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Testing. Advising. Assuring.

Classification report No. 2015-1875-K1

issued 26.11.2015

Customer: **3A Composites GmbH**
Alusingenplatz 1
78224 Singen

Order: **Classification of the burning behaviour according to DIN EN 13501-1 (2010-01)**

Date of order: **25.08.2015**

Notification number of the test laboratory

NB 1378

Designation of the classificated building product

Aluminium composite panels designated as Alucore® 5,5 up to 25 mm.

This classification report lays down the classification of the building product above according to the procedures of DIN EN 13501-1.

This classification report is a translation of the German version 2015-1875-K1 (issued 26.11.2015). In case of doubt only the German ersion is valid.
This classification report contains 11 pages.

1. Beschreibung des Probenmaterials

1.1 Angaben des Auftraggebers:

Trade name:	Alucore®
Sample material:	Aluminium composite panel as panel element
Kind of material:	Aluminium composite panel
Method of production:	Lamination of coil-coated aluminium tapes
Total thickness:	5,5 up to 25 mm
Total surface weight:	3,1 bis 6,6 [kg/m²]
Color: white	
Flame retardants: no	

For composite (E.g. multi-level) materials:

Type of surface:	enamel
The surface material:	PVDF (fluoropolymer), PE (polyester)
Surface weight:	approx. 7,5 g/m ²
Thickness of surface:	< 30 µm
Material of the carrier layer:	aluminium AlMg 1 (EN AW 5005A)
Surface weight of the layer:	2,7- 5,4 [kg/m ²]
Thickness of the layer:	0,5 - 1,0 [mm]

Further layers of material: aluminium honeycomb core

Surface Weight:	190 - 990 [g/m²]
Further layers thickness:	4,5 - 23 [mm]
Glue:	Ethylenacrylatcopolymer
Manufacturer:	BASF
Glue type:	Elastomer-adhesive film

Intended area of application: facade and cladding elements in the shipbuilding industry

Construction: Alucore® 15

Layer	componente	density: [g/cm³]	Layer thickness [mm]	Absolute weight [g/m²]	Percentage weight proportion [%]
Lacquer front side	PVDF silver metallic 500	1,57000	0,019	29,83	0,483
	Polyester Primer white	1,50000	0,005	7,5	0,121
cover sheet up EN AW 5005A	Aluminium	2,70000	1,000	2700	43,691
Glue films	2 x 38 µm	0,92700	0,076	70,452	1,140
Honeycomb EN AA 3003	Al-honeycomb film	0,04302	13,000	559,23	9,049
	Glue of the honeycomb cells	0,00038	13,000	4,9699	0,080
Glue films	2 x 38 µm	0,92700	0,076	70,452	1,140
Cover sheet below EN AW 5005A	Aluminium	2,70000	1,000	2700	43,691
Lacquer back side	Polyester Primer white	1,50000	0,005	7,5	0,121
	PVDF silver metallic 500	1,57000	0,019	29,83	0,483
total				6180	100

Construction: Alucore® 5,5

Layer	componente	density: [g/cm³]	Layer thickness [mm]	Absolute weight [g/m²]	Percentage weight proportion [%]
Lacquer front side	PVDF silver metallic 500	1,57000	0,019	29,83	0,959
	Polyester Primer white	1,50000	0,005	7,5	0,241
cover sheet up EN AW 5005A	Aluminium	2,70000	0,500	1350	43,396
Glue films	2 x 38 µm	0,92700	0,076	70,452	2,265
Honeycomb EN AA 3003	Al-honeycomb film	0,04302	4,500	193,58	6,223
	Glue of the honeycomb cells	0,00038	4,500	1,7204	0,055
Glue films	2 x 38 µm	0,92700	0,076	70,452	2,265
Cover sheet below EN AW 5005A	Aluminium	2,70000	0,500	1350	43,396
Lacquer back side	Polyester Primer white	1,50000	0,005	7,5	0,241
	PVDF silver metallic 500	1,57000	0,019	29,83	0,959
total				3111	100

Construction: Alucore® 25

Layer	componente	density: [g/cm³]	Layer thickness [mm]	Absolute weight [g/m²]	Percentage weight proportion [%]
Lacquer front side	PVDF silver metallic 500	1,57000	0,019	29,83	0,451
	Polyester Primer white	1,50000	0,005	7,5	0,113
cover sheet up EN AW 5005A	Aluminium	2,70000	1,000	2700	40,824
Glue films	2 x 38 µm	0,92700	0,076	70,452	1,065
Honeycomb EN AA 3003	Al-honeycomb film	0,04302	23,000	989,41	14,960
	Glue of the honeycomb cells	0,00038	23,000	8,7929	0,133
Glue films	2 x 38 µm	0,92700	0,076	70,452	1,065
Cover sheet below EN AW 5005A	Aluminium	2,70000	1,000	2700	40,824
Lacquer back side	Polyester Primer white	1,50000	0,005	7,5	0,113
	PVDF silver metallic 500	1,57000	0,019	29,83	0,451
total				6614	100

1.2 At the specimen preparation from the Exova Warringtonfire determined values:

Aluminium composite panels

Colour: lacquer white

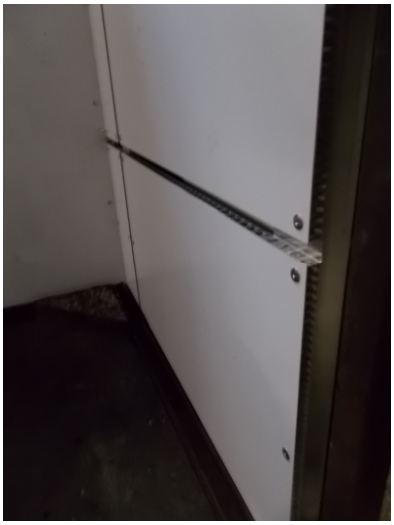
Thickness: i.a. 15 mm

Surface weight: i.a. 6,34 kg/m²

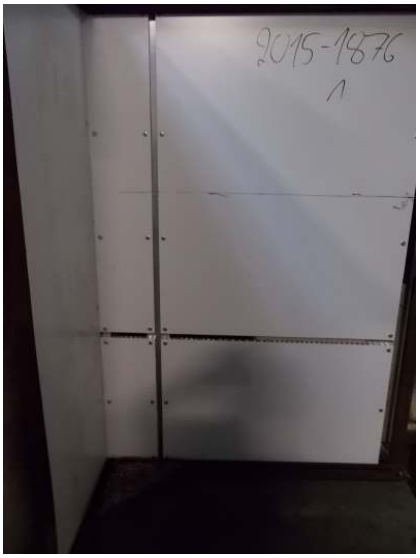
SBI - specimen:

specimen	Material:	colour	thickness: [mm]	surface weight [kg/m²]:
1	Aluminium composite panels	white	15	6,34
2	Aluminium composite panels	white	15	6,34
3	Aluminium composite panels	white	15	6,34

Material construction und fixing see pictures below:



picture: edge of the large sample wing



fixing of specimen

Note: set data for Alucore ® 5.5 or Alucore ® 25 are to remove of the test reports Document reference no. 317514 or no.. 317516 Exova Warringtonfire, Warrington

Sample for heat of combustion:

Material:	colour:	Layer thickness: [mm]	Surface weight [kg/m²]:
Proportion of aluminium	alu	15	6,11
Glue film 2-layers	milky	0,076	0,074
Honeycomb glue Köratec	yellow	13	0,0049699
Polyester Primer	white	0,005	0,015
PVDF	silver metallic	0,019	0,05966

1.3 Production and pre-treatment of the samples for the tests according to DIN EN 1716

The samples were chosen by the customer. On the part of the exova warringtonfire, Frankfurt no review with regard to the sample selection and the matches the requirements of the listed test methods according to page 1 will take place.

Material controlled crushed for test (homogenized).
The samples were conditioned for more than 48 h to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5% prior to the testing.

1.4 Production and pretreatment of the samples for the tests according to DIN EN 13823

The samples were provided and delivered for the tests in the necessary sample dimensions, by the applicant.
Alu honeycomb panels screwed on rectangular sections (30 mm and 80 mm wide).

One longitudinal joint was trained at a distance of 200 mm from the corner on the long side of the samples and 500 mm above the lower edge of the specimen was a transverse joint trained.
Joint width 20 mm.

The material was tested at a distance of 30 mm (thickness of metal profiles) to the end plate analog to DIN EN 13823, point 4.4.10 (calcium silicate) density 800 ± 150 kg / m ³, thick 12 ± 3 mm).

The samples were conditioned for more then 48 h to constant mass at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5% prior to the testing.

2. Test reports and test results

2.1.1 Test reports Alucore® 15

Name of test laboratory	Customer	Report to form the basis	Test procedure
Exova Warringtonfire, Frankfurt	**3A Composites GmbH**	**2015-1875**	**DIN EN 13823 (SBI) DIN EN ISO 1716 (Determination of gross heat combustion)**

2.1.2 Test results

Test procedures	Parameter / classes		Test results
			average
DIN EN 13823 (SBI)	FIGRA $_{0,2MJ}$ ≤120 [W/s] for class A2 FIGRA $_{0,2MJ}$ ≤ 120 [W/s] for class B		**0**
	FIGRA $_{0,4MJ}$ ≤ 250 [W/s] for class C FIGRA $_{0,4MJ}$ ≤ 750 [W/s] for class D		**0**
	THR $_{600s}$ [MJ] ≤ 7,5 MJ for class A2 THR $_{600s}$ [MJ] ≤ 7,5 MJ for class B THR $_{600s}$ [MJ] ≤ 15 MJ for class C THR $_{600s}$ [MJ] no requirement for class D		**0,32**
	SMOGRA-index ≤ 30 [m²/s²] für s1 SMOGRA-index ≤ 180 [m²/s²] für s2		**0**
	TSP $_{600s}$ ≤ 50 [m²] for s1 TSP $_{600s}$ ≤ 200 [m²] for s2		**34,24**
	LFS < edge of the specimen for class A2 LFS < edge of the specimen for class B LFS < edge of the specimen for class C		fulfilled
	no burning dripping off/dropping within 600s for class d0		fulfilled
DIN EN ISO 1716	PCS ≤ 3,0 MJ/kg[a] for Class A2 PCS ≤ 4,0 MJ/m²[2b] for Class A2 PCS ≤ 4,0 MJ/m²[2d] for Class A2 PCS ≤ 3,0 MJ/kg[e] for Class A2	Aluminium proportion: 0,0000 MJ/kg Glue film: 44,0638 MJ/kg =3,2607 MJ/m² Köratec: 34,5984 MJ/kg =0,1720 MJ/m² Polyesterprimer: 15,9250 MJ/kg =0,2389 MJ/m² PVDF silver metallic: 20,9993 MJ/kg =1,2528 MJ/m²	**Total heat combustion: 1,29002 MJ/kg**

Explanations of table standing too above:
Figra$_{02MJ}$: Heat release rate with consideration of the THR of threshold value of 0,2MJ [W/s]
Figra$_{04MJ}$: Heat release rate with consideration of the THR of threshold value of 0,4MJ[W/s]
THR$_{600s}$: Total set free warmth during 600s [MJ]
SMOGRA: Smoke development rate
TSP$_{600s}$: Total set free smoke quantity during 600s [m²]
LSF: lateral propagation of flames
a: for homogenous products and substantial contents of inhomogeneous products
b: for every outer not substantial content from not homogenies products.
d: for every inner not substantial content from not homogenies products
e: for the complete product
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2.2.1 **Test reports** Alucore® 5,5

Name of test laboratory	Customer	Report to form the basis	Test procedure
Exova Warringtonfire, Warrington	**3A Composites GmbH**	**Document Reference No. 317514**	**DIN EN 13823 (SBI) DIN EN ISO 1716 (Determination of gross heat combustion)**

2.2.2 Test results

Test procedures	Parameter / classes		Test results
			average
DIN EN 13823 (SBI)	FIGRA $_{0,2MJ}$ ≤120 [W/s] for class A2 FIGRA $_{0,2MJ}$ ≤ 120 [W/s] for class B		**21,6**
	FIGRA $_{0,4MJ}$ ≤ 250 [W/s] for class C FIGRA $_{0,4MJ}$ ≤ 750 [W/s] for class D		**17,8**
	THR $_{600s}$ [MJ] ≤ 7,5 MJ for class A2 THR $_{600s}$ [MJ] ≤ 7,5 MJ for class B THR $_{600s}$ [MJ] ≤ 15 MJ for class C THR $_{600s}$ [MJ] no requirement for class D		**1,55**
	SMOGRA-index ≤ 30 [m²/s²] für s1 SMOGRA-index ≤ 180 [m²/s²] für s2		**0**
	TSP $_{600s}$ ≤ 50 [m²] for s1 TSP $_{600s}$ ≤ 200 [m²] for s2		**18,49**
	LFS < edge of the specimen for class A2 LFS < edge of the specimen for class B LFS < edge of the specimen for class C		fulfilled
	no burning dripping off/dropping within 600s for class d0		fulfilled
DIN EN ISO 1716	PCS ≤ 3,0 MJ/kg[a] for Class A2 PCS ≤ 4,0 MJ/m²[2b] for Class A2 PCS ≤ 4,0 MJ/m²[2d] for Class A2 PCS ≤ 3,0 MJ/kg[e] for Class A2	Aluminium proportion: 0,0000 MJ/kg Glue fim: 44,0638 MJ/kg =3,2607 MJ/m² Köratec: 34,5984 MJ/kg =0,0129 MJ/m² Polyesterprimer: 15,9250 MJ/kg =0,2389 MJ/m² PVDF silver metallic: 20,9993 MJ/kg =1,2528 MJ/m²	**Total heat combustion: 2,5943 mJ/kg**

Explanations of table standing too above:
Figra$_{02MJ}$: Heat release rate with consideration of the THR of threshold value of 0,2MJ [W/s]
Figra$_{04MJ}$: Heat release rate with consideration of the THR of threshold value of 0,4MJ[W/s]
THR$_{600s}$: Total set free warmth during 600s [MJ]
SMOGRA: Smoke development rate
TSP$_{600s}$: Total set free smoke quantity during 600s [m²]
LSF: lateral propagation of flames
a: for homogenous products and substantial contents of inhomogeneous products
b: for every outer not substantial content from not homogenies products.
d: for every inner not substantial content from not homogenies products
e: for the complete product.

2.3.1 **Test reports** Alucore® 25

Name of test laboratory	Customer	Report to form the basis	Test procedure
Exova Warringtonfire, Warrington	**3A Composites GmbH**	**Document Reference No. 317516**	**DIN EN 13823 (SBI) DIN EN ISO 1716 (Determination of gross heat combustion)**

2.3.2 Test results

Test procedures	Parameter / classes		Test results
			average
DIN EN 13823 (SBI)	FIGRA $_{0,2MJ}$ ≤120 [W/s] for class A2 FIGRA $_{0,2MJ}$ ≤ 120 [W/s] for class B		**18,42**
	FIGRA $_{0,4MJ}$ ≤ 250 [W/s] for class C FIGRA $_{0,4MJ}$ ≤ 750 [W/s] for class D		**10,72**
	THR $_{600s}$ [MJ] ≤ 7,5 MJ for class A2 THR $_{600s}$ [MJ] ≤ 7,5 MJ for class B THR $_{600s}$ [MJ] ≤ 15 MJ for class C THR $_{600s}$ [MJ] no requirement for class D		**1,57**
	SMOGRA-index ≤ 30 [m²/s²] für s1 SMOGRA-index ≤ 180 [m²/s²] für s2		**0**
	TSP $_{600s}$ ≤ 50 [m²] for s1 TSP $_{600s}$ ≤ 200 [m²] for s2		**15,14**
	LFS < edge of the specimen for class A2 LFS < edge of the specimen for class B LFS < edge of the specimen for class C		fulfilled
	no burning dripping off/dropping within 600s for class d0		fulfilled
DIN EN ISO 1716	PCS ≤ 3,0 MJ/kg[a] for Class A2 PCS ≤ 4,0 MJ/m²[2b] for Class A2 PCS ≤ 4,0 MJ/m²[2d] for Class A2 PCS ≤ 3,0 MJ/kg[e] for Class A2	Aluminium proportion: 0,0000 MJ/kg Glue film: 44,0638 MJ/kg =3,2607 MJ/m² Köratec: 34,5984 MJ/kg =0,3045 MJ/m² Polyesterprimer: 15,9250 MJ/kg =0,2389 MJ/m² PVDF silver metallic: 20,9993 MJ/kg =1,2528 MJ/m²	**Total heat combustion: 1,6728 MJ/kg**

Explanations of table standing too above:
Figra$_{02MJ}$: Heat release rate with consideration of the THR of threshold value of 0,2MJ [W/s]
Figra$_{04MJ}$: Heat release rate with consideration of the THR of threshold value of 0,4MJ[W/s]
THR$_{600s}$: Total set free warmth during 600s [MJ]
SMOGRA: Smoke development rate
TSP$_{600s}$: Total set free smoke quantity during 600s [m²]
LSF: lateral propagation of flames
a: for homogenous products and substantial contents of inhomogeneous products
b: for every outer not substantial content from not homogenies products.
d: for every inner not substantial content from not homogenies products
e: for the complete product.

3 Classification and range of application

3.1 Reference

The classification was carried out according to the chapter 11 of DIN EN 13501-1

3.2 Classification

The tested material is ranked related to its behaviour in case of fire and according to its heat combustion into the class **A2**.
Concerning the smoke development the tested material is ranked into the class **s1**
Concerning the dripping off behavior the tested material is ranked into the class **d0**.

The classification of the tested material reads thus:

A2 – s1 d0

3.3 Area of application

The classification is only valid for the in chapter one described material, in the tested thicknesses, 5,5 , 15 und 25 mm and the tested colour, in the tested arrangement.

According to experiences of the testing laboratory are in the classification also in between thicknesses included.

4 Reservation

This classification report replaces not a possible required type admittance or type certification of the product.

Frankfurt, the 26.11.2015

P. Scheinkönig
Tester in charge

Dipl.-Ing. T. Zachäus
Head of Exova Warringtonfire, Frankfurt