuncertainties on these results are high or as there is limited experience with the indicator.

6. LCA: Interpretation

The environmental impact of the life cycle of nora floor covering is determined by the production of the product (A1- A3) and the maintenance scenario over the total assumed reference service life (B2 x RSL). The distribution of the environmental impact of the total life cycle into the life cycle stages looks very similar for all considered impact categories.

Having a closer look at module A1- A3 shows, that the supply chain, i.e. the production of the basic materials (A1) has a major contribution to nearly all impact categories to the total result for A1- A3. The production process at nora systems (A3) contributes to about 4 % of the total fossil resources (ADP fossil) and about 13 % to the global warming potential (GWP total) of the overall manufacturing (A1-A3).

With respect to the used basic materials, NBR, titanium dioxide and sodium aluminium silicate dominate the environmental impacts.

The emissions of GHGs in module C3 are significant; other impact categories are not as relevant for the incineration process.

The use stage is based on a scenario with professional cleaning equipment. The environmental impact depends on the assumptions, following the recommendations of the manufacturer. The application of machine polishing and the approximated LCI for the cleaning agents results in a GWP for the total assumed RSL of about the same value compared to the production (A1- A3) of the product.

The calculation model requires the use of estimations and approximations for some of the basic materials. Also, the use of life cycle inventories from databases leads to uncertainties of the result. Unfortunately, still rare industry data for specific supply chains are available. Being aware of uncertainties of the result values, the applied LCIs are evaluated as good for generating an EPD with applicable LCIA according to the requirements of *EN 15804*.

7. Requisite evidence

As a general rule, all statements must be documented with measured data (presented by the corresponding test certificates). The methods of evidence and the test conditions have to be described together with the results.

If substances are not detected, the limit of detection must be included in the declaration.

Interpreting statements such as "… free of …" or "… are entirely harmless …" are not allowed.

If evidence required by the specific PCR part B is not provided, this has to be justified under the respective title for the required evidence.

If relevant for the scope of application of the declared product, or if derivable from its material composition, it is recommended to provide additional adequate 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. 392-2019-00195506_B_DE) and at DIK in respect to volatile N-nitrosamines (test report no. G20N0868).



The product complies with the Basic Award Criteria for the Blauer Engel (*RAL-UZ 120)* for resilient floor coverings with the following requirements on emissions:

Compound or Substance	3rd Day	Final Value (28th Day)
Total organic compounds within the retention range C_6 – C_{16} (TVOC)	< 1000 µg/m³	< 300 µg/m³
Total organic compounds within the retention range > C_{16} – C_{22} (TSVOC)	-	< 30 µg/m³
Carcinogenic substances[22]	< 10 µg/m³ **total**	< 1 µg/m³ **per single value**
Total VOC without LCI[23]	-	< 100 µg/m³
R value[24]	-	< 1
Formaldehyde	-	< 60 µg/m³ (0.05 ppm)

7.2 VOC emissions - Finland

norament® 928 ed floorcoverings comply also with the Finnish *M1 - Emission Classification* of Building Materials (tested by Työterveyslaitos, Helsinki, Finland, test report no. 2528.1).



7.3 VOC emissions - IRK

Additionally, the following relevant values are met, derived from the guideline's values for indoor air, according to the German Indoor Air Hygiene

Commission (IRK):

- styrene ≤ 30 µg/m³
- naphthaline ≤ 2 µg/m³

8. References

Standards

EN
1081
DIN
EN 1081:2021-01, Resilient, laminate and modular multilayer floor coverings -
Determination of the electrical resistance.

DIN
ISO 4649
DIN
ISO 4649:2021-06, Rubber, vulcanized or thermoplastic - Determination of
abrasion resistance using a rotating cylindrical drum device.

ISO
9001
ISO
9001:2015-09: Quality management systems – Requirements.

ISO
10140-3
DIN
EN ISO 10140-3:2021-09, Acoustics - Laboratory measurement of sound insulation
of building elements - Part 3: Measurement of impact sound insulation.

ISO
10874
ISO
10874:2009-11, Resilient, textile and laminate floor coverings – Classification.

EN 12199
DIN
EN 12199:2020-07, Resilient floor coverings - Specifications for homogeneous and heterogeneous relief rubber floor coverings

EN
13501-1
DIN
EN 13501-1:2019-05, Fire classification of construction products and building
elements - Part 1: Classification using data from reaction to fire tests.

ISO
14001
ISO
14001:2015-09, Environmental management systems – Requirements with guidance
for use.

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

EN
14041
DIN
EN 14041:2018-05, Resilient, textile, laminate and modular multilayer floor
coverings - Essential characteristics.

ISO
15686
ISO
15686-1:2011-05, Buildings and constructed assets - Service life planning -
Part 1: General principles and framework.

EN
15804
EN
15804:2019+A2 (in press), Sustainability of construction works — Environmental
Product Declarations — Core rules for the product category of construction
products.

DIN
18353
DIN 18535:2019-09: German construction contract procedures (VOB) - Part C: General technical specifications in construction contracts (ATV) - Laying of floor screed.

DIN
18354
DIN
18354:2019-09, German construction contract procedures (VOB) - Part C: General
technical specifications in construction contracts (ATV) - Mastic asphalt
works.

DIN
18365
DIN
18365:2019-09, German construction contract procedures (VOB) - Part C: General
technical specifications in construction contracts (ATV) - Flooring works.

ISO
22637
ISO
22637:2019-07, Adhesives - Test of adhesive for floor covering - Determination
of the electrical resistance of adhesive films and composites

ISO
23997
ISO 23997:2007-1: Resilient floor coverings - Determination of mass per unit area.

ISO
50001
ISO
50001:2018-08, Energy management systems - Requirements with guidance for use.

DIN
51130

DIN
51130:2014-02, Testing of floor coverings - Determination of the anti-slip
property - Workrooms and fields of activities with slip danger - Walking method
- Ramp test.

DIN 53436-1
DIN 53436-1:2015-12,
Erzeugung thermischer Zersetzungsprodukte von Werkstoffen für ihre
analytisch-toxikologische Prüfung - Teil 1: Zersetzungsgerät und Bestimmung der
Versuchstemperatur

DIN
53436-2
DIN
53436-2:2015-12, Generation of thermal decomposition products from materials
for their analytic-toxicological testing - Part 2: Thermal decomposition
method.

Further
References

Candidate List
Candidate List: substances of very high concern candidate list published in accordance with Article 59(10) of the REACH Regulation (https://echa.europa.eu/candidate-list-table).
Copyright
cover picture: © Dirk Wilhelmy

ECW
code:
European
Waste catalogue code: 191204: Plastic and Rubber.

DE-UZ
113
Blauer
Engel Basic Award Criteria, DE-UZ 113; Low-emission Flooring Adhesives and
other Installation Materials, Version 3; January 2019.

DE-UZ
120
Blauer
Engel Basic Award Criteria, DE-UZ 120; Elastic Floor Coverings,
Version 6; February 2011.

GaBi 10
GaBi 10, 2021.2 Software,
Leinfelden-Echterdingen, Sphera Solutions GmbH, 2021.

GaBi 2021.2 Database
GaBi 10, 2021.2,
Leinfelden-Echterdingen, Sphera Solutions GmbH, 2021.

GEV-EMICODE

EMICODE
Emission Classification; www.emicode.com;
GEV-EMICODE EC1 PLUS, defines the limit of
what is technically feasible today.

IBU
2020
Institut Bauen und
Umwelt e.V.: General Programme Instructions for the Preparation of EPDs at the
Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt
e.V., 2020. www.ibu-epd.com

M1
- Emission Classification
M1
- Emission Classification, Emission class for building materials by the
Building Information Foundation RTS sr.; Helsinki, Finnland (https://cer.rts.fi/en/m1-emission-class-for-building-material/m1-criteria-2/)

PCR
Part A
Part A: Calculation
Rules for the Life Cycle Assessment and Requirements on the Project Report,
version 1.9, IBU, 2021

PCR
Part B
Part B:
Requirements on the EPD for Floor coverings, version 1.2, IBU, 02-2018

TRGS
610
TRGS
610; Substitution of working methods for solvent-based primer and adhesives for
floorings; January 2011.

Regulation (EU)
No 305/2011

Regulation (EU)
No 305/2011 of the European Parliament and of the Council of 9 March
2011 laying down harmonized conditions for the marketing of construction
products and repealing Council Directive 89/106/EEC Text with EEA relevance.

The literature referred to in the Environmental Product Declaration must be listed in full.Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.

Publisher

Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Daxner & Merl GmbH
Lindengasse 39/8
1070 Wien
Austria

+43 676 849477826
office@daxner-merl.com
www.daxner-merl.com

Angela Schindler Umweltberatung
Tüfinger Str. 12
88682 Salem
Germany

07553 919 9456
angela@schindler-umwelt.de
www.schindler-umwelt.de

Owner of the Declaration

nora systems GmbH
Höhnerweg 2-4
69469 Weinheim
Germany

+49 6201 80 6040
info-de@nora.com
www.nora.com