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The Norwegian EPD Foundation

ECO PLATFORM EPD EN 15804 VERIFIED

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration	NorDan AS
Program operator	The Norwegian EPD Foundation
Publisher	The Norwegian EPD Foundation
Declaration number	NEPD00258E
ECO EPD Ref.No.	00000080
Issue date	16.06.2014
Valid to	16.06.2019

NorDan NTech Balcony security door 105/80

NorDan AS

NorDan

www.epd-norge.no

1.0 u-value

General information

Product
NorDan NTech Balcony security door 105/80

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Declaration number:
NEPD 00258E

Place of production:
Wolsztyn, Poland

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serve as core PCR
NPCR014 rev1 windows and doors (03/2013)

Management system:
-

Declared unit:
1 balcony door measuring 1.23 m x 2.18 m without or with aluminium cladding (alu clad).

Org. No:
NO 979 776 233 MVA

Declared unit with option:
1 balcony door measuring 1.23 m x 2.18 m, produced, transported, maintained and waste managed with an expected service life of 40/60 yrs without/with alu clad.

Issue date
16.06.2014

Functional unit:

Valid to
16.06.2019

The EPD has been worked out by:
Lars G. F. Tellnes
Norwegian Institute of Wood Technology

Treteknisk

Comparability:
EPD of construction products may not be comparable if they do not comply with EN 15804 and are seen in a building context.

Year of study:
2013-2014

Verification:
Independent verification of data, other environmental information and EPD has been carried out in accordance with ISO14025, 8.1.3 and 8.1.4

externally ☑ internally1 ☐

Christofer Skaar, PhD
(Independent verifier approved by EPD Norway)

Approved

Dagfinn Malnes
(Manager Director EPD-Norway)

Declared unit:
1 balcony door measuring 1.23 m x 2.18 m without or with aluminium cladding (alu clad).

Key environmental indicators	Unit	Cradle to gate A1 - A3	Transport *****	Module C4
Global warming	kg CO_2 -eqv	171/208†	15	57/55†
Energy use	MJ	4039/4643	261	492/494
Dangerous substances	*	-	-	-
Share of renewable energy used	%	22/21	1	94
Indoor air classification (Rakennustieto)	-	M3	-	-

† Includes sequestration/ emission of 41.01 kg carbon dioxide of biogenic origin.
* The product contains no substances from the REACH Candidate list or the Norwegian priority list

***** Transport from production site to central warehouse in Norway

Product

Product description:
Door for use in exterior walls of domestic and commercial buildings

Technical data:
Security balcony door, triple glazed, 105mm frame, 80mm door leaf. Uwin 0,84W/m2K. Certified: BBA, Secured by Design, SP Sitac “P”.

Product specification
The total weight is 103.54 kg without alu clad and 106.8 with alu clad. The packaging has a average weight of 3.14 kg.

Market:
Europe, but the scenarios beyond cradle to gate are based on the situation in the Norwegian market.

Reference service life:
Reference service life is 40 years for painted timber frame and 60 years for alu clad timber frame

Materials	kg	%
Pine timber	25,28	24,42
Triple glazed unit	69,42	67,05
Preservative/finishing	0,87	0,84
Aluminium	2,34	2,26
Plastic	0,12	0,12
Gasket	0,5	0,48
Metals	4,94	4,77
Others	0,07	0,07
Total without alu clad	103,54	100,00
Additional for alu clad		
Aluminium	3,12	
Plastic	0,09	
Metals	0,05	
Total with alu clad	106,80	

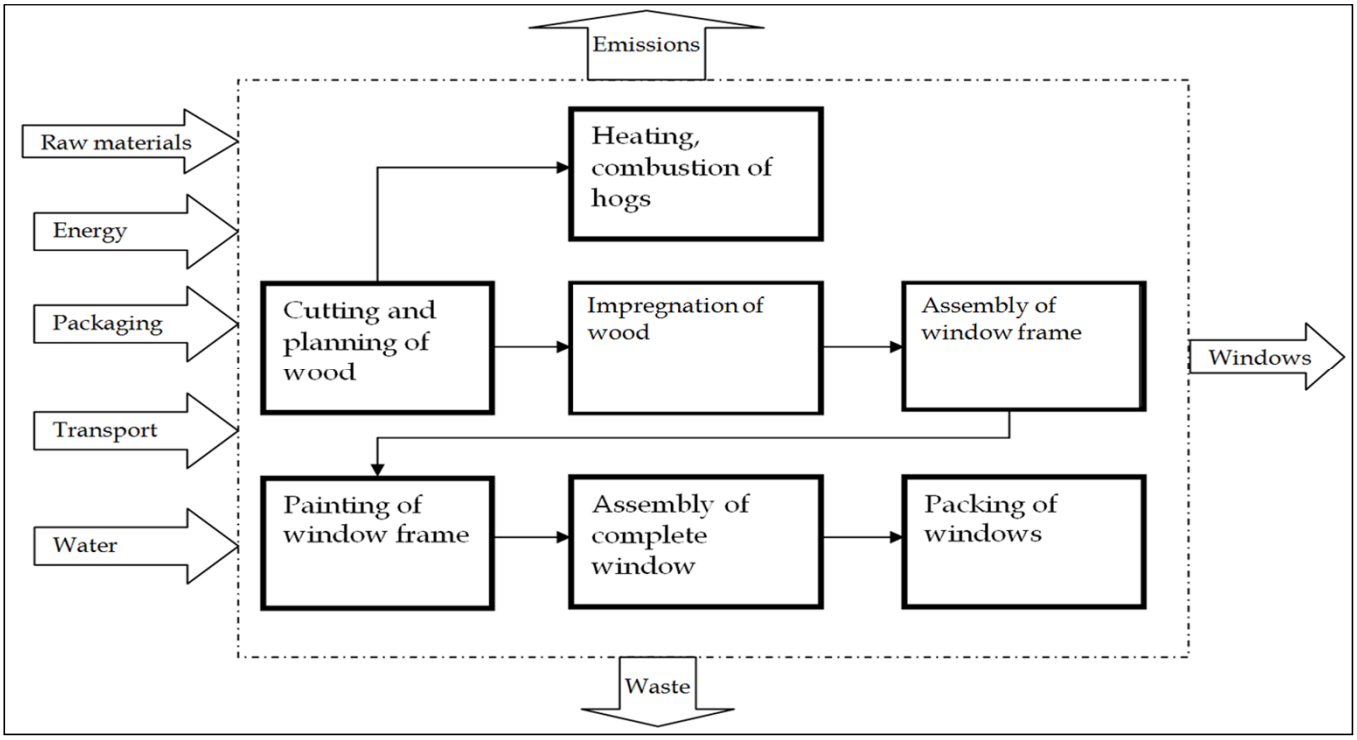
LCA: Calculation rules

Declared unit with option:
1 balcony door measuring 1.23 m x 2.18 m, produced, transported, maintained and waste managed with an expected service life of 40/60 yrs without/with alu clad.

The results are separated between without and with alu clad.

System boundary:
Modules A1-A4, B2, C4 and D are declared and modules A5, B3-B5, C1 and C3 are not declared. Modules B1, B6 and B7 are not relevant according to the PCR. A technical flowchart of the manufacturing at NorDan is presented bellow.

Module D is calculated with substitution of energy production by energy recovery of wood and paint.



Data quality:
The data for energy use, waste, packaging and water use are average data for 2012. Raw material usage per declared unit are calculated based on composition and average wastage in production. Generic data are used for production of material inputs used in manufacturing and maintenance, as well as the waste management processes. The database Ecoinvent v2.2 is the source of generic data and was released in 2010.

Cut-off criteria:
All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are very small amounts (<1%) are not included. This cut-off rules does not apply for hazardous materials and substances.

Allocation:
The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house production is allocated among all products based on the number of units produced. Fixed windows have an factor of 1, while sash windows and doors have an factor of 1.5. Effects of primary production of recycled materials allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Calculation of biogenic carbon:
The sequestration and emissions of biogenic carbon are in this EPD included in the accounting for global warming potential according to EN 16485:2014. This is based on the modularity principle in EN 15804:2012, which states that all environmental aspects and impacts shall be declared in the life cycle stage where they appear. The sequestration of biogenic carbon in forest is then accounted in A1-A3 and balanced completely by the same emissions in C4. The amount of biogenic carbon is calculated according to EN 16449:2014. With a density of 500 kg/m^3 and moisture content of 13%, this gives 41.01 kg CO_2 per declared unit.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

The transport distance from production to buildings site is the distance from Poland to Oslo plus 300 km.

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption		Value (l/t)
Truck	39	Lorry, 3.5-7.5t, EURO4	50	0.11	l/tkm	
Truck	75	Lorry, >32t, EURO4	1500	0.026	kWh/tkm	

Maintenance cycle for the windows are the painting and cleaning of the windows. The alu clad only needs interior painting of the window, while timber frame also need exterior. Intervals are 7-10 years for exterior and 15-20 years for interior paint. Cleaning is also included and requires per year 1.5 dl detergent and 3 l water.

Maintenance (B2)/Repair (B3)

	Unit	Value
Maintenance cycle* paint intervals	yr	7-20
Auxiliary detergent per year	kg	0.15
Other resources	kg	
Water consumption	m^3	0.003
Electricity consumption	kWh	
Other energy carriers	MJ	
Material loss	kg	

Replacement (B4)/Refurbishment (B5)

	Unit	Value
Replacement cycle*	RSL	40/60
Electricity consumption	kWh	
Replacement of worn parts		

* Number or RSL (Reference Service Life)

Windows are sorted as residual waste and treated with incineration. A fraction of the glass is assumed to be separated prior to incineration and landfilled. As a conservative scenario, it is assumed that all the non-combustable parts are landfilled after incineration.

In the benefits beyond the system boundaries, only energy recovery from wood and paint is included.

Benefits and loads beyond the system boundaries (D)

Without alu clad	Unit	Value
Electric energy substitution	MJ	35,03
Thermal energy substitution	MJ	74,01
With alu clad		
Electric energy substitution	MJ	34,25
Thermal energy substitution	MJ	72,3

End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	
Collected as mixed construction waste	kg	104/107
Reuse	kg	
Recycling	kg	
Energy recovery	kg	50/53
To landfill	kg	54

The transport of waste to processing is based on generic data from Ecoinvent v2.2.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	50	Truck	50	0.028 l/tkm	

Additional technical information

LCA: Results

The production of the glazing unit contributes to about half of the product stage impacts. The maintenance stage are about equally diveded between the production of detergent and paint.

System boundaries (X=included, MND=module not declared, MNR=module not relevant)

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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	MND	MNR	x	MND	MND	MND	MNR	MNR	MND	x	MND	x	x

Environmental impact without alu clad

Parameter	Unit	A1-A3	A4		B2		C2	C4	D
GWP	kg CO_2-ekv	171,24	19,97		13,64		1,00	56,52	-1,78
ODP	kg CFC11-ekv	1,62E-05	3,26E-06		1,55E-06		1,63E-07	2,56E-07	-1,84E-07
POCP	kg C_2H_4-ekv	0,0631	0,00262		0,00418		1,93E-04	6,03E-04	-2,41E-04
AP	kg SO_2-ekv	1,308	0,0781		0,0664		0,00551	0,0150	-0,00475
EP	kg PO_4^{3-}-ekv	0,430	0,0213		0,0247		0,00144	0,0124	-0,00199
ADPM	kg Sb-ekv	8,93E-04	6,32E-05		4,82E-05		2,37E-06	1,85E-06	-3,81E-06
ADPE	MJ	2940,11	303,28		335,50		14,919	24,56	-24,51

Environmental impact with alu clad

Parameter	Unit	A1-A3	A4		B2		C2	C4	D
GWP	kg CO_2-ekv	207,96	19,97		13,66		1,04	54,50	-1,74
ODP	kg CFC11-ekv	1,86E-05	3,26E-06		1,08E-06		1,68E-07	2,75E-07	-1,80E-07
POCP	kg C_2H_4-ekv	0,0757	0,00262		0,00424		1,99E-04	6,38E-04	-2,35E-04
AP	kg SO_2-ekv	1,47	0,0781		0,0569		0,00568	0,0159	-0,00464
EP	kg PO_4^{3-}-ekv	0,493	0,0213		0,0210		0,00148	0,0123	-0,00194
ADPM	kg Sb-ekv	9,67E-04	6,32E-05		4,976E-05		2,45E-06	1,9895E-06	-3,72E-06
ADPE	MJ	3393,94	303,28		354,22		15,39	26,41	-23,94

GWP Global warming potential; **ODP** Depletion potential of the stratospheric ozone layer; **POCP** Formation potential of tropospheric photochemical oxidants; **AP** Acidification potential of land and water; **EP** Eutrophication potential; **ADPM** Abiotic depletion potential for non fossil resources; **ADPE** Abiotic depletion potential for fossil resources

Resource use without alu clad

Parameter	Unit	A1-A3	A4		B2		C2	C4	D
RPEE	MJ	877,05	4,57		13,37		0,195	464,49	-125,19
RPEM	MJ	464,14						-464,1	
TPE	MJ	1341,19	4,57		13,37		0,195	0,387	-125,19
NRPE	MJ	3161,78	340,42		378,70		16,72	27,35	-31,90
NRPM	MJ								
TRPE	MJ	3161,78	340,42		378,70		16,72	27,35	-31,90
SM	kg								
RSF	MJ								
NRSF	MJ								
W	m^3	2,14	0,0880		0,307		0,00389	0,0709	-0,00999

Resource use	with alu clad								
Parameter	**Unit**	**A1-A3**	**A4**		**B2**		**C2**	**C4**	**D**
RPEE	MJ	965,90	4,57		9,25		0,201	464,51	-122,32
RPEM	MJ	464,14						-464,10	
TPE	MJ	1430,04	4,57		9,25		0,201	0,408	-122,32
NRPE	MJ	3677,14	340,42		399,26		17,24	29,41	-31,17
NRPM	MJ								
TRPE	MJ	3677,14	340,42		399,26		17,24	29,41	-31,17
SM	kg								
RSF	MJ								
NRSF	MJ								
W	m^3	2,30	0,0880		0,398		0,00401	0,0745	-0,00976

RPEE Renewable primary energy resources used as energy carrier; **RPEM** Renewable primary energy resources used as raw materials; **TPE** Total use of renewable primary energy resources; **NRPE** Non renewable primary energy resources used as energy carrier; **NRPM** Non renewable primary energy resources used as materials; **TRPE** Total use of non renewable primary energy resources; **SM** Use of secondary materials; **RSF** Use of renewable secondary fuels; **NRSF** Use of non renewable secondary fuels; **W** Use of net fresh water

End of life - Waste	without alu clad								
Parameter	**Unit**	**A1-A3**	**A4**		**B2**		**C2**	**C4**	**D**
HW	kg	0,228	0,00889		0,00411		3,27E-04	19,59	-0,00232
NHW	kg	78,53	2,58		1,61		0,109	54,52	-1,02
RW	kg	0,00649	2,74E-04		3,47E-04		1,20E-05	2,36E-05	-1,05E-04

End of life - Waste	with alu clad								
Parameter	**Unit**	**A1-A3**	**A4**		**B2**		**C2**	**C4**	**D**
HW	kg	0,282	0,00889		0,00501		3,37E-04	24,53	-0,00227
NHW	kg	83,81	2,58		1,31		0,112	54,50	-1,001
RW	kg	0,00795	2,74E-04		3,29E-04		1,24E-05	2,4634E-05	-1,02E-04

HW Hazardous waste disposed; **NHW** Non hazardous waste disposed; **RW** Radioactive waste disposed

End of life - Output flow	without alu clad								
Parameter	**Unit**	**A1-A3**	**A4**		**B2**		**C2**	**C4**	**D**
CR	kg								
MR	kg	0,35							
MER	kg	10,7							
EEE	MJ							35,03	-35,03
ETE	MJ							74,01	-74,01

End of life - Output flow	with alu clad								
Parameter	**Unit**	**A1-A3**	**A4**		**B2**		**C2**	**C4**	**D**
CR	kg								
MR	kg	0,35							
MER	kg	10,7							
EEE	MJ							34,25	-34,25
ETE	MJ							72,30	-72,30

CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy

Reading example: 9,0 E-03 = $9,0*10^{-3}$ = 0,009

Additional Norwegian requirements

Electricity
Ecoinvent v2.2 electricity mix for Poland is used in the manufacturing and the data is from 2004.
Beyond cradle-to-gate, Norwegian electricity mix is used with an average for 2008-2010.

Greenhouse gas emissions:	0,311	kg CO_2 - eqv/MJ		Poland
Greenhouse gas emissions:	0,0117	kg CO_2 - eqv/MJ		Norway

Dangerous substances
None of the following substances have been added to the product: Substances on the REACH Candidate list of substances of very high concern or substances on the Norwegian Priority list (of 01.01.2013) or substances that lead to the product being classified as hazardous waste. The chemical content of the product complies with regulatory levels as given in the Norwegian Product Regulations.

Transport
Transport from production site to central warehouse in Norway is: 1250 km

Indoor environment
The window have been measured for the emissions of total volatile organic compounds (TVOC). The results shows that the emissions of TVOC are 1.9 mg/m^2h after 4 weeks and 0.8 mg/m^2h after 6 months. The measurement uncertainty is ±25 %. According to the Emission Classification of Building Materials from Rakennustieto, this corresponds to the criteria for emission class M3.

Carbon footprint
Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2006	*Environmental labels and declarations - Type III environmental declarations - Principles and procedures*
ISO 14044:2006	*Environmental management - Life cycle assessment - Requirements and guidelines*
EN 15804:2012	*Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products*
ISO 21930:2007	*Sustainability in building construction - Environmental declaration of building products*
Tellnes, L.G.F.	*LCA-report for NorDan Wolsztyn. Norwegian Institute of Wood Technology, Oslo, Norway.*
NPCR014 rev1	*Product category rules for windows and doors, rev1, March 2013*
Ecoinvent v2.2	*Swiss Centre of Life Cycle Inventories. www.ecoinvent.ch*
EN 16485:2014	*Round and sawn timber - Environmental Product Declaration - Product category rules for wood and wood-based products for use in construction.*
EN 16449:2014	*Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide.*
Rakennustieto	*Emission Classification of Building Materials. The Building Information Foundation RTS (Rakennustieto). Helsinki, Finland.*

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