ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025 and EN 15804

Declaration holder	FunderMax GmbH
Publisher	Institut Bauen und Umwelt (IBU)
Programme holder	Institut Bauen und Umwelt (IBU)
Declaration number	EPD-FMX-2012111-EN
Issue date	02.10.2012
Validity	01.10.2017

MAX Compact Panels
FunderMax GmbH

www.bau-umwelt.com

1 General information

FunderMax GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin

Declaration number

EPD-FMX-2012111-EN

This Declaration is based on the Product Category Rules:

Requirements on the EPD for thick laminate, 06-2011
(PCR tested and approved by the independent Expert Committee (SVA))

Issue date

02.10.2012

Valid until

01.10.2017

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Prof. Dr.-Ing. Hans-Wolf Reinhardt
(Chairman of the Expert Committee (SVA))

MAX Compact

Holder of the Declaration

FunderMax
Klagenfurter Strasse 87-89
9300 St. Veit/Glan
Austria

Declared product/unit

1 m^2 compact panels

Area of applicability:

The LCA is based on data for 2011 and was collected in the Neudorf plant in Vienna.

Verification

The CEN DIN EN 15804 standard serves as the core PCR.

Verification of the EPD by an independent third party in accordance with ISO 14025

☐ internal ☒ external

Dr. Frank Werner
(Independent verifier appointed by the SVA)

2 Product

2.1 Product description

FunderMax Compact panels are high-pressure decorative laminate panels (HPL) in accordance with EN 438 Part 4 (MAX Compact) and Part 6 (MAX Exterior).

High-pressure decorative laminate panels are distinguished by their decorative surfaces, mechanical resistance, durability and function. They are available in a wide range of décors and patterns and various surface finishes. They are resistant to abrasion, impact, scratches, heat, moisture and light as well as being hygienic and impervious to soiling. MAX Exterior panels are also extremely weatherproof.

HPL are easy to clean and do not require any maintenance.

MAX Compact and MAX Exterior can be bonded, screwed or studded onto substrates made of metal and wood. Furthermore, a wide variety of fastenings and connections can be used.

2.2 Application

Compact panels can be used in both private and public areas. They are particularly suitable for use in private homes, hospitals, public buildings, railway stations and airports, public transport, hotels, schools, business premises, sports facilities and industrial applications.

Their special properties permit the use of HPL in interior applications as wall panelling, panelling between railings, furniture, tables, column panelling, laboratory furnishings, dressing rooms, ceilings, window sills, worktops, business desks, wash stands etc.

2.3 Technical data

Characteristic	Test method	Unit	Value for Compact panels
Resistance to surface abrasion	EN 438.2-10	Revolutions	IP >= 150
Resistance to impact by a large-diameter ball	EN 438.2-21	Drop height mm 2mm<=d<6mm 6mm <= d	 1400 1800
Scratch resistance	EN 438.2-25	Grade Glossy Other surfaces	 >= 2 >= 3
Resistance to dry heat (180 °C)	EN 438.2-16	Appearance Glossy Other surfaces	 >= 3 >= 4
Resistance to humidity (100 °C)	EN 12721	Appearance Glossy Other surfaces	 >= 3 >= 4
Light fastness (xenon arc lamp)	EN 438.2-27	Grey scale	>= 4
Density	EN ISO 1183	g/cm³	>= 1.35
Bending strength	EN ISO 178	MPa	>= 80
Bending module	EN ISO	MPa	>= 9000

	178		
Resistance to artificial weathering (Exterior compact panels)	EN 438.2-29	Grey scale	>= 3

2.4 Placing on the market / Application rules

Product standard:

Product features in accordance with DIN EN 438 - European standard on High-pressure decorative laminates (HPL).

MAX Compact and MAX Exterior bear CE marking in accordance with ÖNORM EN-438-7 High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 7: Compact laminate and HPL composite panels for internal and external wall and ceiling finishes.

Construction approvals: MAX Exterior DE General building inspectorate approval Z-33.2-16; FR Avis technique 2/07-1264, 2/07-1265, 2/09-1380, 2/10-1427; BE ATG 07/2501; NL KOMO K4345/05; HU A-2274/2010.

A full list of all applicable approvals and test reports is available at www.Fundermax.at.

2.5 Delivery status

Full panels or panels cut to size

Maximum length: 4100 mm

Maximum width: 1850 mm

MAX Compact: 2 to 30 mm

MAX Exterior: 2 to 20 mm

2.6 Base materials / Auxiliaries

Compact panels of 1 mm thickness and an average density of 1450 kg/m³ comprise (details as mass percentage per m^2 production):

- Decorative paper 2 - 12%
- Kraft paper 55 - 62%
- Melamine resin 2 - 12%
- Phenol resin 20 - 32%
- Aluminium 0 - 33%

In flame-protected version, additionally phosphorous-based flame retardant up to 4%

2.7 Production

Compact panels are manufactured by means of compression of cellulose fibre fabric panels impregnated with curable resins accompanied by the application of heat (temperature ≥ 120 °C) and high pressure (≥ 5 MPa), giving rise to a homogeneous, non-porous material of increased density (≥ 1.35 g/cm^3) and the requisite surface quality.

2.8 Environment and health during production

Employees do not come into contact with any hazardous substances. Waste incurred is disposed of within the company or externally. Waste air is cleaned in accordance with statutory specifications.

Waste heat is recovered via heat exchangers.

2.9 Product processing / Installation

The processing features of FunderMax Compact panels are similar to those when processing hardwood. Tools with carbide tips are indispensable. Compact panels can also be used on carrier plates or even self-supporting if appropriately thick for which they are secured with screws or studs or bonded to the corresponding substrates. Standard safety guidelines concerning dust separation, dust extraction, fire safety etc. must be observed during processing and installation.

2.10 Packaging

Wrapped in polyethylene film on wooden pallets with pads on top and bottom (particle board or PP multiwall panel), bound with steel or plastic straps (plastic straps are made of PET and can be redirected into the PET recycling circuit)

2.11 Condition of use

The composition complies with the base materials outlined in 2.6, whereby the resins harden and cross-link three-dimensionally during production. Binding agents are stable over the long term.

25.6 kg CO_2 equiv. are stored in 1 m² Compact panel.

2.12 Environment and health during use

FunderMax Compact panels are a hardened, duroplastic material. In everyday use, they are approved for contact with food.

Thanks to their extremely low permeability, they are suitable as a barrier against emissions (e.g. formaldehyde) from the carrier material.

The decorative surfaces are largely resistant to all standard household solvents and chemicals; the material has therefore been used for many years in areas of application necessitating cleanliness and hygiene.

The sealed surface can be easily disinfected using hot water, steam or any type of disinfectant used in hospitals and commercial areas of application.

2.13 Reference Service Life

Owing to the manifold areas of application, a uniform service life can not be indicated. The service life can however range between 20 and 50 years even in heavy-duty areas such as wet rooms.

2.14 Extraordinary effects

Fire

Fire safety (tests in accordance with EN 13823 and EN ISO 11925-2 in compliance with the ÖNORM EN 13501-1)

Description	Value
Building material class	B
Burning drips	s1 (Max Compact F quality), s2 (MAX Exterior F quality)
Smoke gas development	do

FunderMax Compact panels are difficult to set fire to and delay the spread of flames so as to extend the escape time. In the case of partial combustion, smoke can contain toxic substances - like for any other organic material.

On request, FunderMax Compact panels are available in F-quality and containing halogen-free flame retardants.

In fires involving FunderMax Compact panels, the same fire-fighting techniques can be used as for other building materials containing wood.

Water

No ingredients are washed out which are hazardous to health.

Mechanical destruction

FunderMax Compact panels are distinguished by a very high degree of mechanical resistance. Compact panels can also be used as fall protection, e.g. as balcony panelling. If however they are ruptured by impact, sharp-edged fragments can arise.

2.15 Re-use phase

The material can not generally be re-used. Energetic recovery in industrial incineration plants is recommended on account of the high calorific value.

2.16 Disposal

Energetic utilisation or landfilling

Waste code in accordance with ÖNORM S 2100:18702

Waste code as per AVV: 17 02 01/03

2.17 Further information

More information on the properties, processing and treating FunderMax Compact panels is available on www.fundermax.at.

3 LCA: Calculation rules

3.1 Declared unit

The declared unit is one square metre of FunderMax Compact panel (8.21 mm thick and approx. density of 1450 kg/m^3).

3.2 System boundary

Type of EPD: to gate – with options

The Life Cycle Assessment for the products under review comprises the "Product stage" (A1-A3), "End-of-Life stage" (C4) and "Benefits and loads beyond the system boundaries stage" (D).

The systems therefore include the following stages in accordance with EN 15804:

- Product stage (Modules A1-A3 as per EN 15804):

- Production of all raw materials, preliminary products and auxiliaries, including the respective upstream chains and relevant transport in accordance with actual transport mix (truck, rail)

- FunderMax Compact panel production processes at the production site and production processes including upstream chains

- Manufacture of packaging including associated transport

The product stages, A4-A5, B1-B7, C1, C2 and C3 were not considered in this study.

Once the product has left the building, it is assumed that it is directed to a waste incineration plant (R1<0.6) (wet process) producing thermal energy and electricity. Any ensuing impacts and credits are declared in Module C4 and/or D. Energy produced in the form of electricity and thermal energy replaces thermal energy from natural gas and electrical energy (EU 27).

3.3 Estimates and assumptions

Compact panels are incinerated in a waste incineration plant (wet process, R1<0.6) and modelled in line with the composition for individual laminates (in practice, the laminates are usually incinerated along with the wooden carrier material in such types of plants).

3.4 Cut-off criteria

All operating data was taken into consideration. Accordingly, material flows with a share of less than 1 per cent were also analysed.

Some waste incurred during production was not considered in the study (waste oil, paper). These mass flows are minor. Overall, all of the flows not considered contribute to less than 1% of mass. It can therefore be assumed that the total of all neglected processes does not exceed 5% in the impact categories. The cut-off criteria in accordance with EN 15804 are therefore fulfilled.

3.5 Background data

The majority of data for upstream chains originates from industrial sources and was collected under consistent time- and method-based constraints. The process data and background data used are consistent. All other relevant background data sets were taken from the GaBi 5 (GaBI 5 2011) software data base and are less than 10 years old.

3.6 Data quality

The data recorded for the products under review was collated directly at the production site on the basis of a questionnaire drawn up by PE International. The input and output data was supplied by FunderMax and examined for plausibility with the result that good data representativity can be assumed.

3.7 Period under review

The data refers to the production process during the period 1 January 2011 to 31 December 2011.

3.8 Allocation

No co-product allocation is necessary for the LCA of FunderMax Compact panels.

"Allocation for multi-input processes" in this study includes the disposal of material residue from production in incineration plants for paper, wood products and oil. Taking consideration of the elementary composition and calorific value, the credits for energy generated are determined in the case of waste incineration plants.

Any benefits arising as a result to electrical and thermal energy substitution are directly credited to the product stage. This is possible as the volume credited is not greater than the energy requirements on the input side for providing energy during production and manufacturing of preliminary products. The energy reviewed is of the same quality.

No allocation processes were used for re-use, recycling and recovery in this Compact panel LCA.

3.9 Comparability

As a general rule, EPD data can only be compared or evaluated when all of the data records to be compared have been drawn up in accordance with EN 15804 and the building context or product-

specific performance characteristics are taken into consideration.

4 LCA: Scenarios and additional technical information

The following technical information forms the basis for the declared Module C4:

End of Life (C1-C4)

Description	Value	Unit
For energetic waste treatment	100	%

Description	Value	Unit
Calorific value of old sheets	19	MJ
Incineration plant efficiency	0.48	
R1 value	< 0.6	
Distribution of electricity and heat	27% and 73%	

5 LCA: Results

SYSTEM BOUNDARIES (X = INCLUDED IN THE LCA; MND = MODULE NOT DECLARED)															
Product stage			Construction process stage		Use stage							End-of-Life stage				Benefits and loads beyond the system boundaries
Provision of raw materials	Transport	Production	Transport to site	Construction installation process	Use / Application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction	Transport	Waste treatment	Disposal	Re-use, recovery or recy-cling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x													x	x

LCA RESULTS – ENVIRONMENTAL IMPACT: 1m² Compact panel (11.9 kg)				
		Product stage	Disposal	Credits and loads
Parameter	**Unit**	**A1-A3**	**C4**	**D**
Global Warming Potential (GWP)	[kg CO_2 equiv.]	18	27	-10
Ozone Depletion Potential (ODP)	[kg CFC11 equiv.]	8.67E-07	1.14E-09	-2.67E-07
Acidification Potential of soil and water (AP)	[kg SO_2 equiv.]	6.85E-02	7.35E-03	-2.14E-02
Eutrification Potential (EP)	[kg PO_4^3 equiv.]	1.45E-02	1.80E-03	-1.53E-03
Photochemical Ozone Creation Potential (POCP)	[kg ethene equiv.]	4.74E-03	5.07E-04	-1.84E-03
Abiotic Depletion Potential non-Fossil Resources (ADPE)	[kg Sb equiv.]	1.48E-05	1.03E-06	-5.45E-07
Abiotic Depletion Potential Fossil Fuels (ADPF)	[MJ]	570	7	-140

LCA RESULTS – USE OF RESOURCES: 1m² Compact panel (11.9 kg)				
		Product stage	Disposal	Credits and loads
Parameter	**Unit**	**A1-A3**	**C4**	**D**
Renewable primary energy as energy carrier (PERE)	[MJ]	117	0.6	-10.5
Renewable primary energy as material utilisation (PERM)	[MJ]	119	0	0
Total use of renewable primary energy sources (PERT)	[MJ]	236	1	-10
Non-renewable primary energy as energy carrier (PENRE)	[MJ]	504	8	-165
Non-renewable primary energy as material utilisation (PENRM)	[MJ]	107	0	0
Total use of non-renewable primary energy sources (PENRT)	[MJ]	611	8	-165
Use of secondary materials (SM)	[kg]	0	0	0
Renewable secondary fuels (RSF)	[MJ]	9.26E-03	9.68E-05	-1.79E-03
Non-renewable secondary fuels (NRSF)	[MJ]	9.29E-02	1.01E-03	-1.87E-02
Net use of fresh water (FW)	[m³]	67	1	-15

LCA RESULTS – OUTPUT FLOWS AND WASTE CATEGORIES: 1m² Compact panel (11.9 kg)				
		Product stage	Disposal	Credits and loads
Parameter	**Unit**	**A1-A3**	**C4**	**D**
Hazardous waste for disposal (HWD)	[kg]	0.06	0	0
Disposed of, non-hazardous waste (NHWD)	[kg]	28	2	-15
Disposed of, radioactive waste (RWD)	[kg]	1.44E-02	3.78E-04	-1.02E-02
Components for re-use (CRU)	[kg]	0	0	0
Materials for recycling (MFR)	[kg]	0	0	0
Materials for energy recovery (MER)	[kg]	0	0	0
Exported energy per type (electricity)	[MJ]	0	29	0

Exported energy per type (thermal energy)	[MJ]	0	81	0

6 LCA: Interpretation

6.1 Water consumption

Water consumption for 1 m^2 FunderMax Compact panel is 67 m^3 in the product stage. In stage D, credits exceeding -15 m^3 are offset.

Water consumption is the result of water required during production and at the EoL. A high percentage is credited outside the system.

6.2 Renewable and non-renewable primary energy

The share of renewable energy in the products reviewed is attributable to the high use of paper. Kraftliner makes an essential contribution (more than 93%) to primary energy requirements from renewable resources.

The high percentage of non-renewable energy in the products reviewed is accounted for by phenol consumption (61%) and the melamine formaldehyde resin (8%). Together, they represent more than 69% of overall requirements in production.

6.3 Waste

The largest share of waste produced is disposed of, non-hazardous waste. Disposed of, radioactive waste is incurred by the utilisation of energy in the upstream chains associated with preliminary products (electricity generation).

6.4 Global Warming Potential

The Global Warming Potential is dominated by carbon dioxide in manufacturing. CO_2 integration through the use of wood in paper production is offset by other greenhouse CO_2 emissions in the provision of raw materials, production, transport and packaging. The net balance of carbon stored in the product and emissions from production comprises 18 kg CO_2.

Outside the system reviewed, all emissions of GWP relevance are incurred by incineration and are indicated in C4. The credit substitutes a share of the global warming emissions incurred; this percentage is indicated in D and complies with 17 kg CO_2 equiv.

The system under review (A1-A3+C4+D) therefore gives rise to a global warming potential of 35 kg CO_2 equivalent per m^2 Compact panel.

6.5 Ozone Depletion Potential

The Ozone Depletion Potential primarily arises through the use of paper (and particularly during the upstream chains of electricity production) for producing FunderMax panels. Organic emissions containing halogen into air are responsible for the Ozone Depletion Potential. By substituting the energy utilisation associated with FunderMax panels at the End of Life, the overall Ozone Depletion Potential is reduced.

6.6 Acidification Potential

Acidification is primarily attributable to the provision of raw materials with sulphur dioxide and nitrogen oxide emissions from the provision of energy as the culprits.

Here too, primarily Kraftliner and phenol are the main contributors responsible for more than 69% of the overall impact within the modules considered (A1-A3).

6.7 Eutrification Potential

Eutrification is primarily influenced by the provision of raw materials and NOx emissions in the upstream chains. NOx emissions are also the main causes during transport.

6.8 Photochemical Ozone Creation Potential

The POCP is dominated by the provision of raw materials resulting in NMVOC, nitrogen oxide and sulphur dioxide emissions. The POCP displays a negative value for transport. This is due to the NO emissions incurred during transport. NO counteracts the POCP.

6.9 Abiotic Depletion of Resources (fossil)

The ADP is primarily incurred by the consumption of non-renewable fossil fuels such as natural gas and coal where the phenol, thermal energy, Kraftliner and melamine formaldehyde resin make particular contributions.

6.10 Abiotic Depletion of Resources (elementary)

ADP elementary is primarily incurred here by non-renewable material resources such as metals or rock salt.

The phenol used as well as the Kraftliner paper make a significant contribution here.

7 Requisite evidence

Formaldehyde

Measuring agency: Entwicklungs- und Prüflabor Holztechnologie GmbH, Zellescher Weg 24, 01217 Dresden, Germany

Test reports, date: 25.07.2011

Result: The test to determine formaldehyde content was carried out in accordance with the AgBB scheme for obtaining individual evidence of formaldehyde:

Measurement 0.01 ppm after 3 days

Measurement 0.01 ppm after 7 days

The "Compact panel" product examined complies with the requirements of the AgBB scheme.

VOC

Measuring agency: Entwicklungs- und Prüflabor Holztechnologie GmbH, Zellescher Weg 24, 01217 Dresden, Germany

Test reports, date: 25.07.2011

Result: VOC content was tested in accordance with the AgBB scheme.

AgBB overview of results (28 days)

[A] TVOC (C6-C16) = 0 µg/m^3

[B] Σ SVOC (C16-C22) = 0 µg/m^3

[C] R (dimensionless) = 0 µg/m^3

[D] VOC without NIK = 0 µg/m^3

[E] Carcinogens = 0 µg/m^3

Total migration

Measuring agency: ISEGA- Forschungs- und Untersuchungs- Gesellschaft mbH, Postfach 100565, 63704 Aschaffenburg; Zeppelinstr. 3-5, 63741 Aschaffenburg, Germany

Test reports, date: 29.08.2011

Total migration:

Sample 1: 3.8 mg/dm^2

Sample 2: 2.7 mg/dm^2

GC-MS screening:

No compounds were identified.

8 References

Institut Bauen und Umwelt e.V., Königswinter (pub.):

General Principles for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2011-06

Product Category Rules for Construction Products, Part A: Calculation rules for the Life Cycle Assessment and requirements on the background report, 2011-07

Product Category Rules for Construction Products, Part B: Requirements on the EPD for thick laminate, 2011-6

www.bau-umwelt.de

DIN EN ISO 14025:2009-11, Environmental labels and declarations – Type III environmental declarations – Principles and procedures

DIN EN 15804:2012-04, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

DIN EN 438-1:2005-04, High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 1: Introduction and general information; German version EN 438-1:2005

DIN EN 438-2:2005-04, High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 2: Determination of properties; German version EN 438-2:2005

DIN EN 438-3:2005-04, High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 3: Classification and specifications for laminates less than 2 mm thick intended for bonding to supporting substrates; German version EN 438-3:2005

DIN EN 438-4:2005-04, High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 4: Classification and specifications for compact laminates of thickness 2 mm and greater; German version EN 438-4:2005

DIN EN 438-5:2005-04, High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 5: Classification and specifications for flooring-grade laminates of less than 2 mm thick intended for bonding to supporting substrates; German version EN 438-5:2005

DIN EN 438-6:2005-04, High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 6: Classification and specifications for exterior-grade compact laminates of thickness 2 mm and greater; German version EN 438-6:2005

DIN EN 438-7:2005-04, High-pressure decorative laminates (HPL) – Sheets based on thermosetting resins (laminates) – Part 7: Compact laminates and HPL composite panels for internal and external wall and ceiling finishes; German version EN 438-7:2005

DIN EN 13501-1:2010-01, Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2007 + A1:200

Publisher

Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel. +49 (0)30 3087 748-0
Fax +49 (0)30 3087 748-29
E-mail info@bau-umwelt.com
Web **www.bau-umwelt.com**

Programme holder

Institut Bauen und Umwelt e.V.
Panoramastr.1
10178 Berlin
Germany

Tel. +49 (0)30 3087 748-0
Fax +49 (0)30 3087 748-29
E-mail info@bau-umwelt.com
Web **www.bau-umwelt.com**

Holder of the Declaration

FunderMax GmbH
9300 St. Veit/Glan, Klagenfurter
Strasse 87-89
Austria

Tel. +43 (0)4212 494
Fax: +43 (0)4212 494-8099
E-mail michael.peham@FunderMax.biz
Web **www.kplus-wood.at**

Author of the Life Cycle Assessment

PE International
Hütteldorferstr. 63-65 /Top 8
1150 Vienna
Austria

Tel. +43 (0)1 4799 724
Fax +43 (0)1 4799 724-10
E-mail p.gamarra@peinternational.com
Web **www.pe-cee.com**