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Testing. Advising. Assuring.

Test report No. 2015-1875

To test the behaviour in case of fire according to DIN EN 13823 and DIN EN ISO 1716
issued 26.11.2015

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

Date of ordder:	**25.08.2015**
Date of sampling	**no sampling of the specimen by a representative of Exova Warringtonfire, Frankfurt**
Date of arrival	**25.08.2015**
Date of tests:	**07.09.2015 and 08.09.2015**

Designation of the classificated building product

Aluminium composite panels designated as Alucore® 15.

Description of the relevant test procedure

DIN EN 13823 (Dezember 2010)

DIN EN ISO 1716 (November 2010)

This Test report is a translation of the German version 2015-1875 (issued 26.11.2015). In case of doubt only the German version is valid
This test certificate contains 14 pages and 3 annexes.

11. Description of the material

1.1 Details of the customer:

Trade name:	Alucore® 15
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:	15 mm
Total surface weight:	6180 g/m ²
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:	564,2 [g / sqm]
Further layers thickness:	13 [mm]
Glue:	Ethylenacrylatcopolymer
Manufacturer:	BASF
Glue type:	Elastomer-adhesive film

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

Constuction: 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 oft he 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

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 results

2.1.1 Test sheet according to DIN EN 13823 (SBI) :

Single results

		Test 1	Test 2	Test 3	Average
date of receipt		25.08.2015	25.08.2015	25.08.2015	
test date		07.09.2015	07.09.2015	07.09.2015	
FIGRA $_{0,2MJ}$	**[W/S]**	0	0	0	**0**
FIGRA $_{04MJ}$	**[W/S]**	0	0	0	**0**
THR $_{600s}$	**[MJ]**	0,24	0,61	0,12	**0,32**
SMOGRA-index	**[m²/s²]**	0	0	0	**0**
TSP $_{600s}$	**[m²]**	33,03	22,01	47,67	**34,24**
LFS		no	no	no	
Burn time separating drops / parts	**[s]**	--	--	--	

Remark: On test 1 and 2 after flaming with a small flame in the transverse joint.

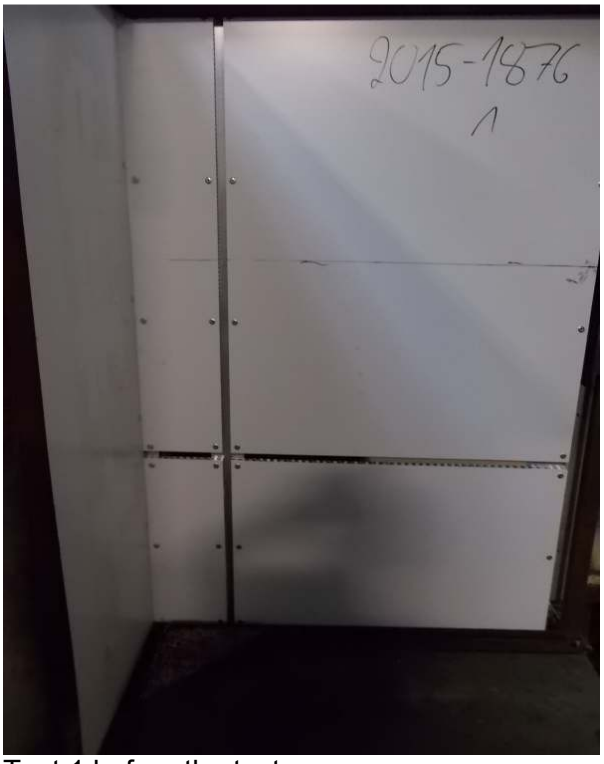
Note: Smoke generation was calculated according to DIN EN 13823 appendix A (A.6.1.2)

Diagrams according to DIN EN 13823 (SBI) see annexes 1 to 3

Explanations of table standing too above:

Figra$_{02MJ}$: Heat release rate with consideration of the THR threshold value of 0,2MJ [W/s]
Figra$_{04MJ}$: Heat release rate with consideration of the THR threshold value of 0,4MJ[W/s]
THR$_{600s}$: Total released heat during 600s [MJ]
SMOGRA: Smoke generation rate
TSP$_{600s}$: Total released smoke quantity during 600s [m²]
LFS: lateral propagation of flames

2.1.2 Appearance of the specimen before and after the test:



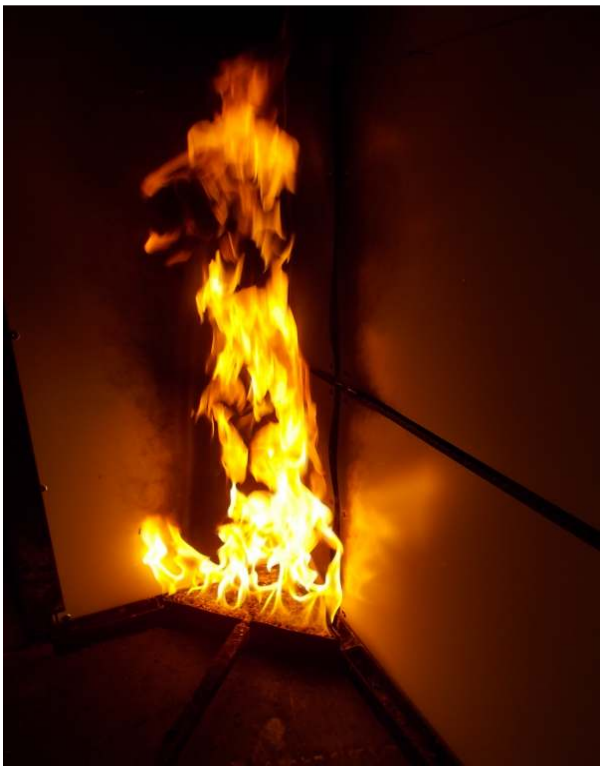
Test 1 before the test

Test 1 during the test h

Test 1 after the test

2.1.3 Appearance of the specimen before and after the test:

Test 2 before the test



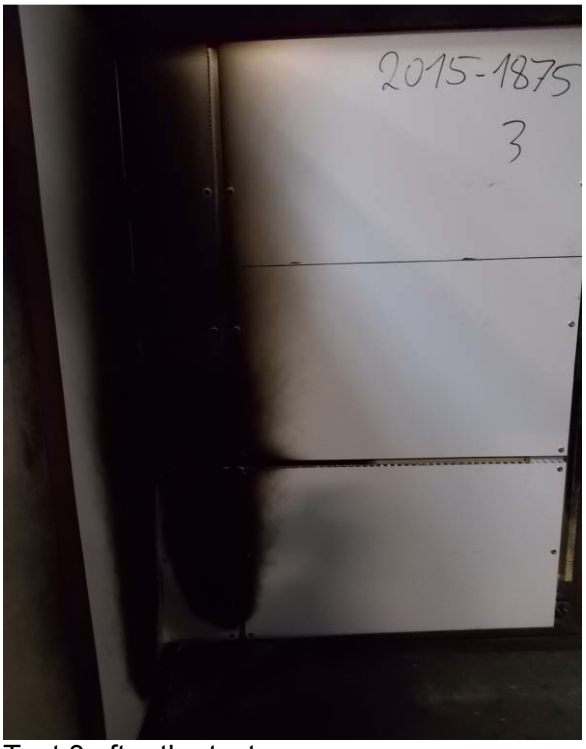
Test 2 during the test

Test 2 after the test

2.1.4 Appearance of the specimen before and after the test:

Test 3 before the test


Test 3 during the test



Test 3 after the test

2.2 Test results:
Determination of heat combustion according to DIN EN ISO 1716:2010-11)
(upper caloric value according to DIN 51900)

sample conditioning: according to EN 13238
date of receipt: 17.02.2014
date of test: 27.03.2014 and 09.07.2014
test procedure: crucible procedure
Burning tools (VHM): Parafinöl thick, Ph EUR, BP, USP, Merck

Gross combustion heat VHM: 46,0656 MJ/kg

Measuring instrument : Parr 1266 / Isoperibole bomb-calorimeter

Water equivalent E of calorimeter: 10,0622 kJ/K = 0,0100622 MJ/K

2.2.1 Glue film:

sample no.	initial sample weight g	initial weight VHM *) g	gross combustion heat MJ/kg	MJ/m² 2 layers
1	0,2931	0,5291	44,0638	3,2607
2	0,2899	0,5241	43,9878	3,2551
3	0,2935	0,5299	44,1398	3,2663
			44,0638	3,2607

Remarks: none

2.2.2 Köratec:

sample no.	initial sample weight g	initial weight VHM *) g	gross combustion heat MJ/kg	MJ/m²
1	0,5016	0,5199	34,7112	0,1725
2	0,5038	0,5229	34,4856	0,1714
3	0,5034	0,5232	34,5984	0,1720
			34,5984	0,1720

Remarks: none

2.2.3 Polyester Primer:

sample no.	initial sample weight g	initial weight VHM *) g	gross combustion heat MJ/kg	gross combustion heat MJ/m²
1	0,5005	0,5229	15,8649	0,2380
2	0,5010	0,5232	15,9250	0,2389
3	0,5012	0,5211	15,9851	0,2393
			15,9250	0,2389

Remarks: none

2.2.4 PVDF silber metallic:

sample no.	initial sample weight g	initial weight VHM *) g	gross combustion heat MJ/kg	gross combustion heat MJ/m²
1	0,5018	0,5193	20,9993	1,2528
2	0,5010	0,5198	21,0015	1,2529
3	0,5013	0,5105	20,9971	1,2527
			20,9993	1,2528

Remarks: none

2.3.1 Test results

Determination of total heat of combustion according to DIN EN ISO 1716:2010-11) (upper caloric value according to DIN 51900: Alucore® 15

Part	Material	Square weight [Kg/m²]	Proportion of product [%]	gross combustion heat [MJ/kg]
1	Proportion of aluminium	6,11	96,37	0,0000
2	Glue film 4 - layers	0,148	2,33	1,0267
3	Köratec	0,0049699	0,08	0,0277
4	Polyester Primer	0,015	0,24	0,03822
5	PVDF silver metallic	0,05966	0,94	0,1974
	Total product	6,34	100	**1,29002**

Remarks: none

2.3.2 Test results: (Calculation according to manufacturer's instructions)
)

Determination of total heat of combustion according to DIN EN ISO 1716:2010-11)
(upper caloric value according to DIN 51900: Alucore® 5,5

Part	Material	Square weight [Kg/m²]	Proportion of product [%]	gross combustion heat [MJ/kg]
1	Proportion of aluminium	2,89	92,93	0,0000
2	Glue film 4 - layers	0,148	4,76	2,0974
3	Köratec	0,0017	0,05	0,0173
4	Polyester Primer	0,015	0,48	0,0764
5	PVDF silver metallic	0,05966	1,92	0,4032
	Total product	3,11	100	**2,5943**

Remarks: none

Determination of total heat of combustion according to DIN EN ISO 1716:2010-11)
(upper caloric value according to DIN 51900: Alucore® 25

Part	Material	Square weight [Kg/m²]	Proportion of product [%]	gross combustion heat [MJ/kg]
1	Proportion of aluminium	6,38	96,50	0,0000
2	Glue film 4 - layers	0,148	2,24	0,9870
3	Köratec	0,0088	1,33	0,4602
4	Polyester Primer	0,015	0,23	0,0366
5	PVDF silver metallic	0,05966	0,90	0,1890
	Total product	6,61	100	**1,6728**

Remarks: none

3. Special note

3.1 The test result is only valid for the in chapter 1 described material construction, in the tested thickness and colour, in the tested arrangement.

If combined with other materials (for example coatings, deposits) the burning behavior can be influenced unfavorable so that the classification above is no longer valid.
Therefore the burning behavior of the material in combination with other materials has to be tested separately.

3.2 The material has not been tested following outdoor weathering.

3.3 The test results relate only to the behaviour of the test samples of the product under the test conditions. They are not intended to be the only criteria that can cause a potential fire hazard of the building product in use.

3.4 The test have been carried out in accordance with DIN EN 13823 and DIN EN ISO 1716.

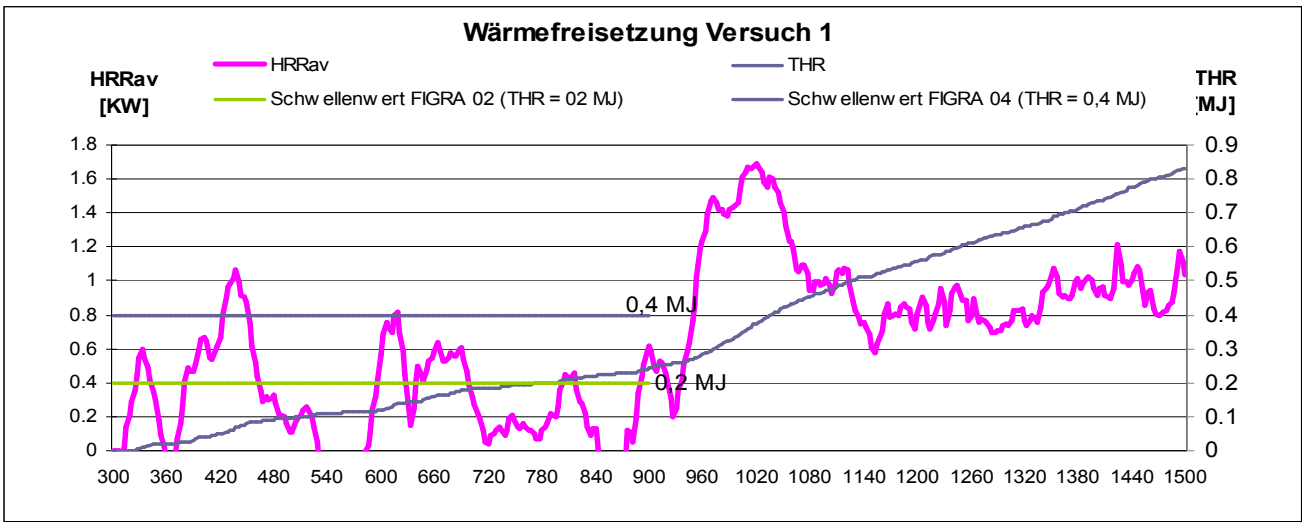
3.5 This test report is only used for issuing a classification report according to DIN EN 13501-1.

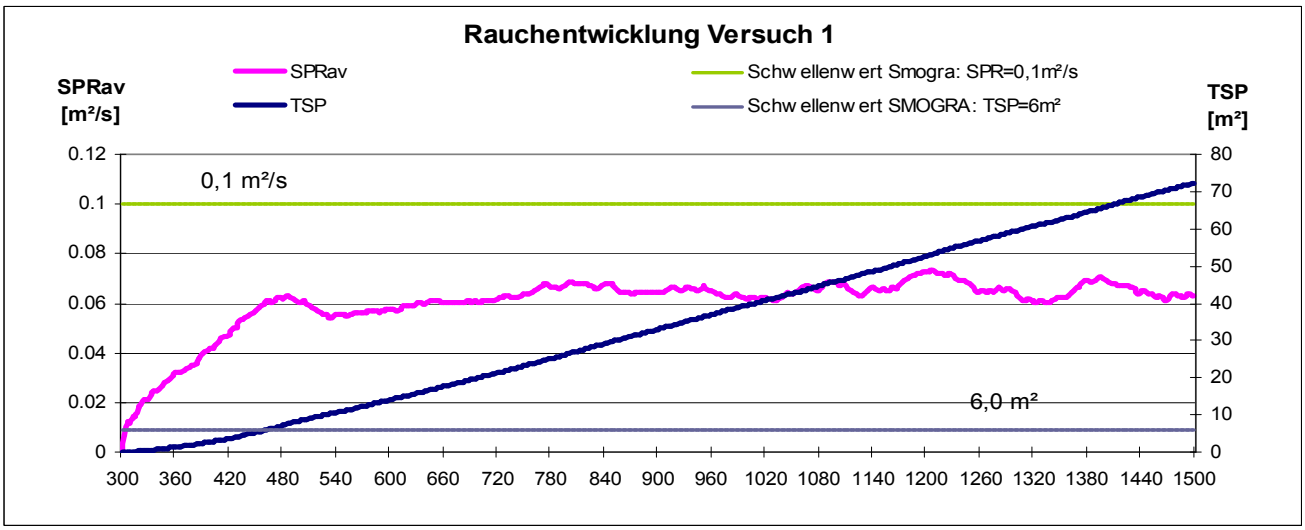
Frankfurt, the 26.11.2015

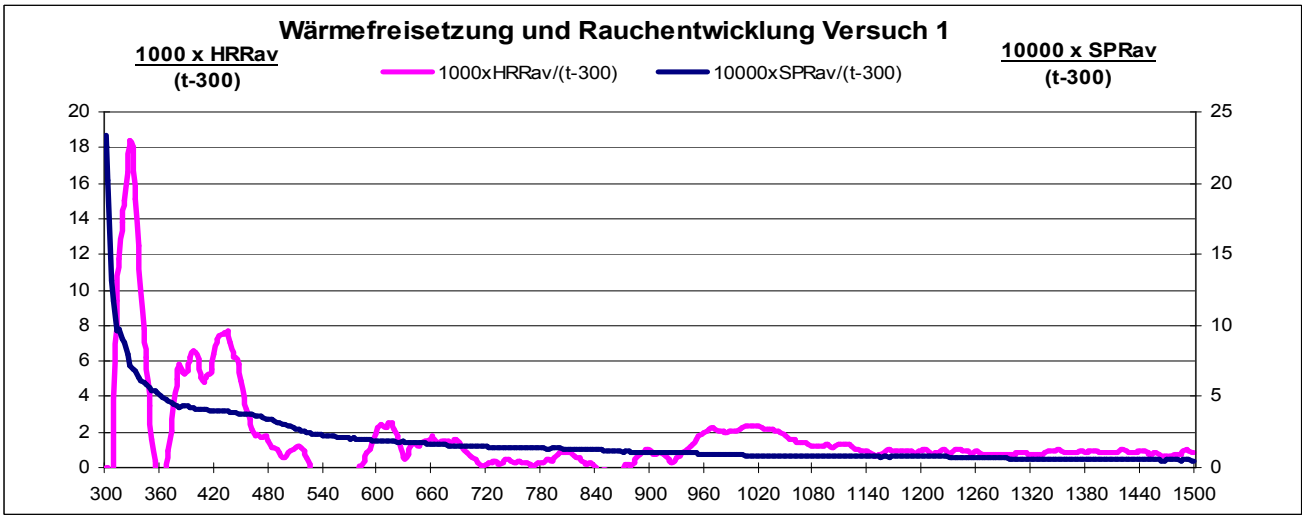
P. Scheinkönig
Tester in charge

Dipl.-Ing. T. Zachäus
Leiter der Exova Warringtonfire, Frankfurt

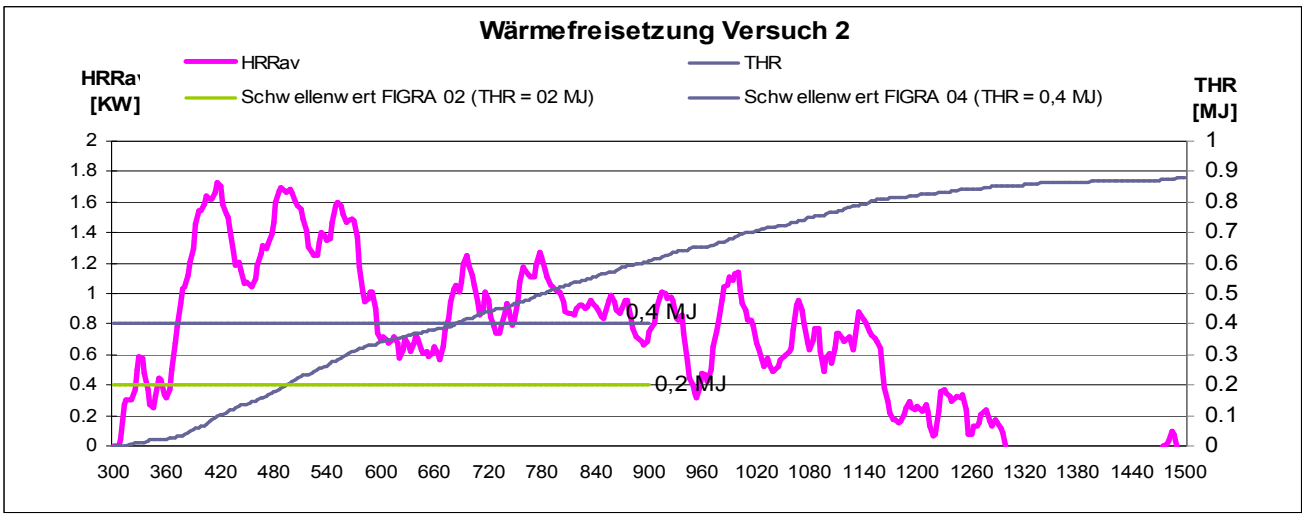
Diagrams according to DIN EN 13823 (SBI) : Test 1

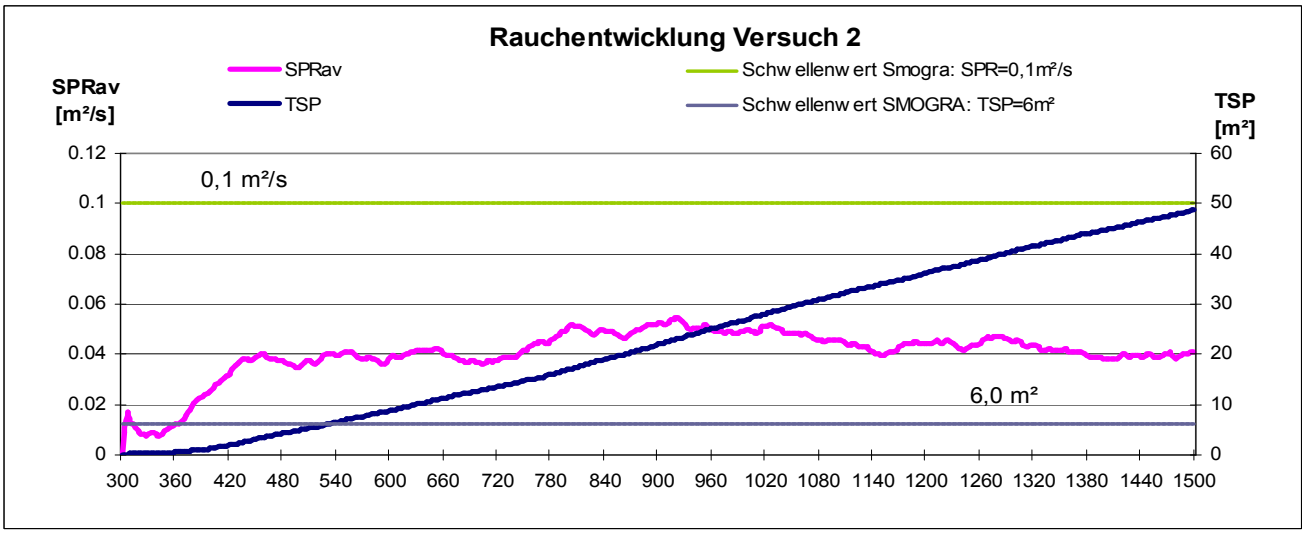


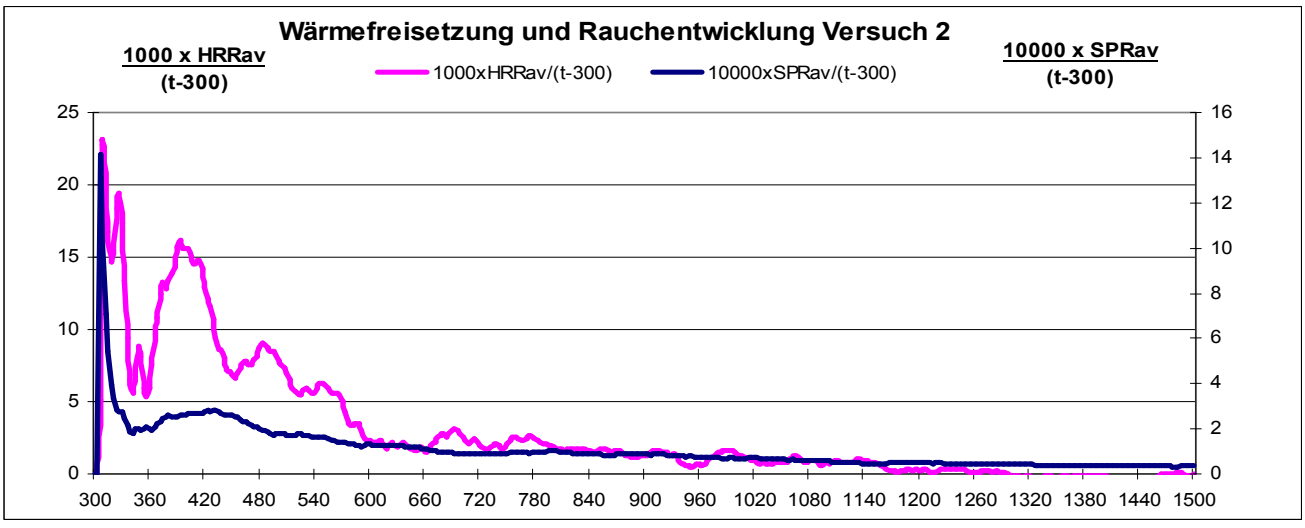




Diagrams according to DIN EN 13823 (SBI) : Test 2







Diagrams according to DIN EN 13823 (SBI) : Test 3