

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	DuPont de Nemours (Luxembourg) s.à.r.l.
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
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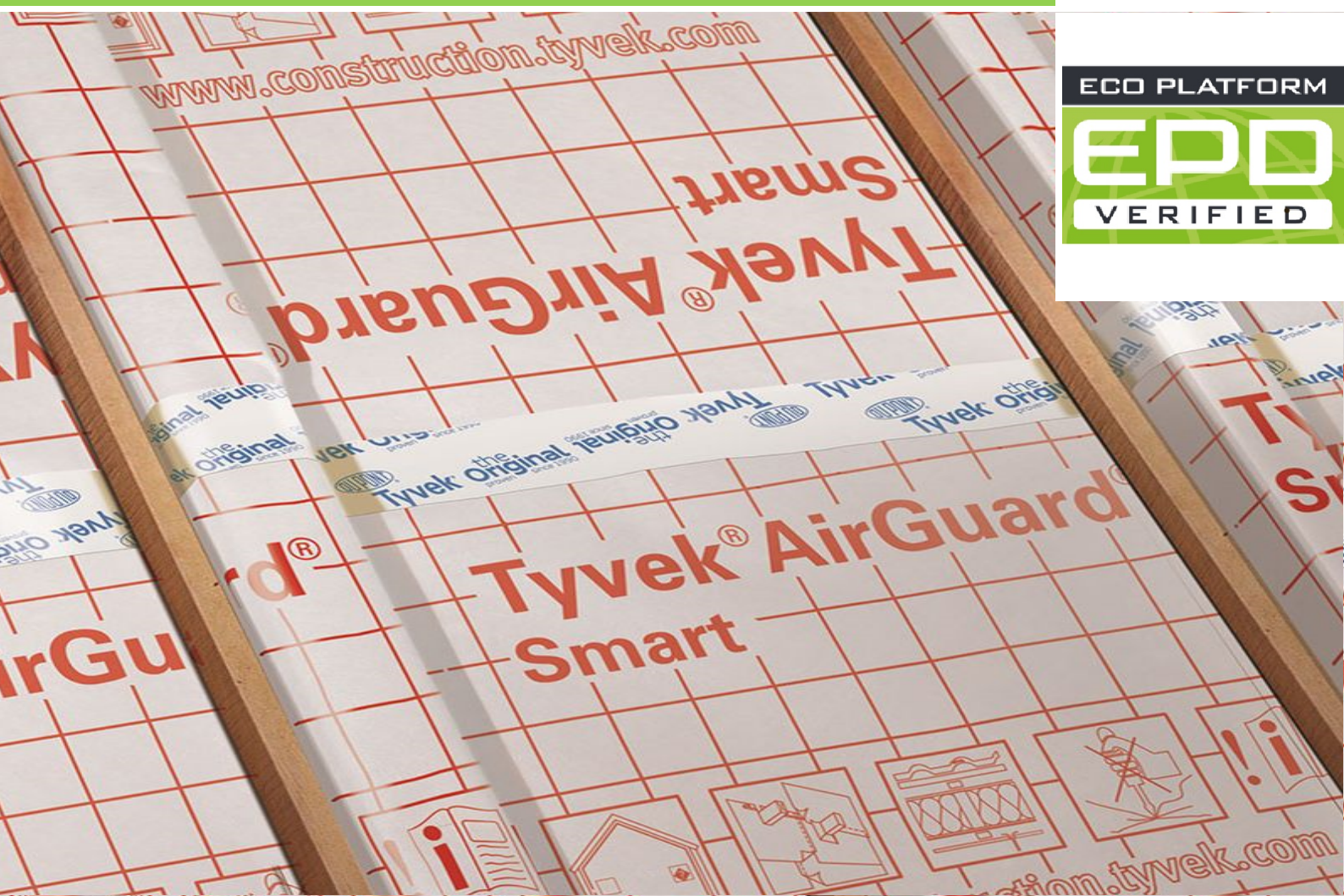
DuPont™ Tyvek® Airguard® Smart 2009B
DuPont de Nemours (Luxembourg) s.à.r.l.



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ECO PLATFORM

EPD
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General Information

DuPont de Nemours (Luxembourg) s.à.r.l.

Programme holder

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

Declaration number

EPD-DUP-20220250-CBA1-EN

This declaration is based on the product category rules:

False ceiling and underlay sheeting, 11.2017
(PCR checked and approved by the SVR)

Issue date

16/11/2022

Valid to

15/11/2027

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

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.)

DuPont™ Tyvek® AirGuard® Smart
2009B

Owner of the declaration

DuPont de Nemours (Luxembourg) s.à.r.l.
Rue Général Patton
L-2984 Contern
Luxembourg

Declared product / declared unit

1 m² DuPont™ Tyvek® AirGuard® Smart 2009B

Scope:

This document applies to DuPont™ Tyvek® AirGuard® Smart 2009B, which is a coated high-density polyethylene (HDPE) membrane. The declared unit weight is 92 g/m². LCA data were compiled using production data for the year 2019 for monolayer and finishing processes (used for EPDs of Tyvek® Monolayer published in 2021) and data for the year 2021 for the coating process. The declaration holder is responsible for the underlying data and its verification.

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*.

Verification

The standard *EN 15804* serves as the core PCR

Independent verification of the declaration and data according to *ISO 14025:2011*

internally externally

Vito D'Incognito
(Independent verifier)

Product

Product description/Product definition

DuPont™ Tyvek® AirGuard® Smart is a humidity variable air and vapour control layer (AVCL) for use in roofs, walls and suspended floors, in domestic and non-domestic buildings.

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 13984: 2013 Flexible sheets for waterproofing — Plastic and rubber vapour control layers — Definitions and Characteristics* and the CE-marking.

For the placing on the market, of the product in the UK market the product needs UK Conformity Assessed (UKCA) marking supported by a UK Approved Body.

For the application and use the respective national provisions apply.

Application

The product can be installed on the cold or on the warm side of the envelope but is typically found on the warm side. It is placed in front or behind insulation and will improve water and wind tightness during construction and the lifetime of the building.

Technical Data

Constructional data (nominal or average values)

Name	Value	Unit
Reaction to fire	E	class
Grammage acc. to EN 1849-2	0.092	kg/m ²
Resistance to water penetration acc. to EN 13859-1 and EN 1928 (A)	W1	-



Water vapor diffusion equivalent air layer thickness acc. to EN 1931	0.2 - 35	m
Resistance to air penetration acc. to EN 12114	0	m ³ /m ² h 50Pa

- Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *Application: Flexible sheets for water proofing – Part 2: Underlays for walls EN 13859-2:2010*

Base materials/Ancillary materials

The product is made from HDPE (ca. 65 % of product weight) and polymeric coating (ca. 35 % of product weight).

LCA: Calculation rules

Declared Unit

This declaration applies to 1 m² of DuPont™ Tyvek® 2009B membrane, with a declared unit weight of 92 g/m².

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Grammage	0.092	kg/m ²

Primary production data were collected to model the three production steps for manufacturing (A1-A3). Monolayer manufacturing data are representative for the years 2019 and 2021; the product is manufactured in Luxembourg, Austria and Germany. All energy and materials flows were considered. Only a few material flows were excluded from the modelling, but the sum of their weight did not exceed 1 % of the total input mass. Manufacturing of the production machines and systems and associated infrastructure were not taken into account for the life cycle assessment.

Transport to the construction site (A4) w based on market shares of 2021 at country level, provided by DuPont Luxembourg s.à.r.l., to cover at least 90% of the sales. Eurostat data representative of 2019 were used to model the shares between the packaging disposal routes during the installation into the building (A5). Regarding possible off-cuts during installation, the amount is lower than 5% and therefore neglected.

Regarding background data, the Luxembourg, Austrian and German electricity grid mix were applied to the production plants in these countries. Other background data were specific to Germany or the European average and were not older than 10 years. A proxy was used for the colour paste for finishing (generic water-based colour paste composition).

This product/article/at least one partial article contains substances listed in the candidate list (date: 16. Nov 2022) exceeding 0.1 percentage by mass: no.

Reference service life

The service life of membranes out of plastic or elastomers is 40 years according to *BNB* (<http://www.nachhaltigesbauen.de/baustoff-und-gebaeuedaten/nutzungsdauern-von-bauteilen.html>). Since the whole lifecycle of the product is not considered and for sake of compliance to *EN 15804+A2 (2019)*, the functional unit does not have to be declared. Instead, the declaration unit is 1 m² of the envelope.

The representativeness can be classified as very good for all the foreground data, and for most of the background data.

The *GaBi database* (Sphera Solutions GmbH, 2022.1) was used to model background data.

System boundary

Type of EPD: Cradle-to-gate (with options)
The system boundaries of the EPD follow the modular construction system as described by *EN 15804*.
The LCA considers the following modules:

- A1-A3: Manufacturing of pre-products, packaging, ancillary materials, transport to the factory and production, with the associated energy supply and waste handling
- A4: Transport to the construction site
- A5: Installation into the building including disposal of packaging
- C4: Waste disposal, namely incineration
- D: Potential for reuse, recovery and/or recycling including benefits for product incineration from module C4

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.

LCA: Scenarios and additional technical information

Characteristic product properties

Information on biogenic carbon

The product does not contain biogenic carbon.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
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Biogenic carbon content in product	0	kg C
Biogenic carbon content in accompanying packaging	0.0037	kg C

**Transport to the building site (A4)**

Name	Value	Unit
Transport distance (truck)	784	km
Transport distance (container ship)	202	km

Installation into the building (A5)

Name	Value	Unit
Wood waste to landfill	2.74E-04	kg
Wood waste to incineration	2.26E-04	kg
Cardboard waste to landfill	2.66E-04	kg
Cardboard waste to incineration	2.84E-04	kg
Plastic waste to landfill	2.47E-05	kg
Plastic waste to incineration	3.94E-05	kg

End of life (C1-C4)

Name	Value	Unit
Collected separately Tyvek® waste	0.092	kg
Energy recovery	0.092	kg

LCA: Results

The results displayed below apply to 1 m² of DuPont™ Tyvek® AirGuard® Smart 2009B membrane, with a declared unit weight of 92 g/m².

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	ND	ND	MNR	MNR	MNR	ND	ND	ND	ND	ND	X	X	

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² DuPont™ Tyvek® 2009B

Core Indicator	Unit	A1-A3	A4	A5	C4	D
Global warming potential - total	[kg CO ₂ -Eq.]	5.34E-1	6.54E-3	1.93E-3	2.88E-1	-1.47E-1
Global warming potential - fossil fuels	[kg CO ₂ -Eq.]	5.34E-1	6.40E-3	1.56E-4	2.88E-1	-1.46E-1
Global warming potential - biogenic	[kg CO ₂ -Eq.]	-2.47E-4	1.04E-4	1.77E-3	9.25E-6	-6.99E-4
GWP from land use and land use change	[kg CO ₂ -Eq.]	1.43E-4	3.55E-5	2.32E-8	3.04E-7	-1.48E-5
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.49E-11	3.90E-16	1.47E-16	1.23E-14	-8.89E-13
Acidification potential, accumulated exceedance	[mol H ⁺ -Eq.]	1.47E-3	4.38E-5	4.00E-7	2.86E-5	-1.81E-4
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg P-Eq.]	1.86E-6	1.90E-8	3.35E-9	2.88E-9	-1.82E-7
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	2.97E-4	2.02E-5	1.70E-7	5.97E-6	-5.04E-5
Eutrophication, accumulated exceedance	[mol N-Eq.]	3.17E-3	2.23E-4	1.65E-6	1.34E-4	-5.41E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	1.07E-3	3.96E-5	6.67E-7	1.78E-5	-1.42E-4
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	8.50E-8	5.38E-10	5.05E-12	2.99E-10	-2.05E-8
Abiotic depletion potential for fossil resources	[MJ]	1.25E+1	8.70E-2	8.11E-4	3.36E-2	-2.47E+0
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m ³ world-Eq deprived]	3.15E-2	5.73E-5	1.05E-4	2.66E-2	-1.38E-2

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² DuPont™ Tyvek® 2009B

Indicator	Unit	A1-A3	A4	A5	C4	D
Renewable primary energy as energy carrier	[MJ]	1.34E+0	4.84E-3	1.03E-4	7.92E-3	-6.13E-1
Renewable primary energy resources as material utilization	[MJ]	6.65E-4	2.65E-14	6.33E-15	2.06E-13	-2.65E-11
Total use of renewable primary energy resources	[MJ]	1.34E+0	4.84E-3	1.03E-4	7.92E-3	-6.13E-1
Non-renewable primary energy as energy carrier	[MJ]	1.25E+1	8.72E-2	8.12E-4	3.36E-2	-2.47E+0
Non-renewable primary energy as material utilization	[MJ]	2.61E-4	2.99E-6	1.74E-8	1.23E-6	-8.48E-5
Total use of non-renewable primary energy resources	[MJ]	1.25E+1	8.72E-2	8.12E-4	3.36E-2	-2.47E+0
Use of secondary material	[kg]	4.67E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	5.65E-8	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	6.23E-7	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m ³]	3.46E-3	5.48E-6	2.49E-6	6.23E-4	-5.87E-4

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² DuPont™ Tyvek® 2009B

Indicator	Unit	A1-A3	A4	A5	C4	D
Hazardous waste disposed	[kg]	8.81E-8	4.16E-13	1.11E-13	3.16E-12	-3.46E-10
Non-hazardous waste disposed	[kg]	6.08E-3	1.24E-5	4.11E-4	1.14E-3	-1.17E-3
Radioactive waste disposed	[kg]	1.84E-4	1.07E-7	2.01E-8	2.03E-6	-1.75E-4
Components for re-use	[kg]	0.00	0.00	0.00	0.00	0.00
Materials for recycling	[kg]	0.00	0.00	0.00	0.00	0.00
Materials for energy recovery	[kg]	0.00	0.00	0.00	0.00	0.00
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	1.38E-3	6.15E-1	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	2.49E-3	1.09E+0	0.00E+0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² DuPont™ Tyvek® 2009B

Indicator	Unit	A1-A3	A4	A5	C4	D
Potential incidence of disease due to PM emissions	[Disease Incidence]	ND	ND	ND	ND	ND
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	ND	ND	ND	ND	ND
Potential comparative toxic unit for ecosystems	[CTUe]	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	ND	ND	ND	ND	ND
Potential soil quality index	[-]	ND	ND	ND	ND	ND

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”.

This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, 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 the uncertainties on these results are high as there is limited experience with the indicator.

References

Standards

EN 12114

EN 12114:2000, Thermal performance of buildings - air permeability of building components and building elements - Laboratory test method.

EN 12310-1

EN 12310-1:1999, Flexible sheets for waterproofing - Part 1: Bitumen sheets for roof waterproofing; determination of resistance to tearing (nail shank).

EN 12311-1

EN 12311-1:1999, Flexible sheets for waterproofing - Part 1: Bitumen sheets for roof waterproofing; Determination of tensile properties

EN 1297

EN 1297:2004, Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Method of artificial ageing by long term exposure to the combination of UV radiation, elevated temperature and water

EN 13859-1

EN 13859-1:2010, Flexible sheets for waterproofing - Definitions and characteristics of underlays - Part 1: Underlays for discontinuous roofing

EN 13984

EN 13984:2013, Flexible Sheets For Waterproofing - Plastic And Rubber Vapour Control Layers - Definitions And Characteristics

EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN 1849-2

EN 1849-2:2019, Flexible sheets for waterproofing - Determination of thickness and mass per unit area - Part 2: Plastic and rubber sheets

EN 1928

EN 1928:2000, Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of watertightness

EN 1931

EN 1231:2000, Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of water vapour transmission properties

ISO 14025

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

Further References

BNB

Bewertungssystem Nachhaltiges Bauen
<https://www.nachhaltigesbauen.de/austausch/nutzungs-dauern-von-bauteilen/>

GaBi software and database:2022

GaBi software/database, version 10.6.1.35. Sphera Solutions GmbH, 2022.

IBU 2021

Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibu-epd.com

PCR 2021, Part A

PCR Guidance-Texts for Building-Related Products and Services: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019

PCR 2017, Part B

PCR Guidance-Texts for Building-Related Products and Services: Requirements on the EPD for False ceiling and underlay sheeting (version 1.6, 2017)



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**Publisher**

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

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

**Programme holder**

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

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 - 3087748 - 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

**Author of the Life Cycle Assessment**

Luxembourg Institute of Science and Technology (LIST)
Avenue des Hauts-Fourneaux 5
4362 Esch/Alzette
Luxembourg

Tel 00352-275888-1
Fax 00352-275888-555
Mail info@list.lu
Web www.list.lu

**Owner of the Declaration**

DuPont de Nemours (Luxembourg)
s.à r.l.
Rue Général Patton 1
2984 Contern
Luxembourg

Tel +352 3666 5210
Fax +352 3666 0000
Mail tyvek.info@dupont.com
Web www.dupont.com