

ENVIRONMENTAL PRODUCT DECLARATION

ETHOS® MODULAR

TARKETT / TANDUS CENTIVA
COMMERCIAL FLOOR COVERING



Ethos Modular – Style: Loop Stitch, Color: Ocean Isle



THE ULTIMATE
FLOORING EXPERIENCE

Tarkett is a global leader in innovative and sustainable solutions for flooring and sports surfaces serving customers in more than 100 countries worldwide. Tarkett has been involved in developing a collaborative circular economy, respectful of natural resources and people's health. With recycling centers worldwide, product development is focused on reuse and recycling at the end of use. Tarkett also continues to pursue its ambitious eco-innovation strategy by focusing on transparency and optimizing products for improved indoor air quality and material health based on Cradle to Cradle principals.

For more information visit
www.tarkett.com or
www.tarkettna.com



ENVIRONMENTAL PRODUCT DECLARATION



Tandus Centiva ethos® Modular with Omnicoat Technology™
Commercial Floor Covering

According to ISO 14025 and ISO 21930:2007

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 | Tarkett/Tandus Centiva |
| DECLARATION NUMBER | 4788046862.101.1 |
| DECLARED PRODUCT | Tandus Centiva ethos® modular with Omnicoat Technology™ |
| REFERENCE PCR | NSF PCR for Flooring: Carpet, Resilient, Laminate, Ceramic, Wood, Version 2 |
| DATE OF ISSUE | August 30, 2017 |
| PERIOD OF VALIDITY | 5 Years |
| CONTENTS OF THE DECLARATION | <ul style="list-style-type: none"> 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: | NSF International |
| | Accepted by PCR Review Panel |
| | ncss@nsf.org |
| This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL |  Wade Stout, UL Environment |
| |  Thomas Gloria, Industrial Ecology Consultants |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by: |  Thomas Gloria, Industrial Ecology Consultants |

This EPD conforms with ISO 21930:2007



Tandus Centiva ethos® Modular with Omnicoat Technology™
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According to ISO 14025



Ethos Modular Style: Thin Lines

Product Definition

Product Classification & Description

Ethos Modular styles are made with a nylon wear layer and ethos recycled content backing with Omnicoat Technology™. The product wear layer is composed of either nylon 6, recycled content nylon 6 or nylon 6,6 which is solution dyed, yarn dyed or a combination of solution and yarn dyed. The ethos® secondary backing is produced from recycled polyvinyl butyral (PVB) film recovered from automotive and safety glass recycling. Omnicoat Technology™ provides a high performance barrier system which protects the product from pre-existing adhesives and excessive moisture.

The ethos Modular product group was assessed for styles produced with virgin yarn and those produced with Aquafil ECONYL® recycled nylon 6 yarn. An average face weight of 18.1 ounces per square yard (osy) was utilized with the maximum (30 osy) and minimum (10 osy) yarn weights assessed for sensitivity. Unless otherwise noted, data is presented for an average product with 18.1 osy yarn weight.

All styles in the Powerbond and modular ethos product lines are Cradle to Cradle Certified™ v3.1 at the Silver level. Additionally, the products are certified at the Platinum level to the ANSI/NSF 140 Sustainability Assessment for Carpet standard and are fully recyclable in Tarkett's Restart® reclamation program for flooring.

Accreditations

- Cradle to Cradle Certified™ / Silver v3.1 (ethos)
- NSF 140 Sustainability Assessment for Carpet / Platinum
- DeclareSM Product Label
- Recycled Content Certification
- Recycling Program Certification
- Carpet and Rug Institute (CRI) Green Label Plus
- MAS Certified Green® Program (Adhesives)
- Cradle to Cradle Certified™ v3.1 (Adhesives)
- Carbonfund.org Carbonfree® Certification (optional)



Recovered Windshields - the feedstock for ethos flooring





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Range of Applications

ethos® Modular with Omnicoat Technology™ is intended for heavy or severe traffic use in commercial buildings.

Product Standards and Approvals

| | |
|---|--|
| Flammability Radiant Panel ASTM E-648 | Class 1 (Mean Avg. CRF \geq 0.45 watts/cm ²) |
| Smoke Density ASTM E-662 | Maximum Specific Optical Density \leq 450 |
| Surface Flammability FF 1-70 | Pass |
| Electrostatic Propensity AATCC 134 | <3.0kV |
| Colorfastness to Light AATCC 16E | \geq 4.0 @ 60 AFUs |
| ISO 2551/ASTM D7570 Dimensional Stability | < 0.149% change |
| Delamination Strength ASTM D-3936 | No Delamination |
| Tuft Bind ASTM D-1335 | \geq 8 pounds |
| CRI Green Label Plus | Meets criteria GLP ID# 8320 |
| California Specification 01350 | Meets criteria (CDPH v1.1 and v1.2) |

Delivery Status

| | | | | |
|--|--|-------------|----------------|-------------|
| Type of Manufacture/Tufting Construction | Textured Loop, Stratatec® Patterned Loop, Accuweave® Patterned Loop, Level Loop, Stratatec® Patterned Symtex™, Accuweave® Patterned Symtex™ or Symtex™ | | | |
| Wear Layer Composition | Nylon 6 or Nylon 6,6 yarn | | | |
| Primary Backing | Polyester, Non-woven | | | |
| Secondary Backing | ethos® modular backing is made from recycled postconsumer PVB polymer | | | |
| Recycled Content | Dependent upon style. 46 to 76% overall recycled content; min. 23% postconsumer | | | |
| Installation Options | Dependent upon style. Random, Quarter Turned, Unidirectional, Horizontal Ashlar, Vertical Ashlar (18 x 36), Herring Bone (18 x 36), Unidirectional (18 x 36) | | | |
| Product Size Availability (inches) | 24 x 24 | 18 x 18 | 36 x 36 | 18 x 36 |
| Product Size Availability (centimeters) | 60.9 x 60.9 | 45.7 x 45.7 | 91.4 x 91.4 | 45.7 x 91.4 |
| | Range | Unit | Range | Unit |
| Wear Layer/Yarn Weight | 10 to 30 | osy | 339 to 1,017 | gsm |
| Total Product Weight (+/- 5%) | 87.9 to 107.9 | osy | 2,980 to 3,658 | gsm |

Material Content



- ← Face Yarn/Wear Layer – is composed of either nylon 6 or nylon 6,6 yarn
- ← Primary Backing/Tufting Substrate – wear layer nylon yarn is tufted into a polyester nonwoven sheet known as the primary backing
- ← Glass Stabilization – A nonwoven sheet made of glass filament is incorporated into the secondary backing to impart dimensional stability
- ← Secondary Backing – ethos backing is composed of recycled polyvinyl butyral (PVB) polymer recovered from automotive and safety glass recycling





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Material Content of the Product

| Component | Material | Mass % | Availability | | Origin |
|-----------------------------------|--------------------------|--------|---------------|----------|--------|
| Wear Layer/Pile Yarn | Nylon 6 or Nylon 6,6 | 19.0 | Non-Renewable | Limited | Global |
| Primary Backing/Tufting Substrate | Polyester | 3.4 | Non-Renewable | Limited | Global |
| Stabilization Layer | Glass filament non-woven | 2.1 | Non-Renewable | Abundant | Global |
| Structural Backing | PVB | 75.5 | Recycled | Limited | Global |
| | Calcium carbonate | | Non-Renewable | Abundant | Global |
| | Aluminum trihydrate | | Non-Renewable | Abundant | Global |

Production of Main Materials

Aluminum trihydrate - a mineral filler derived from bauxite that is mined from natural surface deposits

Calcium carbonate - also known as limestone, a mineral filler that is mined from natural surface deposits

Glass stabilization layer - a nonwoven sheet consisting of glass fibers used for dimensional stability

Nylon 6 - a polymer of caprolactam formed by ring opening polymerization

Nylon 6,6 - manufactured by combining adipic acid and hexamethylenediamine, both having six carbon atoms, and polymerizing the resultant monomer by condensation polymerization

Polyester - most commonly referred to as polyethylene terephthalate, produced by the polymerization of ethylene glycol and terephthalic acid or its derivatives

Polyvinyl Butyral (PVB) - postconsumer PVB is obtained from recycled windshields and safety glass recycling operations

Production

In the manufacturing process, nylon yarn is tufted into a polyester, nonwoven primary backing. The ethos secondary backing containing an embedded non-woven glass sheet is produced and adhered to the tufted primary backing composite. A proprietary coating/chemical barrier, Omnicoat Technology™, is applied to the secondary backing.

Health, Safety, and Environmental Aspects During Production

- ISO 14001 certification and an Environmental Management System (EMS) is employed.
- Tandus Centiva is in compliance with all applicable local, state and federal environmental regulations.
- The company has a successful supply chain and raw material management program.
- World Class Manufacturing (WCM) – is a comprehensive Environment, Health and Safety (EHS) program focused on continual improvement in industrial performance, safety, quality, customer service and the environment.

Production Waste

All trimmings and carpet manufacturing waste, along with postconsumer carpet, is recycled into new flooring in Tandus Centiva's closed-loop carpet recycling process. Non-carpet waste is also recycled in various programs.





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Delivery and Installation

Delivery

For the life cycle assessment, the weighted average transportation distance from the Dalton manufacturing facility to its customers amounts to 1,900 km by truck and 300 km by boat.

Installation



Ethos Modular with Omnicoat Technology provides a protective coating and chemical barrier that prevents installation issues due to moisture, pre-existing adhesives and adverse flooring conditions. When installed with TarkettTape™, ethos Modular with Omnicoat Technology allows flooring installation to be unaffected by pH or moisture as long as there are no free standing liquids present. The product can be installed with either TarkettTape™ or Tandus Centiva's C-EX adhesive which is Cradle to Cradle Certified v3.1, Silver. TarkettTape applied to the corners of the product provides adhesion during use and ease of removal upon de-installation. Detailed installation instructions can be found at www.tarkettna.com.

Installation Waste

Packaging and flooring installation waste can be recycled in a local recycling program or returned to Tandus Centiva for recycling. Although installation waste is often recycled, to remain conservative in the LCA model, the recycled portion was not taken into account. Thus, product waste and packaging was modeled as disposed of in a landfill.

Packaging

Modular flooring is packaged in recycled content, cardboard boxes, stacked on wooden pallets and secured with stretch wrap. Tandus Centiva encourages installers to recycle packaging materials in local recycling programs.

Health, Safety and Environmental Aspects during Installation

Tandus Centiva floor coverings and adhesives meet VOC emission requirements in accordance with the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions for Indoor Sources Using Environmental Chambers, v1.1 (Feb 2010) and v1.2 (Jan 2017). These test methods are also known as the California 01350 Specification, or referenced as Green Label Plus. Additionally, adhesives have been tested for VOC content, are third party certified in the MAS Certified Green® program and also meet the VOC emission requirements of the South Coast Air Quality Management District - Rule 1168. Many adhesives are also Cradle to Cradle Certified™. Installation Instructions and Material Safety Data Sheets (MSDS) are available at www.tarkettna.com.



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Use

The use stage takes into account environmental impacts during product use. A reference service life (RSL) of 15 years has been applied. It should be noted that floor coverings may be replaced before the end of their useful life and they may also last much longer than the stated RSL.

Cleaning and Maintenance

Product selection, construction, color, use of entry mats, traffic wear patterns, vacuuming, extraction cleaning and spot removal all play a part in product maintenance. Tandus Centiva’s recommended cleaning and maintenance guidelines are available at www.tarkettna.com. Cleaning and maintenance was modelled as shown below.

| Level of Use | Cleaning Process | Cleaning Frequency | Consumption of Energy and Resources |
|--------------------------|---------------------|--------------------|-------------------------------------|
| Commercial Heavy Traffic | Vacuuming | 4 times per week | Electrical Energy |
| | Extraction Cleaning | 2 times per year | Electrical Energy |
| | | | Water |
| | | | Cleaning Agent |

Prevention of Structural Damage

Floor coverings should be installed on dry, structurally sound and adequately prepared floors. Subfloor requirements and installation instructions are available at www.tarkettna.com

End-of-Life

Customers are encouraged to return and recycle end-of-life carpet in the company’s ReStart® reclamation program. Tandus Centiva’s third party certified, closed-loop carpet recycling process is located in Dalton, Georgia. Alternative product types returned for recycling are recycled in other locations or in affiliate recycling programs.





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Tandus Centiva's Carpet Recycling Process



Disposal

Tandus Centiva's Dalton facility annually recycles average of 10 million pounds of postconsumer carpet, at a rate of 12.8%. This recycled portion is accounted for as being diverted from the landfill but no credit is given to the recycled products in the LCA model or results. The non-recycled portion of the products is modeled as disposed of in a landfill. A diesel-powered truck is assumed to transport the products 30 miles to the landfill.





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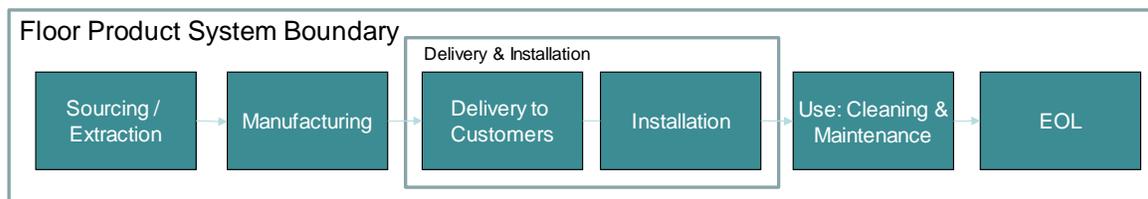
Life Cycle Assessment

A cradle-to-grave Life Cycle Assessment (LCA) was completed on this product in accordance with ISO 14040 / ISO 14044, and the study was reviewed for conformance with ISO 14044 and the NSF flooring PCR v2.

System Boundaries

The life cycle stages included in the system boundaries are:

1. Sourcing and extraction: This includes production of the materials in the flooring products. Extraction of materials from the earth and/or extraction from postconsumer sources are quantified. Transportation of materials to the Tandus Centiva facilities as well as production of packaging materials are included.
2. Manufacturing, which accounts for the operations at Tandus Centiva facilities.
3. Delivery and Installation, which includes delivery of the finished product to the end user and installation of the product.
4. Use, which takes into account the use of the flooring product in a building, including cleaning and maintenance.
5. End of life, includes the fate of the flooring product at the end of its life.



The Declared or Functional Unit

The functional unit, or reference flow, has been defined as one square meter of floor product used in a commercial building with a reference service life of 60 years. As such, replacements of the product every 15 years are taken into account.

Background Data

The SimaPro LCA software was used to model the life cycle of the product. Tandus Centiva supplied primary data on the product's bill of materials and manufacturing operations. Background data came from databases appropriate for the geography and with the highest data quality in mind: nylon 6 came from PlasticsEurope (2012); nylon 6,6 came from a manufacturer-specific LCA (2014); polyester came from US LCI Database (2011); and the remaining materials came from ecoinvent (2013). For the product with the recycled content yarn, that recycled content nylon 6 data came from the company's LCA (2015).

Cut-off Criteria

For mass and energy, a cut-off goal of 99% of energy inputs and total mass inputs was defined. However, an attempt was made to collect all materials and energy involved in the materials systems – despite the defined energy and mass criteria – in order to capture any aspect that may be environmentally relevant.





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Allocation

Allocation of the production data for this product was based on a total facility mass basis.

Data Quality

The data applied to this study represent current products and practices. Data from 2016 for the Dalton, GA, manufacturing facility were used. Data for manufacturing includes all processes to manufacture the carpet, (including facility heating and lighting) and represents the average energy use based on total production. The product formulation is current. Energy and transportation data are based on the 2010's, and production data for materials are based on mid 2000's to 2010's. Data for energy and transportation are North American-based. Data for materials and processes are based on a combination of North American and European sources; EcolInvent 2.2-US was used in order to comprehensively capture some upstream North American data. Technological coverage for Tandus Centiva operations is current. Technological coverage for the materials and processes upstream and downstream of Tandus Centiva are in most cases industry average, and in some instances, typical.

Results & Interpretation

Statement of Comparison

Users of EPDs should avoid comparing results for products from different companies. Assumptions, data sources, databases, and assessment tools may all impact the uncertainty of final results and make comparisons misleading. As a general rule, comparisons of different products should not be made unless similar background data, calculation methods, building context, service life and assumptions for use are utilized.

Life Cycle Impact Assessment Results

The life cycle impact assessment (LCIA) results were calculated using the CML (required) and TRACI v.2.1 (optional) methodologies. Energy results are based on the Cumulative Energy Demand (CED) methodology.

| | | Ethos Modular - 1 Installation, no Use | | | | |
|--|--------------|--|----------|-------------------------|-------------|-----------------|
| CML Impact Categories | Unit | Sourcing & Extraction | Manuf. | Delivery & Installation | End of Life | Total |
| Abiotic Depletion Potential (ADP) | kg Sb eq | 2.3 E-06 | 1.0 E-08 | 6.8 E-08 | 2.2 E-08 | 2.4 E-06 |
| Acidification Potential (AP) | kg SO2 eq | 3.6 E-02 | 2.4 E-02 | 8.5 E-03 | 3.6 E-04 | 0.07 |
| Eutrophication Potential (EP) | kg PO4--- eq | 4.0 E-03 | 7.5 E-04 | 1.3 E-03 | 5.9 E-05 | 0.01 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 7.5 E+00 | 2.6 E+00 | 1.7 E+00 | 5.5 E-02 | 11.8 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 4.7 E-08 | 3.3 E-10 | 1.4 E-07 | 6.1 E-09 | 1.9 E-07 |
| Photochem. Oxidant Form'n Pot'l (POCP) | kg C2H4 eq | 1.8 E-03 | 1.4 E-03 | 3.7 E-04 | 1.5 E-05 | 3.6 E-03 |
| Energy Categories | | | | | | |
| Primary Energy - Non Renewable | MJ | 1.4 E+02 | 3.8 E+01 | 2.6 E+01 | 1.1 E+00 | 203 |





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|--|--------------|----------|----------|----------|----------|-----------------|
| Primary Energy - Renewable | MJ | 2.8 E+00 | 1.2 E-02 | 9.0 E-02 | 5.2 E-03 | 2.9 |
| TRACI Impact Categories (Optional) | | | | | | |
| Acidification Potential (AP) | kg SO2 eq | 3.6 E-02 | 2.2 E-02 | 9.5 E-03 | 4.1 E-04 | 0.07 |
| Eutrophication Potential (EP) | kg N eq | 3.6 E-03 | 3.9 E-04 | 1.1 E-03 | 3.7 E-05 | 0.01 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 7.5 E+00 | 2.6 E+00 | 1.7 E+00 | 5.5 E-02 | 11.8 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 6.5 E-08 | 4.6 E-10 | 1.8 E-07 | 8.1 E-09 | 2.6 E-07 |
| Smog Formation (POCP) | kg O3 eq | 3.2 E-01 | 1.4 E-01 | 2.1 E-01 | 9.9 E-03 | 0.68 |

Table 1 Ethos Modular – 1 m2 of 1 production cycle of floor product (without use phase)

| | | Ethos Modular with recycled yarn - 1 Installation, no Use | | | | |
|---|--------------|---|----------|-------------------------|-------------|-----------------|
| CML Impact Categories | Unit | Sourcing & Extraction | Manuf. | Delivery & Installation | End of Life | Total |
| Abiotic Depletion Potential (ADP) | kg Sb eq | 1.0 E-06 | 1.0 E-08 | 6.8 E-08 | 2.2 E-08 | 1.1 E-06 |
| Acidification Potential (AP) | kg SO2 eq | 3.6 E-02 | 2.4 E-02 | 8.5 E-03 | 3.6 E-04 | 0.07 |
| Eutrophication Potential (EP) | kg PO4--- eq | 3.7 E-03 | 7.5 E-04 | 1.3 E-03 | 5.9 E-05 | 0.01 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 4.5 E+00 | 2.6 E+00 | 1.7 E+00 | 5.5 E-02 | 8.9 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 7.2 E-08 | 3.3 E-10 | 1.4 E-07 | 6.1 E-09 | 2.2 E-07 |
| Photochem. Oxidant Form'n Pot'l (POCP) | kg C2H4 eq | 2.4 E-03 | 1.4 E-03 | 3.7 E-04 | 1.5 E-05 | 4.1 E-03 |
| Energy Categories | | | | | | |
| Primary Energy - Non Renewable | MJ | 1.0 E+02 | 3.8 E+01 | 2.6 E+01 | 1.1 E+00 | 166 |
| Primary Energy - Renewable | MJ | 1.8 E+01 | 1.2 E-02 | 9.0 E-02 | 5.2 E-03 | 17.9 |
| TRACI Impact Categories (Optional) | | | | | | |
| Acidification Potential (AP) | kg SO2 eq | 3.2 E-02 | 2.2 E-02 | 9.5 E-03 | 4.1 E-04 | 0.06 |
| Eutrophication Potential (EP) | kg N eq | 3.2 E-03 | 3.9 E-04 | 1.1 E-03 | 3.7 E-05 | 4.7 E-03 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 4.5 E+00 | 2.6 E+00 | 1.7 E+00 | 5.5 E-02 | 8.9 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 9.0 E-08 | 4.6 E-10 | 1.8 E-07 | 8.1 E-09 | 2.8 E-07 |
| Smog Formation (POCP) | kg O3 eq | 1.3 E-01 | 1.4 E-01 | 2.1 E-01 | 9.9 E-03 | 0.49 |

Table 2 ethos Modular with recycled yarn – 1 m2 of 1 production cycle of floor product (without use phase)





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| CML Impact Categories | Unit | 1 Yr Use & Maintenance |
|--|--------------|------------------------|
| Abiotic Depletion Potential (ADP) | kg Sb eq | 2.8 E-08 |
| Acidification Potential (AP) | kg SO2 eq | 0.01 |
| Eutrophication Potential (EP) | kg PO4--- eq | 2.1 E-04 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 0.70 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 2.8 E-10 |
| Photochemical Oxidant Formation Potential (POCP) | kg C2H4 eq | 6.3 E-04 |
| Energy Categories | | |
| Primary Energy - Non Renewable | MJ | 10.5 |
| Primary Energy - Renewable | MJ | 0.08 |
| TRACI Impact Categories (Optional) | | |
| Acidification Potential (AP) | kg SO2 eq | 0.01 |
| Eutrophication Potential (EP) | kg N eq | 1.0 E-04 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 0.70 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 4.0 E-10 |
| Smog Formation (POCP) | kg O3 eq | 0.04 |

Table 3 1-year use phase impacts for 1 m2 of flooring product





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Ethos Modular - 60 years
RSL of Product (yr) = 15
Replacements in 60 yrs = 4

| CML Impact Categories | Unit | Sourcing & Extraction | Manuf. | Delivery & Installation | Use | EOL | Total |
|---|--------------|-----------------------|----------|-------------------------|----------|----------|------------------|
| Abiotic Depletion Potential (ADP) | kg Sb eq | 9.1 E-06 | 4.0 E-08 | 2.7 E-07 | 1.7 E-06 | 9.0 E-08 | 1.1 E-05 |
| Acidification Potential (AP) | kg SO2 eq | 1.4 E-01 | 9.6 E-02 | 3.4 E-02 | 4.0 E-01 | 1.4 E-03 | 0.67 |
| Eutrophication Potential (EP) | kg PO4---eq | 1.6 E-02 | 3.0 E-03 | 5.3 E-03 | 1.3 E-02 | 2.4 E-04 | 0.04 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 3.0 E+01 | 1.0 E+01 | 6.9 E+00 | 4.2 E+01 | 2.2 E-01 | 89.5 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 1.9 E-07 | 1.3 E-09 | 5.5 E-07 | 1.7 E-08 | 2.4 E-08 | 7.8 E-07 |
| Photochem. Oxidant Form'n Pot'l (POCP) | kg C2H4 eq | 7.3 E-03 | 5.5 E-03 | 1.5 E-03 | 3.8 E-02 | 5.8 E-05 | 0.05 |
| Energy Categories | | | | | | | |
| Primary Energy - Non Renewable | MJ | 5.5 E+02 | 1.5 E+02 | 1.1 E+02 | 6.3 E+02 | 4.4 E+00 | 1438 |
| Primary Energy - Renewable | MJ | 1.1 E+01 | 4.7 E-02 | 3.6 E-01 | 4.5 E+00 | 2.1 E-02 | 16.1 |
| TRACI Impact Categories (Optional) | | | | | | | |
| Acidification Potential (AP) | kg SO2 eq | 1.4 E-01 | 8.7 E-02 | 3.8 E-02 | 3.6 E-01 | 1.6 E-03 | 0.64 |
| Eutrophication Potential (EP) | kg N eq | 1.4 E-02 | 1.6 E-03 | 4.2 E-03 | 6.1 E-03 | 1.5 E-04 | 0.03 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 3.0 E+01 | 1.0 E+01 | 6.9 E+00 | 4.2 E+01 | 2.2 E-01 | 89.5 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 2.6 E-07 | 1.8 E-09 | 7.3 E-07 | 2.4 E-08 | 3.2 E-08 | 1.05 E-06 |
| Smog Formation (POCP) | kg O3 eq | 1.3 E+00 | 5.4 E-01 | 8.6 E-01 | 2.5 E+00 | 4.0 E-02 | 5.2 |

Table 4 ethos Modular – 1 m2 over the 60-year life of the building





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Ethos Modular with recycled yarn - 60 years
RSL of Product (yr) = 15
Replacements in 60 yrs = 4

| CML Impact Categories | Unit | Sourcing & Extraction | Manuf. | Delivery & Installation | Use | EOL | Total |
|---|--------------|-----------------------|----------|-------------------------|----------|----------|------------------|
| Abiotic Depletion Potential (ADP) | kg Sb eq | 4.2 E-06 | 4.0 E-08 | 2.7 E-07 | 1.7 E-06 | 9.0 E-08 | 6.3 E-06 |
| Acidification Potential (AP) | kg SO2 eq | 1.5 E-01 | 9.6 E-02 | 3.4 E-02 | 4.0 E-01 | 1.4 E-03 | 0.67 |
| Eutrophication Potential (EP) | kg PO4---eq | 1.5 E-02 | 3.0 E-03 | 5.3 E-03 | 1.3 E-02 | 2.4 E-04 | 0.04 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 1.8 E+01 | 1.0 E+01 | 6.9 E+00 | 4.2 E+01 | 2.2 E-01 | 77.8 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 2.9 E-07 | 1.3 E-09 | 5.5 E-07 | 1.7 E-08 | 2.4 E-08 | 8.8 E-07 |
| Photochem. Oxidant Form'n Pot'l (POCP) | kg C2H4 eq | 9.4 E-03 | 5.5 E-03 | 1.5 E-03 | 3.8 E-02 | 5.8 E-05 | 0.05 |
| Energy Categories | | | | | | | |
| Primary Energy - Non Renewable | MJ | 4.0 E+02 | 1.5 E+02 | 1.1 E+02 | 6.3 E+02 | 4.4 E+00 | 1290 |
| Primary Energy - Renewable | MJ | 7.1 E+01 | 4.7 E-02 | 3.6 E-01 | 4.5 E+00 | 2.1 E-02 | 76.3 |
| TRACI Impact Categories (Optional) | | | | | | | |
| Acidification Potential (AP) | kg SO2 eq | 1.3 E-01 | 8.7 E-02 | 3.8 E-02 | 3.6 E-01 | 1.6 E-03 | 0.62 |
| Eutrophication Potential (EP) | kg N eq | 1.3 E-02 | 1.6 E-03 | 4.2 E-03 | 6.1 E-03 | 1.5 E-04 | 0.02 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 1.8 E+01 | 1.0 E+01 | 6.9 E+00 | 4.2 E+01 | 2.2 E-01 | 77.8 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 3.6 E-07 | 1.8 E-09 | 7.3 E-07 | 2.4 E-08 | 3.2 E-08 | 1.15 E-06 |
| Smog Formation (POCP) | kg O3 eq | 5.1 E-01 | 5.4 E-01 | 8.6 E-01 | 2.5 E+00 | 4.0 E-02 | 4.4 |

Table 5 ethos Modular with recycled yarn – 1 m2 over the 60-year life of the building

Interpretation

When evaluating 1 m2 of flooring without the use phase, most of the environmental impacts occur during production of the flooring (raw materials production and manufacturing). When the product is evaluated in terms of its 60-year use in a building, the relative impacts of the use phase become more prominent in the life cycle, and the relative impacts of the flooring production decrease. When the yarn weight is lower or higher, the impacts slightly decrease or increase, respectively.





Tandus Centiva ethos® Modular with Omnicoat Technology™
Commercial Floor Covering

According to ISO 14025

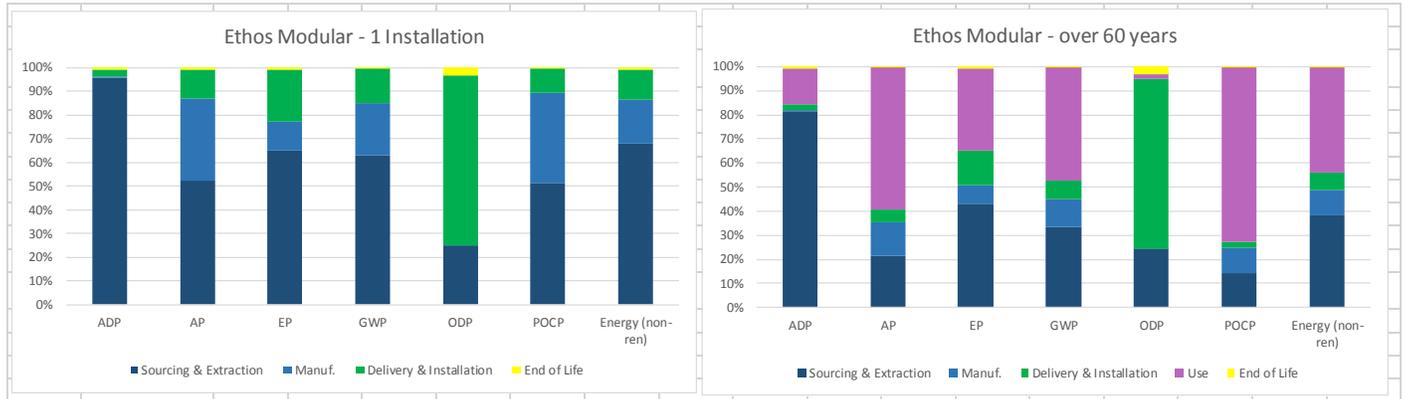


Figure 1 Relative impacts of the life cycle stages – ethos Modular

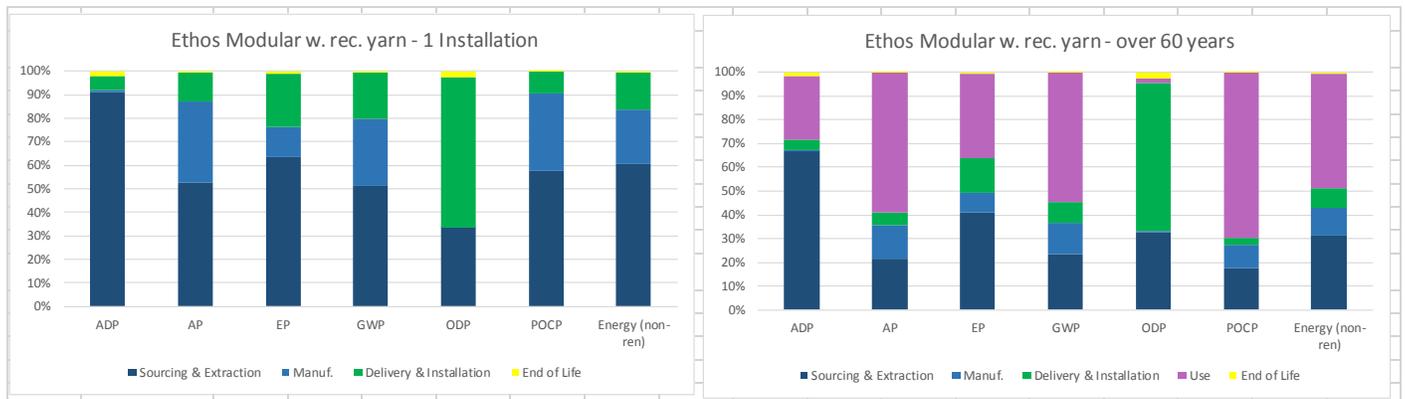


Figure 2 Relative impacts of the life cycle stages – ethos Modular with recycled yarn

Cradle to grave results using low (10 osy), average (18.1 osy) and high (30 osy) yarn weights:

| | | Ethos Modular - 60 yrs | | |
|---|--------------|------------------------|----------|----------|
| CML Impact Categories | Unit | Low | Average | High |
| Abiotic Depletion Potential (ADP) | kg Sb eq | 6.3 E-05 | 1.1 E-05 | 1.8 E-04 |
| Acidification Potential (AP) | kg SO2 eq | 0.68 | 0.67 | 0.77 |
| Eutrophication Potential (EP) | kg PO4--- eq | 0.04 | 0.04 | 0.06 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 80 | 90 | 106 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 7.4 E-07 | 7.8 E-07 | 8.6 E-07 |
| Photochemical Oxidant Formation Potential | kg C2H4 eq | 0.05 | 0.05 | 0.06 |
| Energy Categories | | | | |
| Primary Energy - Non Renewable | MJ | 1261 | 1438 | 1636 |
| Primary Energy – Renewable | MJ | 7.1 | 7.4 | 8.3 |

Table 6 ethos Modular face weight analysis





Tandus Centiva ethos® Modular with Omnicoat Technology™
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According to ISO 14025

| | | Ethos Modular with recycled yarn - 60 yrs | | |
|---|--------------|---|----------|----------|
| CML Impact Categories | Unit | Low | Average | High |
| Abiotic Depletion Potential (ADP) | kg Sb eq | 6.2 E-06 | 6.3 E-06 | 6.3 E-06 |
| Acidification Potential (AP) | kg SO2 eq | 0.66 | 0.67 | 0.70 |
| Eutrophication Potential (EP) | kg PO4--- eq | 0.03 | 0.04 | 0.04 |
| Global Warming Potential (GWP) (100a) | kg CO2 eq | 73 | 78 | 85 |
| Ozone Depletion Potential (ODP) | kg CFC-11 eq | 7.9 E-07 | 8.8 E-07 | 1.0 E-06 |
| Photochemical Oxidant Formation Potential | kg C2H4 eq | 0.05 | 0.05 | 0.06 |
| Energy Categories | | | | |
| Primary Energy - Non Renewable | MJ | 1193 | 1290 | 1432 |
| Primary Energy - Renewable | MJ | 48 | 76 | 117 |

Table 7 ethos Modular with recycled yarn face weight analysis

Additional Information, Evidence, and Test Results

Carbon footprinting enables Tandus Centiva to offer its customers the option to purchase products that are “carbon free” or “climate neutral” through the Carbonfund.org, a leading, nonprofit organization dedicated to combating climate change. Claiming a product is carbon free means that the greenhouse gas emissions related to the life cycle of the product have been offset. For a nominal cost, Tandus Centiva customers can purchase carbonfree Powerbond or modular flooring products through a registered and credible program.

Ethos modular has a Class I fire rating and meets flammability requirements of the 2012 NFPA 101 Life Safety Code and the 2012 International Fire Code.



Emissions

Product and adhesives have low VOC emissions and are per the criteria defined in CRI’s Green Label Plus program (CDPH v1.1 and v1.2). Additionally, adhesive VOC content is tested by Materials Analytical Services, LLC and certified in the MAS Certified Green® Program. Adhesives meet the requirements of the South Coast Air Quality Management District - Rule 1168.

References

- /1/ Product Category Rule: NSF Sustainability, Product Category Rule (PCR) on Flooring: Carpet, Resilient, Textile, Laminate, Ceramic, Wood, version 2, Valid through June 23, 2019.
- /2/ ISO 14025:2006, the International Organization for Standardization, Environmental Labels and Declarations - Type III Environmental Declarations - Principals and Procedures, Edition 1.
- /3/ ISO 14040:2006, the International Standard of the International Standardization Organization, Environmental Management - Life Cycle Assessment - Principles and Framework.
- /4/ ISO 14044:2006, the International Standard of the International Standardization Organization, Environmental Management - Life Cycle Assessment – Requirements and guidelines.





Tandus Centiva ethos® Modular with Omnicoat Technology™
Commercial Floor Covering

According to ISO 14025

/5/ ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA
<http://www.astm.org/Standard/index.shtml>

/6/ 16 CFR 1631 - STANDARD FOR THE SURFACE FLAMMABILITY OF SMALL CARPETS AND RUGS (FF 2-70); Code of Federal Regulations; 40 FR 59935

/7/ American Association of Textile Chemists and Colorists (AATCC), Research Triangle Park, NC., USA, Test Methods and Evaluation Procedures <http://www.aatcc.org/>

/8/ Carpet and Rug Institute, Green Label Plus Program, Carpet and Adhesives, <http://www.carpet-rug.org/commercial-customers/green-building-and-the-environment/green-label-plus/carpet-and-adhesive.cfm>

/9/ Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers v1.1 (February 2010) and v1.2 (January 2017), Indoor Air Quality Section, Environmental Health Laboratory Branch, Division of Environmental and Occupational Disease Control, California Department of Public Health (also known as California Specification 01350) AND http://www.cal-iaq.org/phocadownload/cdph-iaq_standardmethod_v1_1_2010%20new1110.pdf

/10/ South Coast Air Quality Management District, Rule 1168, Adhesives and Sealant Applications;
<http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1168.pdf>

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/22/ U.S. EPA, Tool for the Reduction and Assessment of Chemical and other environmental Impacts (TRACI), version 2.1. More information can be found at <http://www.epa.gov/nrmrl/std/sab/traci/>.

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/24/ Cumulative Energy Demand (CED): see Frischknecht R., Jungbluth N., et.al. (2003). Implementation of Life Cycle Impact Assessment Methods. Final report ecoinvent 2000, Swiss Centre for LCI. Duebendorf, CH, www.ecoinvent.ch. See also www.pre.nl.