For over 65 years, nora® rubber floor coverings have met the unique demands of facilities worldwide. Extremely durable, ergonomic, sound absorbent, stain and slip resistant, nora flooring solutions address the daily challenges of commercial applications and allow the creation of long-lasting, comfortable, quiet and safe environments.

nora’s manufacturing facility maintains 3rd-party certified ISO 14001 and 9001 certifications. This declaration includes every phase of the product life cycle from the production through to installation, usage and maintenance, right up to the end of the product’s life cycle in the building.

The superior performance attributes combined with an extended life cycle, 3rd-party certified low emissions and environmentally friendly maintenance make nora the perfect solution for healthcare, education and life sciences.
This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. **Exclusions:** EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. **Accuracy of Results:** EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. **Comparability:** EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

**PROGRAM OPERATOR**  
UL Environment

**DECLARATION HOLDER**  
nora systems Inc.

**DECLARATION NUMBER**  
4787273649.101.1

**DECLARED PRODUCT**  
norament® standard

**REFERENCE PCR**  
Requirements on the EPD for Floor coverings, Version 1.5, 2013

**DATE OF ISSUE**  
April 18, 2016

**PERIOD OF VALIDITY**  
5 Years

**CONTENTS OF THE DECLARATION**  
- Product definition and information about building physics
- Information about basic material and the material's origin
- Description of the product's manufacture
- Indication of product processing
- Information about the in-use conditions
- Life cycle assessment results
- Testing results and verifications

The PCR review was conducted by:

- **IBU**
  - UL Environment
  - epd@ulenvironment.com

This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories

- [ ] INTERNAL
- ☒ EXTERNAL

This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:

- Wade Stout, UL Environment
- Thomas Gloria, Industrial Ecology Consultants

This EPD conforms with EN 15804
Product Definition

Product description

This Environmental Product Declaration (EPD), covers the norament® standard range of rubber floor coverings – a broad range of designs and colors available in 3.5 mm tiles.

norament® standard floor coverings are homogeneous vulcanized rubber floor coverings made with synthetic rubber, minerals from natural sources, color pigments, and processing aids.

The norament® standard range is GREENGUARD Gold certified for low VOC emissions, Blue Angel certified and in compliance with the State of California’s Department of Public Health CA 01350 Standard.

Application

norament® standard rubber floor coverings are the perfect solution for all commercial and extremely heavy traffic applications - including healthcare, education and life sciences - where underfoot comfort, acoustics, indoor air quality, low maintenance, durability, stain and slip resistance are important.

Product standards

norament® standard rubber floor coverings meet the performance requirements of ASTM F 1344 Standard Specification for Rubber Floor Tile defined as Type IB and Grade 2.

Delivery status

Delivery of tiles up to ~ 39.53 inches x 39.53 inches (1004 x 1004 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.

Initial cleaning may only be carried out after the bonding phase of the adhesive, i.e. at the earliest 72 hours after installation. Because of their dense and closed surface, 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.

Product characteristic

<table>
<thead>
<tr>
<th>Product Specification</th>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product thickness</td>
<td>0.14 inches / 3.5 mm</td>
<td>ASTM F 386</td>
</tr>
<tr>
<td>Weight per unit area</td>
<td>5.4 kg/m²</td>
<td>EN ISO 23997</td>
</tr>
</tbody>
</table>
Production

Base materials / Ancillary materials

Simplified formulation of norament® standard:

<table>
<thead>
<tr>
<th>Material name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymers (synthetic rubber)</td>
<td>39%</td>
</tr>
<tr>
<td>Minerals</td>
<td>46%</td>
</tr>
<tr>
<td>Pigments</td>
<td>8%</td>
</tr>
<tr>
<td>Auxiliary substances and vulcanization system</td>
<td>7%</td>
</tr>
</tbody>
</table>

The formulation is checked according the current REACH candidate list. The formulation does not contain any substances of very high concern. Flame retardants are not used.

Manufacture

The main production stages are first weighting and mixing the rubber compound of the different components, and then moulding the blanks on the calender. Vulcanization is done in high-pressure daylight presses with a pressing power of approximately 1.200 tonnes and at a temperature of 170°C. 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 5.40 kg.

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.

As a matter of course, all requirements set by authorities (e.g. on immission control) are met.

Packaging

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

**Installation**

All subfloors must be absorptive, permanently dry, clean, smooth and structurally sound as per ASTM F 710 — “Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring” and the nora® Installation Guide or if installing nora nTx, the nora nTx installation Guide.

It is the responsibility of the installing party to determine the suitability and porosity of the subfloor being covered. The area to receive flooring must be fully enclosed, weather tight and climate controlled at the normal service ambient temperature and humidity (except walk-in freezers or similar) or 68°F ± 5°F and 50% ±10% ambient relative humidity (RH) for 48 hours before, during and 72 hours after the installation. For all other substrates please contact nora’s Technical Dept.

The flooring, adhesive and all accessories shall be acclimated within this area or nearby with the same climate conditions for at least 48 hours prior to installation. The use of any other manufacturer’s adhesive is not permitted and will void the warranty. The procedures and recommendations described in nora’s installation guides are developed to offer the best opportunity for a proper and successful nora flooring installation. Any deviation from these guidelines may result in an installation failure. Detailed installation instructions can be found at www.nora.com/us.

**Condition of use**

nora® rubber flooring requires no finishing, waxing or sealing. All nora floor coverings have a dense, nonporous and dirt-repellant surface - eliminating the need to use environmentally unfriendly and harsh cleaning chemicals.

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.

Routine cleaning should be done manually, thrice weekly, with suitable microfibre covers and neutral detergent. Further cleaning recommendations are available at www.nora.com/us. Cleaning agents with a pH-value higher than 12 are not to be used without consulting nora’s technical department.

**Environment and health during use**

nora® floor coverings meet the requirements of

- Greenguard Gold
- Blue Angel RAL-UZ 120 for resilient floor coverings
- California Specification 01350
40 years. Due to their very high abrasion resistance and their homogenous 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.

**Extraordinary effects**

**Fire**

Flame resistant, free of halogens, toxicologically safe in the event of fire:

<table>
<thead>
<tr>
<th>Product Specification</th>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire resistance, critical radiant flux</td>
<td>class 1</td>
<td>ASTM E 648</td>
</tr>
<tr>
<td>Smoke density, flaming/non flaming</td>
<td>&lt; 450</td>
<td>ASTM E 662</td>
</tr>
</tbody>
</table>

**End-of-life**

**Re-use phase**

Material recycling (e.g. granulating and processing into landing mats, industrial or stable mats, and coverings of sports areas), thermal recycling (e.g. use as substitute fuel in thermal power plants), or full material and thermal recycling for energy recovery in the cement industry.

**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).

**LCA - Calculation rules**

The LCA calculation is performed according EN 15804.

**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.
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

**Transport A4:**
Assumption for the transport of the products to the construction site (boat: 5600 km, truck: 3100 km)

**Installation A5:**
Production and incineration of the off-cut material (5%), disposal of the packaging

The pretreatment of the underground surface (prime coat, surfacer, 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

**End-of-Life stage C1, C2, C4:**
Scenario for the incineration of the floor covering incl. removal from the building and transport to the waste incineration plant

**Benefits for the next product system D:**
Credits 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.
**Estimates and assumptions**

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

The assumptions about the cleaning scenario are described above (condition of use). For the end-of-life scenario it is assumed that 100% of the product is thermally recovered. As transport distance in the EoL-scenario a value of 200 km per truck is considered.

**Cut-off criteria**

All data from the production data acquisition, i.e. on all raw material used as per formulation, are considered. Transport expenditures are taken into account for all essential basic materials, the dispatch of the products and the end-of-life scenario.

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. Transport expenditures for the packaging are ignored. Thus, even material and energy flows with a proportion of less than 1% are considered.

**Background data**

For life cycle modeling of the considered products, the GaBi 6 Software System for Life Cycle Engineering, developed by thinkstep AG, is used. Upstream data, specific information is not available, are taken from the GaBi 6 database.

**Data quality**

The primary data collected from the manufacturer are based on annual quantities from 2012, or are projected from measurements on the specific facilities.

The GaBi 6 database contains datasets for some of the basic materials used in the respective formulations. Database status is 2014.

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.

Electrical and thermal energy for the production are obtained from a power plant at the industrial site Weinheim, which is operated by the Freudenberg Service KG. For the natural gas fired power plant with cogeneration of heat and power current and specific data have been collected.
Allocation for 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.

Allocation in the foreground data
The manufacturing process does not create any by-products. Regarding this aspect the software model does not include an allocation.

The total production of nora systems, Inc. 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 of waste materials
Combustible waste is fed into energy recovery processes. 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.

Production waste: The energy gained is looped back in the module A1-A3.

Installation waste and product waste in the end-of-life scenario:
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, C4); resulting credits for thermal and electrical energy are declared in module D.

Allocation for waste paper:
Paper/corrugated board is used as packaging material and this usually includes a mix of recycled and virgin fibers. When modeling the production of paper, the scrap paper that is used in this process has been assumed to be burden free. Similarly, waste paper arising in the product life cycle is assumed to be recycled; a cut-off approach has been applied.
The following technical information is a basis for the declared modules. The values refer to the functional unit.

### Transport to the construction site (A4)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liters of fuel (truck) Europe</td>
<td>0.00891 l/ 100 km</td>
</tr>
<tr>
<td>Capacity utilization (incl. empty runs) Europe</td>
<td>85%</td>
</tr>
<tr>
<td>Liters of fuel (truck) NA</td>
<td>0.0215 l/ 100 km</td>
</tr>
<tr>
<td>Capacity utilization (incl. empty runs) NA</td>
<td>78%</td>
</tr>
<tr>
<td>Liters of fuel (vessel)</td>
<td>0.00221 l/ 100 km</td>
</tr>
<tr>
<td>Capacity utilization (incl. empty runs) vessel</td>
<td>48%</td>
</tr>
<tr>
<td>Gross density of products transported</td>
<td>1 577 kg/m³</td>
</tr>
</tbody>
</table>

### Installation in the building (A5)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auxiliary</td>
<td>Depending on building conditions</td>
</tr>
<tr>
<td>Water and electricity consumption</td>
<td>Depending on building conditions</td>
</tr>
<tr>
<td>Material loss</td>
<td>5%</td>
</tr>
</tbody>
</table>

### End of Life (C1-C4)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy recovery (waste incineration plant)</td>
<td>5.4 kg/m²</td>
</tr>
<tr>
<td>Landfilling</td>
<td>0 kg/m²</td>
</tr>
</tbody>
</table>
LCA - Results

The result of module B2 refers to a time frame of one year. For the specific application the value can be multiplied with the assumed period respectively.

The following information on environmental impacts is expressed with the impact category parameters of LCIA using characterisation factors. The selected method is CML 2001 (updated 2013, following requirements of EN 15804) and TRACI 2.1.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Production</th>
<th>Installation</th>
<th>Use</th>
<th>End-of-life</th>
<th>Benefits and loads beyond the system boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>CML</td>
<td>A1-A3</td>
<td>A4</td>
<td>A5</td>
<td>B2</td>
<td>C1</td>
</tr>
<tr>
<td>GWP</td>
<td>[kg CO₂-eq.]</td>
<td>1,9E+01</td>
<td>2,3E+00</td>
<td>1,8E+00</td>
<td>2,7E-01</td>
</tr>
<tr>
<td>ODP</td>
<td>[kg CFC11-eq.]</td>
<td>1,0E-08</td>
<td>1,3E-11</td>
<td>6,3E-10</td>
<td>3,1E-11</td>
</tr>
<tr>
<td>AP</td>
<td>[kg SO₂-eq.]</td>
<td>4,6E-02</td>
<td>2,0E-02</td>
<td>3,8E-03</td>
<td>5,7E-04</td>
</tr>
<tr>
<td>EP</td>
<td>[kg PO₄³⁻-eq.]</td>
<td>5,3E-03</td>
<td>3,2E-03</td>
<td>4,8E-04</td>
<td>1,9E-04</td>
</tr>
<tr>
<td>POCP</td>
<td>[kg Ethen eq.]</td>
<td>6,9E-03</td>
<td>4,4E-05</td>
<td>4,1E-04</td>
<td>1,4E-04</td>
</tr>
<tr>
<td>ADPE</td>
<td>[kg Sb eq.]</td>
<td>2,7E-04</td>
<td>2,5E-07</td>
<td>1,4E-05</td>
<td>2,4E-07</td>
</tr>
<tr>
<td>ADPF</td>
<td>[MJ]</td>
<td>3,9E+02</td>
<td>3,2E+01</td>
<td>2,4E+01</td>
<td>4,8E+00</td>
</tr>
</tbody>
</table>

Caption: 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.
## Environmental Product Declaration

### nora® standard
Rubber Tile Floor Coverings

According to ISO 14025

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Production</th>
<th>Installation</th>
<th>Use</th>
<th>End-of-life</th>
<th>Benefits and loads beyond the system boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERE [MJ]</td>
<td>1.0E+01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PERM [MJ]</td>
<td>1.4E+00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PERT [MJ]</td>
<td>1.2E+01</td>
<td>4.9E-01</td>
<td>7.6E-01</td>
<td>1.4E-01</td>
<td>9.1E-02 2.8E-02 2.1E+00 -5.2E+00</td>
</tr>
<tr>
<td>PENRE [MJ]</td>
<td>3.2E+02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PENRM [MJ]</td>
<td>8.0E+01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PENRT [MJ]</td>
<td>4.0E+02</td>
<td>3.2E+01</td>
<td>2.5E+01</td>
<td>5.0E+00</td>
<td>9.6E-01 1.9E+00 4.6E+01 -5.7E+01</td>
</tr>
<tr>
<td>SM [kg]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>RSF [MJ]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NRSF [MJ]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FW [m³]</td>
<td>5.8E-02</td>
<td>5.1E-03</td>
<td>5.4E-03</td>
<td>1.6E-03</td>
<td>3.8E-04 3.7E-04 2.9E-02 -1.1E-02</td>
</tr>
</tbody>
</table>

**Unit**
- A1-A3
- A4
- A5
- B2
- C1
- C2
- C4
- D

**Caption**
PERE = Use of renewable primary energy as energy carrier; PERM = Use of renewable primary energy as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy as energy carrier; PENRM = Use of non-renewable primary energy 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

<table>
<thead>
<tr>
<th>Unit</th>
<th>A1-A3</th>
<th>A4</th>
<th>A5</th>
<th>B2</th>
<th>C1</th>
<th>C2</th>
<th>C4</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWD</td>
<td>[kg]</td>
<td>1.1E-02</td>
<td>7.4E-03</td>
<td>4.5E-06</td>
<td>5.6E-04</td>
<td>1.1E-06</td>
<td>2.8E-07</td>
<td>0.0E+00</td>
</tr>
<tr>
<td>NHWD</td>
<td>[kg]</td>
<td>3.6E+00</td>
<td>1.9E+00</td>
<td>1.1E-03</td>
<td>1.7E-01</td>
<td>5.0E-02</td>
<td>3.1E-04</td>
<td>0.0E+00</td>
</tr>
<tr>
<td>RWD</td>
<td>[kg]</td>
<td>2.6E-03</td>
<td>4.5E-03</td>
<td>5.0E-05</td>
<td>3.1E-04</td>
<td>1.1E-04</td>
<td>8.0E-05</td>
<td>0.0E+00</td>
</tr>
<tr>
<td>CRU</td>
<td>[kg]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MFR</td>
<td>[kg]</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
</tr>
<tr>
<td>MER</td>
<td>[kg]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EEE</td>
<td>[MJ]</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>8.0E-01</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>9.4E+00</td>
</tr>
<tr>
<td>EET</td>
<td>[MJ]</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>2.1E+00</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>0.0E+00</td>
<td>2.7E+01</td>
</tr>
</tbody>
</table>

**Caption**
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

**Note:**
Not all of the used inventories for the calculation of the LCA support the methodological approach for the declaration of water and waste indicators. The indicators for waste and water are declared, the uncertainty of these values is increased.
LCA - Interpretation

The main proportion of the environmental impact and the demand on primary energy is determined by the expenditure for the supply chain production. The manufacturing of the floor covering at nora systems contributes less, but still significantly to the environmental impacts in relation to the total production process.

The use stage/cleaning depends on the assumptions made for the scenario. The effects of the chosen and recommended typical cleaning scenario contribute significantly when projected to the total period of use; this is a key factor for the assessment of the floor covering.

Credits in module D result from incineration processes of installation off-cut and the product in the EoL-scenario.
References


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