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The Norwegian EPD Foundation

# ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration:	Alutile Norge AS
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	POUØE1 4 4 HEP
Registration number:	POUØE1 4 4 HEP
ECO Platform reference number:	È
Issue date:	F1 4 4 4
Valid to:	F1 4 4 4

Alutile fire resistance (FR) panel (4mm)

Alutile Norge AS



[www.epd-norge.no](http://www.epd-norge.no)



## General information

### Product:

Alutile fire resistance (FR) panel (4mm)

### Program operator:

The Norwegian EPD Foundation  
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### Declaration number:

POU001-EN-EPD

### ECO Platform reference number:

E

### This declaration is based on Product Category Rules:

CEN Standard EN 15804 serves as core PCR  
NPCR010:2013 rev 1 Building Boards

### Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

### Declared unit:

1m<sup>2</sup> of manufactured Alutile fire resistance (FR) panel (4mm).

### Declared unit with option:

### Functional unit:

1m<sup>2</sup> of installed Alutile fire resistance (FR) panel (4mm), with a reference service lifetime of 60 years.

### Verification:

The CEN Norm EN 15804 serves as the core PCR.  
Independent verification of the declaration and data, according to ISO14025:2010

☐ internal ☒ external

Third party verifier:

*Lars Tellnes*

Lars Tellnes, Østfoldforskning  
(Independent verifier approved by EPD Norway)

### Owner of the declaration:

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### Manufacturer:

Jiangxi Alutile Building Materials Co. Ltd  
NO.1155, 2nd Chuangxin Road, State High-Tech.  
Development Zone, Nanchang, Jiangxi, China.  
Phone: +86 791-88169315  
e-mail: [alutile@alutile.com](mailto:alutile@alutile.com)

### Place of production:

Nanchang, Jiangxi, China

### Management system:

ISO 14001, ISO 9001

### Organisation no:

NO 991 609 563 MVA

### Issue date:

11.01.2017

### Valid to:

31.12.2018

### Year of study:

2017-2018

### Comparability:

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

### The EPD has been worked out by:

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Approved

*Håkon Hauan*

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Managing Director of EPD-Norway

## Product

### Product description:

Alutile fire resistance (FR) panels are aluminium-faced sandwich panels with a fire resistance core. The panels are intended to be used as external wall cladding in buildings (i.e. skyscrapers, hotels, airports, industrial and residential buildings).

### Product specification:

The calculations are based on 1m<sup>2</sup> of Alutile fire resistance (FR) panel (4mm), as shown in Table 1. This EPD is valid for all variations carrying the name Alutile fire resistance (FR) panel.

The deviation in the LCA results due to colour is estimated to be less than 1%.

Table 1. Composition of 1m<sup>2</sup> of Alutile fire resistance (FR) panel (4mm).

Materials	kg	%
Protective film	0,08	1,1
PVDF paint	0,18	2,4
Aluminium sheet	1,72	22,6
Fire resistance core	5,63	74,0
<b>Total</b>	<b>7,61</b>	<b>100</b>
Timber	0,47	
LDPE	0,04	
Isopor	4,8E-05	
<b>Total with packaging</b>	<b>8,12</b>	

### Technical data:

The mass of the declared unit is 7.6 kg/m<sup>2</sup> and the thickness is 4mm.

### Market:

The market area are predominantly, Norway, other Nordic countries and Europe. The scenarios beyond cradle to gate are based on a Norwegian scenario.

### Reference service life, product:

The lifetime of the product is 30 years when applied according to the management, use and maintenance (FDV) documentation. The product is replaced once during the lifetime of the building (in life cycle module B4).

### Reference service life, building:

The reference service life of 60 years has been assumed for the building in all calculations.

### Conversion table

The panels are produced in different thicknesses. The environmental impact of the panels with different thicknesses can be estimated by multiplying the LCA result of each impact category in the environmental impact table (page 6) with the corresponding factor given in Table 2.

Table 2. Factors for estimating the environmental impact from different panel thicknesses.

Impact Categories		Conversion factors														
Parameter	Unit	Module A1-A3			Module A4-A5			Module B1-B5			Module C1-C4			Module A1-C4		
		4mm	5mm	6mm	4mm	5mm	6mm	4mm	5mm	6mm	4mm	5mm	6mm	4mm	5mm	6mm
GWP	kg CO <sub>2</sub> -eqv	1,00	1,03	1,07	1,00	1,11	1,22	1,00	1,04	1,08	1,00	1,14	1,29	1,00	1,04	1,08
ODP	kg CFC11-eqv	1,00	1,06	1,12	1,00	1,16	1,32	1,00	1,09	1,17	1,00	1,11	1,22	1,00	1,09	1,17
POCP	kg C <sub>2</sub> H <sub>4</sub> -eqv	1,00	1,03	1,06	1,00	1,15	1,31	1,00	1,04	1,08	1,00	1,09	1,17	1,00	1,04	1,08
AP	kg SO <sub>2</sub> -eqv	1,00	1,02	1,04	1,00	1,16	1,32	1,00	1,04	1,08	1,00	1,09	1,18	1,00	1,04	1,08
EP	kg PO <sub>4</sub> <sup>3-</sup> -eqv	1,00	1,03	1,07	1,00	1,14	1,27	1,00	1,05	1,09	1,00	1,11	1,22	1,00	1,05	1,09
ADPM	kg Sb-eqv	1,00	1,02	1,05	1,00	1,01	1,03	1,00	1,02	1,04	1,00	1,09	1,17	1,00	1,02	1,04
ADPE	MJ	1,00	1,06	1,13	1,00	1,14	1,29	1,00	1,07	1,14	1,00	1,10	1,21	1,00	1,07	1,14
RPEE	MJ	1,00	1,02	1,03	1,00	1,05	1,11	1,00	1,02	1,03	1,00	1,00	1,00	1,00	1,02	1,03
RPEM	MJ	1,00	1,00	1,00	0,00	0,00	0,00	1,00	1,00	1,00	0,00	0,00	0,00	1,00	1,00	1,00
TPE	MJ	1,00	1,02	1,03	1,00	1,05	1,11	1,00	1,02	1,03	1,00	1,00	1,00	1,00	1,02	1,03
NRPE	MJ	1,00	1,07	1,13	1,00	1,14	1,28	1,00	1,07	1,14	1,00	1,09	1,19	1,00	1,07	1,14
NRPM	MJ	1,00	1,00	1,00	0,00	0,00	0,00	1,00	1,00	1,00	0,00	0,00	0,00	1,00	1,00	1,00
TRPE	MJ	1,00	1,07	1,13	1,00	1,14	1,28	1,00	1,07	1,14	1,00	1,09	1,19	1,00	1,07	1,14

## LCA: Calculation rules

### Declared unit:

1m<sup>2</sup> of manufactured Alutile fire resistance (FR) panel (4mm).

### System boundary:

All processes from raw material extraction to production at the factory gate are included in the analysis (A1-A3). In addition, life cycle scenarios from transportation to market (Norway) to final disposal (A4 - C4) are included. See Figure 1 for more details. Module D has not been assessed.

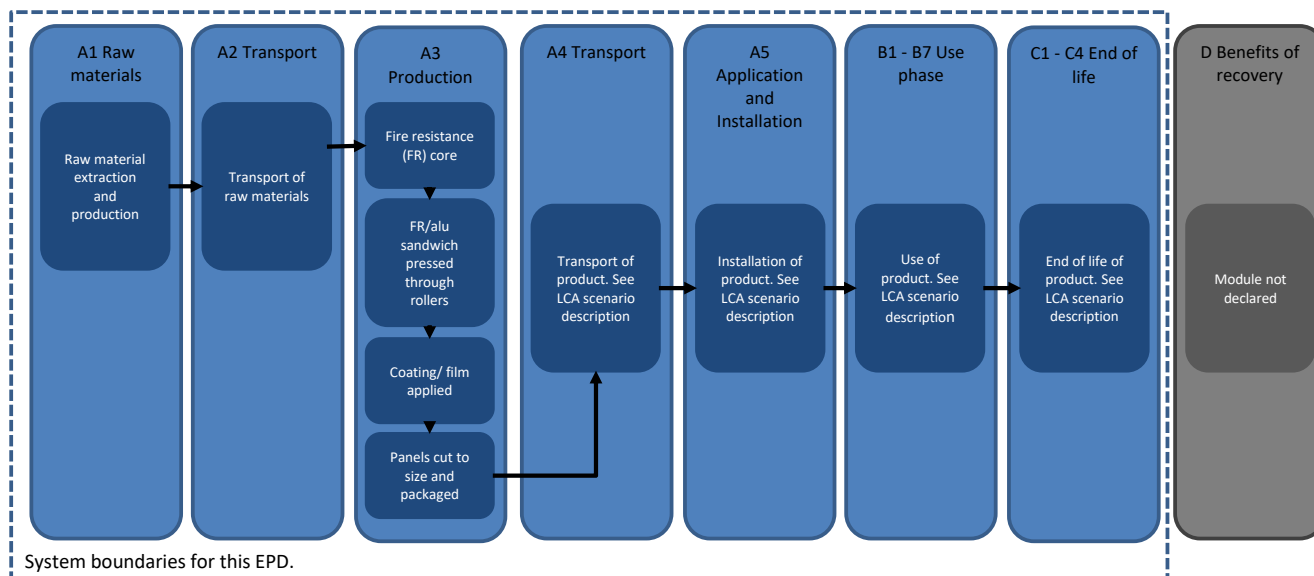


Figure 1. System boundaries for 1m<sup>2</sup> Alutile fire resistance (FR) panel.

### Data quality:

The data quality requirements are according to PCR 010 rev1 Building Boards clause 7.3.6. Specific production data collected from the manufacturer at the production site in China is valid for production in 2016, and has been applied to life cycles modules A1-A3. The production data for Alutile fire resistance (FR) panels is from one production site, so no average data has been used for different locations. Missing data has been substituted with generic data from Ecoinvent v.3.3 (2016) 'allocation, recycled content - unit' library. No data is more than 5 years old.

### Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. 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.

### 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 included with very small amounts (<1%) are not included. This includes infrastructure at the manufacturing site, electric hand tools and high pressure washer. This cut-off rule does not apply for hazardous materials and substances.

## LCA: Scenarios and additional technical information

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

### Transport from production place to user (A4)

From	To	Type	Capacity utilisation incl. return	Type of vehicle	Distance (km)	Fuel/Energy consumption	Value (l/t)
Nanchang, China	Jiujiang port, China	Lorry	65 %	16-32t: EURO5	143	0.045 l/tkm	6.4
Jiujiang port, China	Shanghai port, China	Barge	71 %	Barge	787	8.74 g/tkm	8,27
Shanghai port, China	Oslo port, Norway	Ship	65 %	Freight ship	20296	0.003 l/tkm	60.9
Oslo port, Norway	Oslo, Norway	Lorry	65 %	16-32t: EURO5	50	0.045 l/tkm	2.25

### Assembly (A5)

	Unit	Value
Auxiliary	kg	0.11
Water consumption	m <sup>3</sup>	0
Electricity consumption	kWh	0
Other energy carriers	MJ	0
Material loss	kg	0
Output materials from waste treatment	kg	0
Dust in the air	kg	0

### Use (B1)

	Unit	Value

Assembly (A5): Stainless steel screws and EPDM gaskets are used to install the Alutile fire resistance (FR) panels at site. Energy use from installation is considered negligible. Packaging materials are recycled and generate output materials from waste treatment. Alutile fire resistance panels are made to order, so no material loss is experienced on site.

Use (B1) is equal to zero, because installed Alutile fire resistance (FR) panels do not require any inputs, nor produce any outputs to nature that fall under the LCA impact categories of EN 15804.

### Maintenance (B2)/Repair (B3)

	Unit	Value
Maintenance cycle*	yr	1
Repair cycle*	yr	30
Auxiliary	l	0,03
Other resources	kg	0
Water consumption	m <sup>3</sup>	0,03
Electricity consumption	kWh	0
Other energy carriers	MJ	0
Material loss	%	1

### Replacement (B4)/Refurbishment (B5)

	Unit	Value
Replacement cycle*	yr	30

\* Number or RSL (Reference Service Life)

Maintenance (B2): Documentation from the manufacturer recommends cleaning Alutile fire resistance (FR) panels once a year with soap and water via a high-pressure washer.

Repair (B3): It is assumed that 1% of panels may become damaged during their 30-year reference service life. Since the Alutile fire resistance (FR) panels are of a modular construction, it is easier to replace the damaged panel than repair it. Therefore, the repair scenario considers 1% of Alutile fire resistance (FR) panel being replaced during its 30-year reference service life.

Replacement (B4): Alutile fire resistance (FR) panels have a service life of 30 years. Since the building reference service life is set to 60 years, the entire Alutile fire resistance (FR) panel system would need to be replaced once during the lifetime of the building.

### Operational energy (B6) and water consumption

	Unit	Value
Water consumption	m <sup>3</sup>	-
Electricity consumption	kWh	-
Other energy carriers	MJ	-
Power output of equipment	kW	-

### End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	0
Collected as mixed construction waste	kg	0
Reuse	kg	0
Recycling	kg	1,75
Energy recovery	kg	5,97
To landfill	kg	0

Operational energy (B6) and water consumption (B7) are considered irrelevant by the product category rules.

### Transport to waste processing (C2)

From	To	Type	Capacity utilisation	Type of vehicle	Distance (km)	Fuel/Energy consumption	Value (l/t)
Building	Waste processing	Lorry	65 %	16-32t: EURO5	50	0.045 l/tkm	2.25

## LCA: Results

The calculations are based on Alutile fire resistance (FR) panels (4mm).

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

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

## Environmental impact

Parameter	Unit	A1	A2	A3	A1 - A3	A4	A5	B1	B2
GWP	kg CO <sub>2</sub> -eqv	53	0,80	0,16	54	2,32	1,46	0	4,5E-04
ODP	kg CFC11-eqv	1,0E-06	1,5E-07	7,1E-08	1,246E-06	3,8E-07	5,0E-08	0	2,4E-11
POCP	kg C <sub>2</sub> H <sub>4</sub> -eqv	0,02	1,4E-04	0,000	0,02	1,3E-03	2,4E-04	0	2,5E-07
AP	kg SO <sub>2</sub> -eqv	0,30	2,9E-03	0,00	0,30	4,0E-02	5,3E-03	0	1,8E-06
EP	kg PO <sub>4</sub> <sup>3-</sup> -eqv	0,05	6,0E-04	0,001	0,05	4,6E-03	1,5E-03	0	1,6E-06
ADPM	kg Sb-eqv	3,0E-05	2,4E-06	3,0E-07	3,2E-05	1,3E-06	1,7E-05	0	1,5E-09
ADPE	MJ	528	12,04	7,6	548	31,9	8,7	0	1,9E-03

Parameter	Unit	B3	B4	B5	C1	C2	C3	C4	
GWP	kg CO <sub>2</sub> -eqv	1,18	60	0	0	0,06	0,3	0	
ODP	kg CFC11-eqv	3,4E-08	1,7E-06	0	0	1,2E-08	1,7E-08	0	
POCP	kg C <sub>2</sub> H <sub>4</sub> -eqv	3,8E-04	1,9E-02	0	0	1,0E-05	2,8E-05	0	
AP	kg SO <sub>2</sub> -eqv	0,01	0,36	0	0	2,0E-04	6,3E-04	0	
EP	kg PO <sub>4</sub> <sup>3-</sup> -eqv	1,1E-03	0,05	0	0	4,5E-05	2,8E-04	0	
ADPM	kg Sb-eqv	1,0E-06	5,2E-05	0	0	1,9E-07	3,9E-07	0	
ADPE	MJ	12	603	0	0	0,95	1,53	0	

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

Parameter	Unit	A1	A2	A3	A1 - A3	A4	A5	B1	B2
RPEE	MJ	23	0,17	21	43	0,75	1,86	0	3,5E-03
RPEM	MJ	0	0	1,22	1,22	0	0	0	0
TPE	MJ	23	0,17	22	45	0,75	1,86	0	3,5E-03
NRPE	MJ	544	12,37	8	565	33	10	0	2,4E-03
NRPM	MJ	0	0	0,24	0,24	0	0	0	0
TRPE	MJ	544	12,37	9	565	33	10	0	2,4E-03
SM	kg	INA	INA	INA	INA	INA	INA	0	INA
RSF	MJ	INA	INA	INA	INA	INA	INA	0	INA
NRSF	MJ	INA	INA	INA	INA	INA	INA	0	INA
W	m <sup>3</sup>	162	6,8E-01	0,09	163	3,24	15	0	0,03

Parameter	Unit	B3	B4	B5	C1	C2	C3	C4	
RPEE	MJ	1,1	56	0	0	0,01	8,9	0	
RPEM	MJ	0,02	1,24	0	0	0	0	0	
TPE	MJ	1,13	57	0	0	0,01	8,9	0	
NRPE	MJ	12	623	0	0	0,98	1,88	0	
NRPM	MJ	0,00	0,24	0	0	0	0	0	
TRPE	MJ	12	623	0	0	0,98	1,88	0	
SM	kg	INA	INA	0	0	INA	INA	0	
RSF	MJ	INA	INA	0	0	INA	INA	0	
NRSF	MJ	INA	INA	0	0	INA	INA	0	
W	m <sup>3</sup>	4	188	0	0	0,05	3,08	0	

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\*

Parameter	Unit	A1	A2	A3	A1 - A3	A4	A5	B1	B2
HW	kg	INA	INA	INA	INA	INA	INA	0	INA
NHW	kg	INA	INA	0,02	0,02	INA	0,51	0	INA
RW	kg	INA	INA	INA	INA	INA	INA	0	INA

Parameter	Unit	B3	B4	B5	C1	C2	C3	C4	
HW	kg	INA	INA	0	0	INA	INA	0	
NHW	kg	0,17	8,42	0	0	INA	7,72	0	
RW	kg	INA	INA	0	0	INA	INA	0	

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed; INA Indicator not assessed

\*Results for waste only include direct wastes and not the indirect wastes from upstream and/or downstream processes.

## End of life - Output flow

Parameter	Unit	A1	A2	A3	A1 - A3	A4	A5	B1	B2
CR	kg	INA	INA	INA	INA	INA	INA	0	INA
MR	kg	INA	INA	0,01	0,01	INA	0,04	0	INA
MER	kg	INA	INA	0,012	0,012	INA	0,47	0	INA
EEE	MJ	INA	INA	INA	INA	INA	INA	0	INA
ETE	MJ	INA	INA	INA	INA	INA	INA	0	INA

Parameter	Unit	B3	B4	B5	C1	C2	C3	C4	
CR	kg	INA	INA	0	0	INA	INA	0	
MR	kg	1,8E-02	1,8E+00	0	0	INA	1,75	0	
MER	kg	6,5E-02	6,5E+00	0	0	INA	5,97014	0	
EEE	MJ	INA	INA	0	0	INA	INA	0	
ETE	MJ	INA	INA	0	0	INA	INA	0	

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy; INA Indicator not assessed

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

## Additional Norwegian requirements

### Greenhouse gas emission from the use of electricity in the manufacturing phase

National production mix from import, medium voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Data source	Amount	Unit
Ecoinvent v3.3 (june 2016)	1140	gCO <sub>2</sub> -eqv/kWh

### Dangerous substances

- ☒ The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- ☐ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- ☐ The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- ☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforsikten, Annex III), see table.

### Indoor environment




No tests have been carried out on the product concerning indoor climate - Not relevant

### Carbon footprint

Carbon footprint has not been worked out for the product.

## Bibliography

ISO 21930:2007	<i>Sustainability in building construction - Environmental declaration of building products</i>
ISO 14001:2004	<i>Environmental management systems - Requirements with guidance for use</i>
ISO 14020:2000	<i>Environmental labels and declarations - General Principles</i>
ISO 14025:2010	<i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>
ISO 14044:2006	<i>Environmental management - Life cycle assessment - Requirements and guidelines</i>
ISO 9001: 2015	<i>Quality management systems - Requirements</i>
EN 15804:2012+A1:2013	<i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products</i>
Ecoinvent Centre	<i>Ecoinvent v3.3 Database, 2016</i>
REACH	<i>Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006</i>
SVHC candidate list	<i>Candidate List of substances of very high concern for Authorisation IAW Article 59(10) of the REACH Regulation</i>
Spielmann, M., Bauer, C., Dones, R., Tuchschnid, M.	<i>Ecoinvent report no. 14: Transport Services, 2007</i>
The Norwegian EPD Foundation	<i>General program of instructions</i>
The Norwegian EPD Foundation	<i>PCR 010 rev1 Building Boards, December 2013</i>
The Norwegian Environment Agency	<i>Norwegian A20 list: List of Priority Substances.</i>
Wiik, Marianne Kjendseth	<i>LCI/LCA REPORT: Alutile fire resistance (FR) panel (4mm). 2017: 00553</i>

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