



**EXTRUDED
POLYSTYRENE
FOAM PLATES
(XPS)
DANOSA**

Product Family

DANOPREN®

DANOSA extruded polystyrene foam
(XPS) thermal insulation

XPS PLATES DANOSA



Extruded polystyrene plates (XPS)

Product family representative

DANOPREN®

Description

Flexible Bitumen Sheets for roof waterproofing.

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Summary table: Environmental parameters, in which products have a specific contribution.
 Contribution detailed in LEED credit information.

Support Documentation ■ Certified: EPD, CSR, REACH ■ Self-declared ■ Potential

Category	Parameter	Support Documentation	Certified: EPD, CSR, REACH	Self-declared	Potential
Site. Mobility	Solar Reflectance Index SRI	Rainwater Management	Exterior lighting	...	
Energy Atmosph.	Embodied Energy	Greenhouse gases	Energy Demand Reduction	Equipments Efficiency	Other polluting gases
				Renewable energy	Energy management
Materials	Accredited location	Pre-consumer recycled content	Post-consumer recycled content	Potential reuse	Certified wood
					Construction waste
					Chemical composition
Water	Consumption < reference	Water management	...		
Indoor Environm.	Low emitting VOC's	Low emitting formaldehyde	Thermal comfort. Control	Lighting comfort	Acoustic comfort
					Air quality
Innovation	Innovation	...			

NOTES:

- The information included in this document shows product compliance with environmental certification (VERDE, LEED or BREEAM) criteria. The analysis is performed based on the information provided by manufacturer.
- This document does not constitute a product certification, nor does it guarantee compliance with local regulations.
- The conclusions of this study applies only to products included in this report, and are subject to the invariability of product technical conditions.
- The validity of this document is subject to supporting documents expiration date, regulations variation, and environmental certification systems updates.
- This document informs about products possible contribution to VERDE, LEED or BREEAM certifications. However, the final decision on whether or not a product meets certification requirements is exclusive to certification bodies: GBCI (Green Business Certification Inc.) for LEED certification and BREEAM ES for BREEAM certification.

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CREDIT SUMMARY

LEED v4



SUSTAINABLE SITES (SS)

- SS Heat Island Reduction



ENERGY & ATMOSPHERE (EA)

- EA Minimum energy performance (prerequisite)
- EA Optimize energy performance (credit)



MATERIAL & RESOURCES (MR)

- MR Building life-cycle impact reduction
- MR Building product disclosure and optimization - Environmental Product Declarations
- MR Building product disclosure and optimization - sourcing of raw materials
- MR Construction and demolition waste management



INDOOR ENVIRONMENTAL QUALITY (IEQ)

- IEQ Thermal comfort



INNOVATION (ID)

- ID Innovation. Exemplary Performance

LEED Categories



(LT)
Location & Transportation



(SS)
Sustainable Sites



(WE)
Water Efficiency



(EA)
Energy & Atmosphere



(MR)
Material & Resources



(IEQ) Indoor Environmental Quality



(ID)
Innovation



(RP)
Regional Priority

LEED (v4) Rating Systems

EB Existing Building
 NC New Construction
 CI Commercial Interiors
 CS Core & Shell
 SNC School New Construction
 SEB School Existing Building
 MMR Multifamily Mid Rise

RNC Retail New Construction
 REB Retail Existing Building
 RCI Retail Commercial Interiors
 HC Healthcare
 HNC Hospitality-New Constr.
 HEB Hospitality-Existing Building
 HCI Hospitality-Commercial Int.

DCNC Data Center NC
 DCEB Data Center EB
 WNC Warehouse NC
 WEB Warehouse EB
 NDP Neighborhood Devel. Plan
 ND Neighborhood Develop.
 HM Homes

CREDIT DOCUMENT

LEED v4



CATEGORY

SUSTAINABLE SITES (SS)

SS Heat Island Reduction (HCNC, NC, CS, SNC, RNC, HNC, DCNC, WNC)

Intent To minimize effects on microclimates and human and wildlife habitats by reducing heat islands.

Compliance information **Option 1:** DANOLOSA initial SRI is 56. DANOLOSA does not meet SRI low-sloped roof LEED requirements for Standard Calculation Compliance. However, it can contribute to Weighted Calculation Compliance, in combination with other materials with a higher SRI.

**NOTE: The final result depends on the area weighted calculation, including all measures employed to reduce heat island effect.*

LEED Requirements

Option 1. Roofs:

Use High-Reflective roofing materials according to LEED requirements. Other heat island effect measures:

- Use open-grid pavement systems or paving materials with a high solar reflectance (SR)
- Provide shade with vegetated structures, high-reflective architectural devices, or structures covered by energy generation systems

NOTE: The weighted calculation includes all roof and exterior pavements. Therefore, it is not necessary that 100% of the products comply with the requirements. Their compliance will be calculated using an area weighted average.

Option 2: Parking under cover.

EP*: Achieve both Options 1 and 2. Locate 100% of parking under cover.

**EP: Requirements for Exemplary Performance (see Innovation LEED category)*

Example

N/A

Support Documentation Reference Standards

SRI Test - Danolosa XPS.

- ASTM Standards E903 y E892: astm.org
- Cool Roof Rating Council Standard (CRRC-1): coolroofs.org



CATEGORY ENERGY & ATMOSPHERE (EA)

- ◆ EA Minimum energy performance (prerequisite)
- ◆ EA Optimize energy performance (credit)
(SNC, NC, CS, RNC, HNC, DCNC, WNC, HCNC)

Intent	<p>To reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.</p> <p>To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.</p>
Compliance information	<p>DANOSA XPS products have a low thermal conductivity, contributing to efficiency and energy savings.</p> <p>Thermal conductivity and thickness are defined in product technical data sheets. These data can be used to develop the project building energy simulation, as required by LEED.</p> <ul style="list-style-type: none"> • DANOSA products thermal conductivity range: 0.032 to 0.037 W/m-K • DANOSA products thickness range: 30 to 100mm. <p><i>NOTE: Simulation result depends on the building design, its location, orientation, materials, envelope definition and systems.</i></p>
LEED Requirements	<p>Option 1: Energy Simulation.</p> <p>Demonstrate an improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G, with errata.</p> <p>Demonstrate an improvement of 2-5% (depending on the rating system) for prerequisite, and an improvement of 3-50% for credit achievement.</p> <p>EP* Option 1: Demonstrate an improvement of 54% in the proposed building performance rating compared with the baseline building performance rating.</p> <p><i>*EP: Requirements for Exemplary Performance (see Innovation LEED category)</i></p>
Example	N/A
Support Documentation	<p>Technical Data Sheets: www.danosa.com</p>
Reference Standards	<ul style="list-style-type: none"> • ASHRAE 90.1 - 2.010



**CATEGORY
MATERIAL & RESOURCES (MR)**

MR Building life-cycle impact reduction

(NC, SNC, RNC, HC, HNC, DCNC, WNC, CS)

Intent To encourage adaptive reuse and optimize the environmental performance of products and materials.

Compliance information DANOSA has developed “DANOPREN extruded polystyrene foam (XPS) plates” EPD. Below is shown environmental performance calculated in the EPD. The data can be used for project LCA calculations. The EPD has at least a cradle to gate scope.

CRADLE TO GATE SCOPE IMPACTS	GLOWAL WARMING POTENTIAL	OZONE DEPLETION POTENTIAL	ACIDIFICATION	EUTROPHICATION	PHOTOCHEMICAL OZONE FORMATION	NON-RENEWABLE PRIMARY ENERGY
INDICATOR	Kg CO ₂ eq/fu	KG DE CFC11 eq/fu	Kg de SO ₂ eq/fu	Kg PO ₄ eq/fu	KG DE C ₂ H ₄ eq/fu	MJ/fu
DANOPREN	3,98E-00	9,15E-08	1,57E-02	1,84E-03	9,39E-04	88,2

NOTES:

- The final result depends on the calculations including all envelope and structure materials.
- Functional unit: 1sqm.

LEED Requirements

Option 4: whole-building life-cycle assessment (structure and enclosure)

Conduct a life-cycle assessment of the project’s structure and enclosure that demonstrates a minimum of 10% reduction, compared with a baseline building, in at least three of the six impact categories listed below, one of which must be global warming potential:

- Global warming potential (greenhouse gases), in kg CO₂e;
- Depletion of the stratospheric ozone layer, in kg CFC-11;
- Acidification of land and water sources, in moles H+ or kg SO₂;
- Eutrophication, in kg nitrogen or kg phosphate;
- Formation of tropospheric ozone, in kg NO_x, kg O₃ eq, or kg ethene; and
- Depletion of nonrenewable energy resources, in MJ.

No impact category assessed as part of the life-cycle assessment may increase by more than 5% compared with the baseline building.

EP* Option 4: Achieve any improvement over the required credit thresholds in all six impact measures.

**EP: Requirements for Exemplary Performance (see Innovation LEED category)*

Example N/A

**Support
Documentation**

“DANOPREN extruded polystyrene foam (XPS) plates” EPD

**Reference
Standards**

- ASHRAE 90. 1 - 2010 (edificio de referencia)
- ISO 14044





CATEGORY MATERIAL & RESOURCES (MR)

MR Building product disclosure and optimization - Environmental Product Declarations

(NC, CS, SNC, RNC, HCNC, HNC, DCNC y WNC)

Intent To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

Compliance information DANOSA has developed “DANOPREN extruded polystyrene foam (XPS) plates” EPD. It is a product-specific EPD. For this reason, products are valued as one whole product for purposes of credit achievement calculation (option 1). In order to comply with option 2, it will be necessary to demonstrate and certify impact reduction below industry average.

LEED Requirements

Option 1. Environmental Product Declarations (EPD) (1 point)

Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the disclosure criteria below.

- Products with a publicly available, critically reviewed product-specific life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope are valued as one quarter (1/4) of a product for the purposes of credit achievement calculation.
- Environmental product declarations which conform to ISO 14025 and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
 - Industry-wide (generic) EPDs are valued as one half (1/2) of a product for purposes of credit achievement calculation.
 - Product-specific Type III EPD are valued as one whole product for purposes of credit achievement calculation.

EP* Option1: Source at least 40 qualifying products from five manufacturers.

Option 2. Multi-attribute optimization (1 point)

Use third party certified products for 50%, by cost, of the total value of permanently installed products in the project that demonstrate impact reduction below industry average in at least three of the following categories.

- global warming potential (greenhouse gases), in CO₂e;
- depletion of the stratospheric ozone layer, in kg CFC-11;
- acidification of land and water sources, in moles H⁺ or kg SO₂;
- eutrophication, in kg nitrogen or kg phosphate;
- formation of tropospheric ozone, in kg NO_x, kg O₃ eq, or kg ethene; and
- depletion of nonrenewable energy resources, in MJ.

For credit achievement calculation, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost.

EP* Option2: Purchase 75%, by cost, of permanently installed building products that meet the required attributes.

**EP: Requirements for Exemplary Performance (see Innovation LEED category)*

Example

N/A

**Support
Documentation**

“DANOPREN extruded polystyrene foam (XPS) plates” EPD

**Reference
Standards**

ISO 14021–1999/ ISO 14025–2006/ ISO 14040–2006/ ISO 14044–2006 / EN 15804.





CATEGORY MATERIAL & RESOURCES (MR)

MR Building product disclosure and optimization - sourcing of raw materials (NC, CS, SNC, RNC, HCNC, HNC, DCNC y WNC)

Intent To encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

Compliance information DANOSA DANOPREN extruded polystyrene (XPS) plates analyzed in this document, have a 60% post-consumer recycled content. Therefore, they can contribute to credit compliance (option 2).

LEED Requirements

Option 1. Raw material source and extraction reporting

Use at least 20 different permanently installed products from at least five different manufacturers that have publicly released a report from their raw material suppliers which include raw material supplier extraction locations, a commitment to long-term ecologically responsible land use, a commitment to reducing environmental harms from extraction and/or manufacturing processes, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria.

- Products sourced from manufacturers with self-declared reports are valued as one half (1/2) of a product for credit achievement.
- Third-party verified corporate sustainability reports (CSR) which include environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain, are valued as one whole product for credit achievement calculation. Acceptable CSR frameworks include GRI, OECD Guidelines for Multinational Enterprises, U.N. Global Compact- Communication of Progress and ISO 26000: 2010 Guidance on Social Responsibility

EP* Option 1. Source at least 40 products from five manufacturers.

Opción 2: Leadership extraction practices

Use products that meet at least one of the responsible extraction criteria below for at least 25%, by cost, of the total value of permanently installed building products in the project.

- Extended producer responsibility.
- Bio-based materials
- FSC certified wood products.
- Materials reuse.
- Recycled content.

For credit achievement calculation, products sourced (extracted, manufactured, and purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost.

EP* Option 2. Purchase 50%, by cost, of the total value of permanently installed building products that meet the responsible extraction criteria.

**EP: Requirements for Exemplary Performance (see Innovation LEED category)*

Example N/A

Support *XPS DANOPREN Recycled content declaration*

Documentation**Reference Standards**

- Global Reporting Initiative (GRI) Sustainability Report: globalreporting.org/
- Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises: oecd.org/daf/internationalinvestment/guidelinesformultinationalenterprises/
- U.N. Global Compact, Communication of Progress: unglobalcompact.org/cop/
- ISO 26000—2010 Guidance on Social Responsibility: iso.org/iso/home/standards/iso26000.htm
- Sustainable Agriculture Network: sanstandards.org
- ASTM Test Method D6866: astm.org/Standards/D6866.htm
- International Standards ISO 14021—1999, Environmental Labels and Declarations—Self Declared
- Environmental Claims (Type II Environmental Labeling): iso.org/iso/catalogue_detail.htm?csnumber=23146



CATEGORY MATERIAL & RESOURCES (MR)

MR Construction and demolition waste management

(NC, CS, SNC, RNC, HCNC, HNC, DCNC y WNC)

Intent To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

Compliance information DANOSA contributes to waste reduction on construction site, through its packaging reduction strategies.

“DANOPREN extruded polystyrene foam (XPS) plates” EPD has developed an estimate of how many kg of non-hazardous waste is generated on site per product sqm (functional unit):

PRODUCT	Non Hazardous waste disposal (A5) kg/fu
DANOPOL FV 1.2	3,37E-02

Functional unit: 1sqm (thickness 3,4cm).

LEED Requirements

Opción 2. reduction of total waste material (2 points)

Do not generate more than 12.2 kilograms of waste per square meter of the building's floor area.

EP*: Achieve both Option 1 (either Path 1 or Path 2) and Option 2.

**EP: Requirements for Exemplary Performance (see Innovation LEED category)*

Example

N/A

Support Documentation

“DANOPREN extruded polystyrene foam (XPS) plates” EPD

Reference Standards

- European Commission Waste Framework Directive 2008/98/EC
- European Commission Waste Incineration Directive 2000/76/EC
- EN 303-1—1999/A1—2003
- EN 303-3—1998/AC—2006
- EN 303-4—1999
- EN 303-5—2012
- EN 303-6—2000
- EN 303-7—2006



CATEGORY INDOOR ENVIRONMENTAL QUALITY (IEQ)

◆ IEQ Thermal comfort (NC, CS, SNC, RNC, HNC, DCNC, WNC, HCNC)

Intent To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort.

Compliance information DANOSA products thermal insulation contributes to credit achievement.

The standards listed below require the design of the thermal envelope and building systems, in order to maintain the thermal comfort conditions within certain ranges. The thermal insulation helps to avoid thermal asymmetries, temperature variation over time, vertical air temperature differences, etc., which are parameters limited by these standards.

LEED Requirements **Design heating, ventilating, and air-conditioning (HVAC) systems and the building envelope to meet the requirements of:**

- Option 1. ASHRAE Standard 55-2010.
- Option 2:
 - ISO 7730:2005
 - CEN Standard EN 15251:2007, Section A2.

NOTE: There are also thermal control requirements for credit compliance, which do not apply to analyzed products.

Example N/A

Support Documentation **Technical Data Sheets: www.danosa.com**

Reference Standards

- ASHRAE Standard 55–2010, Thermal Environmental Conditions for Human Occupancy: ashrae.org
- ASHRAE HVAC Applications Handbook, 2011 edition, Chapter 5, Places of Assembly, Typical Natatorium Design Conditions: ashrae.org
- ISO 7730–2005 Ergonomics of the thermal environment, Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria: iso.org
- European Standard EN 15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics: cen.eu



CATEGORY INNOVATION (ID)

◆ ID Innovación (NC, CS, SNC, RNC, HC, HNC, DCNC, WNC)

Intent	To encourage projects to achieve exceptional or innovative performance.
Compliance information	<p>DANOSA can contribute to meet the requirements of exemplary performance in the following credits:</p> <ul style="list-style-type: none"> • SS - Heat Island Reduction • EA – Optimize Energy Performance. • MR Building life-cycle impact reduction • MR Building product disclosure and optimization - Environmental Product Declarations • MR Building product disclosure and optimization - sourcing of raw materials • MR Construction and demolition waste management
LEED Requirements	<p>Option 3: Exemplary Performance – EP Achieve exemplary performance in an existing LEED v4 prerequisite or credit that allows exemplary performance, as specified in the LEED Reference Guide, v4 edition.</p> <p>Exemplary Performance thresholds have been defined in this document as EP, in each specific credit.</p>
Example	N/A
Support Documentation	<i>See requirements defined as “EP”, in each specific credit.</i>
Reference Standards	<i>See specifics credits.</i>