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Accred. No. 1002
Testing
ISO/IEC 17025

ByggForm A/S
Eternitveien 8
NO-3470 Slemmestad
Norge

Heat of combustion according to EN-ISO 1716

Product Description

Product	Thickness, mm	Area weight, kg/m^2	Density, kg/m^3	Colour
Fibersementplate BF	6	9.0	1500	Grey
Moxi board	6	-	1200	White-grey

Manufacturer

ByggForm A/S, Slemmestad, Norway.

Purpose of test

Basis for technical fire classification.

Conditioning

Temperature (23 ±2) °C
Relative humidity (50 ± 5) %
Time 2 weeks

Sampling

The samples were delivered by the client. It is not known to SP Chemistry, Materials and Surfaces if the products received are representative of the mean production characteristics.

Fibersementplatte BF was received October 8, 2015 at SP, Fire Research.
Moxi board was received November 6, 2015 at SP, Fire Research.

Water equivalent E

Calorimetric bomb	Water equivalent E (MJ/K)
1	10.918
2	10.925

Date of test

Fibersementplatte BF -November 4, 2015.
Moxi board –December 2, 2015.

Test results – EN ISO 1716:2010

Product	Area weight kg/m^2	Gross heat of combustion at constant volume MJ/kg			**PCS** Average value MJ/kg
		Test 1	Test 2	Test 3	
Fibersementplate BF	9.0	1.46	1.44	1.46	**1.46**
Moxi booard	-	1.06	1.12	1.08	**1.08**

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use

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Non-combustibility according to EN ISO 1182

(3 appendices)

Introduction

SP has by request of ByggForm AS performed fire tests according to EN ISO 1182. The purpose of the test is to form a basis for technical fire classification.

Product

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Fibersementplate BF	Silica sand Cement Wood pulp	6	9.0	1500	Grey
Moxi board	Magnesium oxide Magnesium chloride Perlite	6	-	1200	White-grey

Manufacturer

Byggform AS, Slemmestad, Norway.

Sampling

The samples were delivered by the client. It is not known to SP Fire Research if the products received are representative of the mean production characteristics.

The samples were received October 8 and November 6, 2015 at SP Fire Research.

Test results

The test results are given in appendix 1 - 2.

The test results relate only to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

Note

The accreditation referred to is valid for EN ISO 1182.

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Fire Research - Fire Dynamics

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Appendices

1. Test results – "Fibersementplate BF"
2. Test results – "Moxi board"
3. Calibration results according to EN ISO 1182:2010

Test results – EN ISO 1182:2010

Product

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Fibersementplate BF	Silica sand Cement Wood pulp	6	9.0	1500	Grey

Test results

The table below shows the maximum temperature rise relative to the final temperature recorded by the furnace thermocouple, duration of sustained flaming and mass loss.

Test specimen No.	Max. temperature rise Furnace (°C)	Duration of sustained flaming (s)	Mass loss (%)
1	32	0	19.7
2	51	15	19.4
3	29	0	20.3
4	51	0	19.5
5	51	11	19.7
Average	43	5.2	19.7

Measured data

Thickness 6.4 – 7.3 mm.

Density 1180 – 1270 kg/m^3.

Conditioning

Temperature (60 ± 5) °C.

Time (20 – 24) h.

Date of test

November 18 – 19, 2015.

Appendix 2

Test results – EN ISO 1182:2010

Product

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Moxi board	Magnesium oxide Magnesium chloride Perlite	6	-	1200	White-grey

Test results

The table below shows the maximum temperature rise relative to the final temperature recorded by the furnace thermocouple, duration of sustained flaming and mass loss.

Test specimen No.	Max. temperature rise Furnace (°C)	Duration of sustained flaming (s)	Mass loss (%)
1	5	0	47.2
2	7	0	46.4
3	8	0	46.7
4	11	0	46.4
5	11	0	47.0
Average	8	0	46.7

Measured data

Thickness 6.0 – 6.8 mm.

Density 1070 – 1150 kg/m^3.

Conditioning

Temperature (60 ± 5) °C.

Time (20 – 24) h.

Date of test

November 17 – 18, 2015.

Appendix 3

Calibration results according to EN ISO 1182:2010

Calibration of furnace wall temperature according to EN ISO 1182:2010 part 7.3.1

The average deviation of the temperature on the three vertical axes from the average furnace wall temperature $T_{avg.dev.axis}$ shall be less than 0.5 %.

SP, $T_{avg.dev.axis}$ = 0.1 %.

The average deviation of the temperature on the three levels from the average furnace wall temperature $T_{avg.dev.level}$ shall be less than 1.5 %.

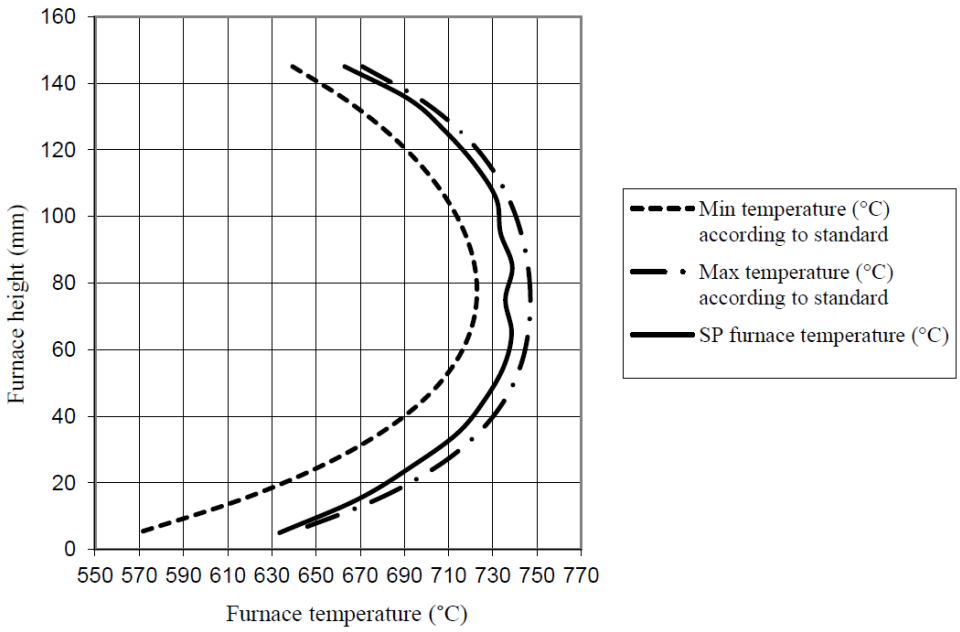
SP, $T_{avg.dev.level}$ = 0.1 %.

The average wall temperature at level (+30 mm) $T_{avg.level\ a}$ is less than the average wall temperature at level (-30 mm), $T_{avg.level\ c}$.

SP, $T_{avg.level\ a}$ = 835 °C.

SP, $T_{avg.level\ c}$ = 837 °C.

Calibration of furnace temperature according to EN ISO 1182:2010 part 7.3.2



Furnace temperature profile along its axis measured with Thermal sensor.

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Fire test according to EN 13823 (SBI Method)

(3 appendices)

Introduction

SP has by request of ByggForm AS performed a fire test according to EN 13823:2010+A1:2014 (SBI method). The purpose of the test is to form a basis for technical fire classification.

Product

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Fibersementplate BF	Silica sand Cement Wood pulp	6	9.0	1500	Grey

Manufacturer

ByggForm AB. Slemmestad, Norway.

Sampling

The sample was delivered by the client. It is not known to SP Fire Research if the product received is representative of the mean production characteristics.

The sample was received January 18, 2016 at SP Fire Research.

Test results

The test results are given in appendix 1 and photographs are shown in appendix 2. An explanation of the SBI-test parameters is given in appendix 3.

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire

Note

The accreditation referred to is valid for EN 13823.

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Appendices

1 Test results, EN 13823

2 Photographs

3 Test parameter explanation, EN 13823

Test results, EN 13823:2010+A1:2014

Product

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Fibersementplate BF	Silica sand Cement Wood pulp	6	9.0	1500	Grey

Mounting

See photo 1 – 2, appendix 2.

The product was mounted according to EN 13823:2010+A1:2014, 5.2.2 c and e. The product was tested with an air-gap of 40 mm to a wooden particle board. The product was mechanically fixed with screws, by means of wooden spacers, to the substrate. Both vertical and horizontal joint was used.

Note

The measured TSP of the plywood used as substrate is out of the range specified in EN 13238.

Test results

Test no	Test 1	Test 2	Test 3	Average
General information				
Test start, min:s	0:00	0:00	0:00	
Auxiliary burner ignited and adjusted, min:s	2:00	2:00	2:00	
Main burner ignited, min:s	5:00	5:00	5:00	
Main burner stopped, min:s	26:00	26:00	26:00	
Observations				
Flaming droplets or particles	No	No	No	
Burning droplets or particles, > 10 s	No	No	No	
Lateral flame spread until the edge, LFS	No	No	No	
Fire performance, see graph no 3 to 6				
$FIGRA_{0,2MJ}$, W/s	11	53	23	29
$FIGRA_{0,4MJ}$, W/s	11	53	23	29
$SMOGRA$, m^2/s^2	12	16	17	15
THR_{600s}, MJ	0.7	0.6	0.7	0.7
TSP_{600s}, m^2	17	26	24	22

Observations made during the tests

None.

Note

The accreditation referred to is valid for EN 13823.

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Appendices

1 Test results, EN 13823

2 Photographs

3 Test parameter explanation, EN 13823

Appendix 1

Test results, EN 13823:2010+A1:2014

Product

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Fibersementplate BF	Silica sand Cement Wood pulp	6	9.0	1500	Grey

Mounting

See photo 1 – 2, appendix 2.

The product was mounted according to EN 13823:2010+A1:2014, 5.2.2 c and e. The product was tested with an air-gap of 40 mm to a wooden particle board. The product was mechanically fixed with screws, by means of wooden spacers, to the substrate. Both vertical and horizontal joint was used.

Note

The measured TSP of the plywood used as substrate is out of the range specified in EN 13238.

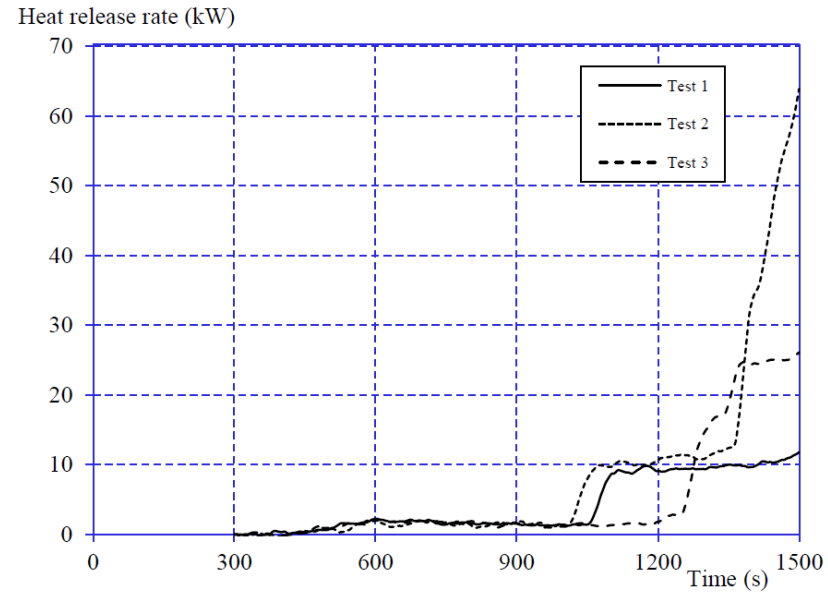
Test results

Test no	Test 1	Test 2	Test 3	Average
General information				
Test start, min:s	0:00	0:00	0:00	
Auxiliary burner ignited and adjusted, min:s	2:00	2:00	2:00	
Main burner ignited, min:s	5:00	5:00	5:00	
Main burner stopped, min:s	26:00	26:00	26:00	
Observations				
Flaming droplets or particles	No	No	No	
Burning droplets or particles, > 10 s	No	No	No	
Lateral flame spread until the edge, LFS	No	No	No	
Fire performance, see graph no 3 to 6				
$FIGRA_{0,2MJ}$, W/s	11	53	23	29
$FIGRA_{0,4MJ}$, W/s	11	53	23	29
$SMOGRA$, m^2/s^2	12	16	17	15
THR_{600s}, MJ	0.7	0.6	0.7	0.7
TSP_{600s}, m^2	17	26	24	22

Observations made during the tests

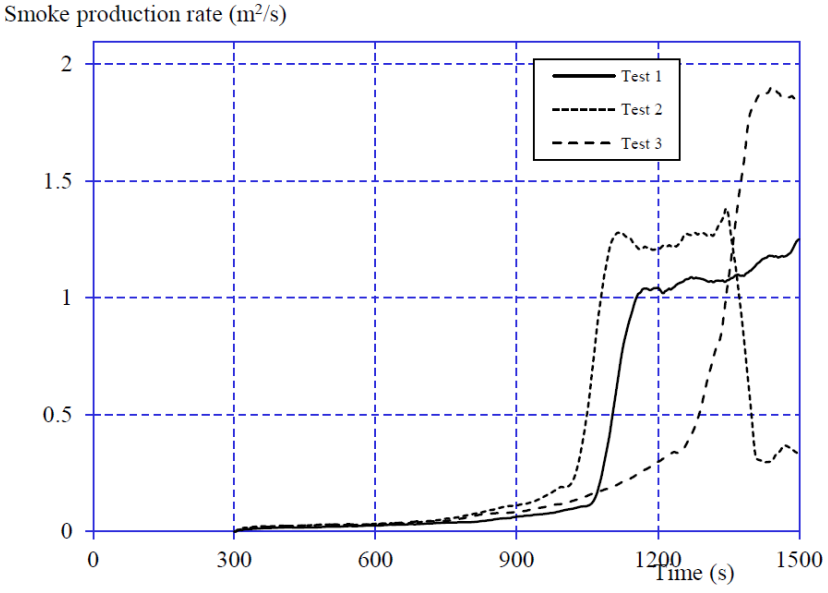
None.

Graph of heat release rate (HRR_{av})



Graph 1 Heat release rate (burner excluded), 30 seconds running average value.

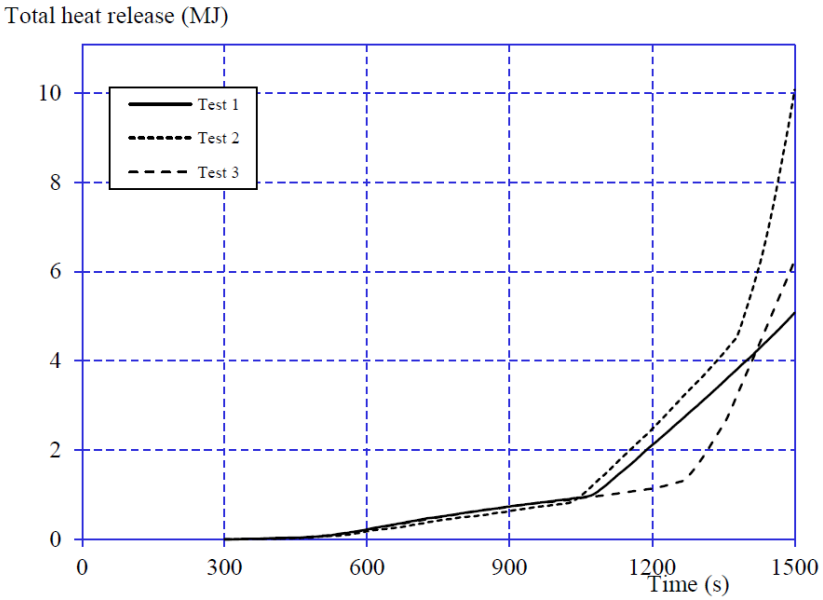
Graph of smoke production rate (SPR_{av})



Graph 2 Smoke production rate (burner excluded), 60 seconds running average value.

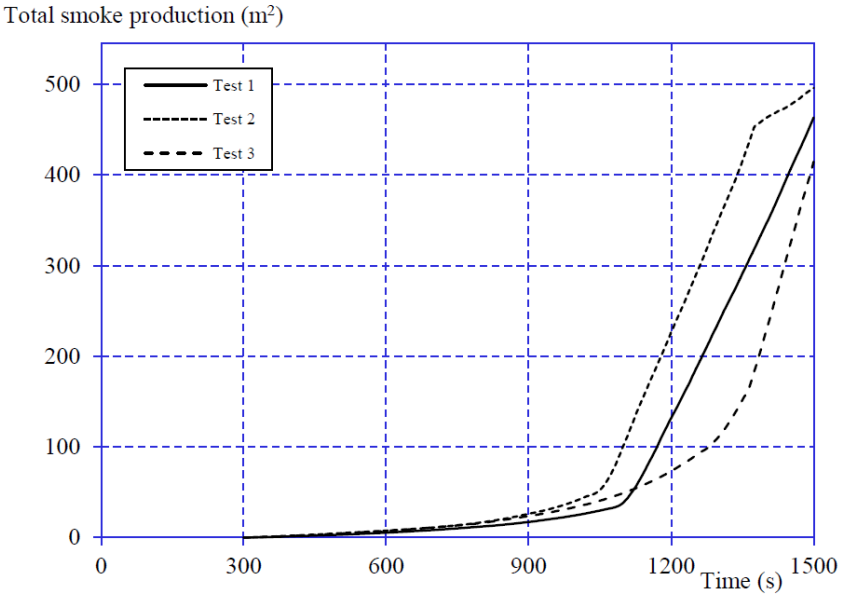
Appendix 1

Graph of total heat release (*THR*)



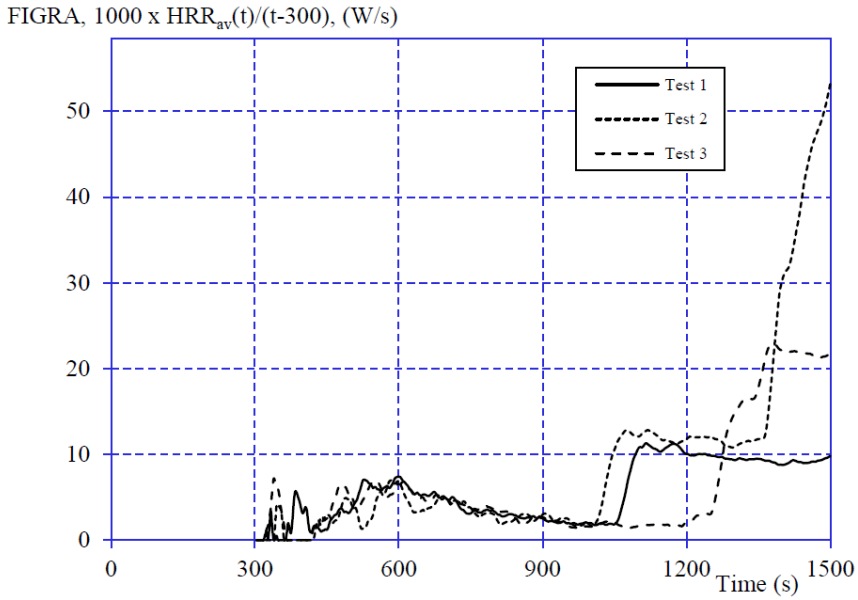
Graph 3 Total heat release (burner excluded).

Graph of total smoke production (*TSP*)



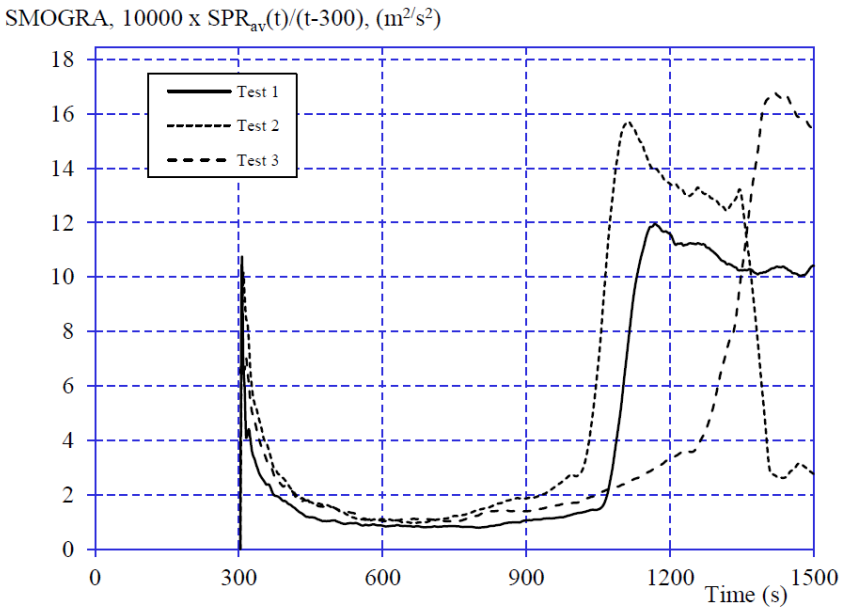
Graph 4 Total smoke production (burner excluded).

Graph of FIre Growth RAte index (*FIGRA*)



Graph 5 Fire growth rate index.

Graph of SMOke Growth RAte index (*SMOGRA*)



Graph 6 Smoke growth rate index.

Note

Graphs 5 and 6 show the time relationships of *FIGRA* and *SMOGRA* respectively without applying the threshold values, see EN 13823, paragraph A.5.3 and A.6.3. Therefore the reported single maximum values of $FIGRA_{0,2MJ}$, $FIGRA_{0,4MJ}$ and *SMOGRA* may be smaller than shown in the graphs as the threshold values are applied in this case.

Measured data

Thickness 6.4 mm approximately.

Area weight 8.8 kg/m^2 approximately.

Density 1370 kg/m^3 approximately.

Conditioning

According to EN 13238 and EN 13823:2010.

Temperature (23 ± 2) °C.

Relative humidity (50 ± 5) %.

Date of test

March 16, 2016.

Appendix 2

Photographs

Photo no 1 Prior to test "Fibersementplate BF"

The exposed surface of the long wing.

Appendix 2

Photo no 2 Prior to test "Fibersementplate BF"

The vertical outer edge of the long wing at a height of 500 mm above the floor of the trolley.

Appendix 2

Photo no 3 After test "Fibersementplate BF"

Impact of flames in the burner corner.

Appendix 3

Test parameter explanation – EN 13823:2010+A1:2014 (SBI method)

Parameter	Explanation
Test start	Start of data collection.
End of test	26:00 (min:s) after test start.
HRR_{av}, maximum, kW	Peak Heat Release Rate of material between ignition of the main burner and end of test (burner heat output excluded), as a 30 seconds running average value.
SPR_{av}, maximum, m^2/s	Peak Smoke Production Rate of material between ignition of the main burner and end of test (burner heat output excluded), as a 60 seconds running average value.
$FIGRA_{0,2MJ}$, W/s	FIre Growth RAte index is defined as the maximum of the quotient $HRR_{av}(t)/(t-300s)$, multiplied by 1000. During 300 s ≤ t ≤ 1500 s, threshold value 3 kW and 0.2 MJ.
$FIGRA_{0,4MJ}$, W/s	FIre Growth RAte index is defined as the maximum of the quotient $HRR_{av}(t)/(t-300s)$, multiplied by 1000. During 300 s ≤ t ≤ 1500 s, threshold value 3 kW and 0.4 MJ.
$SMOGRA$, m^2/s^2	SMOke Growth RAte index is defined as the maximum of the quotient $SPR_{av}(t)/(t-300s)$, multiplied by 10 000. During 300 s ≤ t ≤ 1500 s, threshold value 0.1 m^2/s and 6 m^2.
THR_{600s}, MJ	Total heat release of the sample during 300 s ≤ t ≤ 900 s.
TSP_{600s}, m^2	Total smoke production of the sample during 300 s ≤ t ≤ 900 s.

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Reaction to fire classification report

1 Introduction

This classification report defines the classification assigned to the product "Fibersementplate BF" in accordance with the procedure given in EN 13501-1:2007+A1:2009.

2 Details of classified product

2.1 General

The product "Fibersementplate BF" is defined as a non-combustible board.

2.2 Product description

The product, "Fibersementplate BF", is fully described below

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Fibersementplate BF	Silica sand Cement Wood pulp	6	9.0	1500	Grey

3 Test reports

3.1 Test reports

This classification is based on the test reports listed below:

Name of laboratory	Name of sponsor	Test report ref no	Accredited test method
SP	Byggform AS	5P07788	EN ISO 1182
SP	Byggform AS	5P07788-3	EN 13823

3.2 Test results

Test method	Parameter	Number of tests	Results	
			Continuous parameter mean (m)	Compliance with parameters
EN ISO 1182		5		
	ΔT (°C)		42.8	Compliant
	Δm (%)		19.7	Compliant
	T_f (s)		5.2	Compliant
EN 13823		3		
	$FIGRA_{0,2MJ}$ (W/s)		29	Compliant
	$FIGRA_{0,4MJ}$ (W/s)		29	Compliant
	$LFS <$ edge		(-)	Compliant
	THR_{600s}, (MJ)		0.7	Compliant
	$SMOGRA$, (m^2/s^2)		15	Compliant
	TSP_{600s}, (m^2)		22	Compliant
	Flaming droplets/particles		(-)	No flaming droplets/particles

4 Classification and field of application

4.1 Reference and direct field of application

This classification has been carried out in accordance with clause 11 and 15 of EN 13501-1:2007+A1:2009.

4.2 Classification

The product called “Fibersementplate BF” in relation to its reaction to fire behaviour is classified:

A2

The format of the reaction to fire classification for construction products excluding floorings and linear pipe thermal insulation product is:

Fire Behaviour		Smoke Production			Flaming Droplets	
A2	**-**	**s**	**1**	**,**	**d**	**0**,

Reaction to fire classification: *A2-s1,d0*

4.3 Field of application:

This classification is valid for the following product parameters:

Nominal thickness: 6 mm.

Nominal density: 1500 kg/m^3

This classification is valid for the following end use conditions:

Substrates

- Wood based substrates at least 10 mm thick and any end use substrate of Euroclasses A1 or A2-s1,d0 at least 9 mm thick, having a density ≥ 510 kg/m^3.

Fixings

- Mechanically fixed.

Joints

- Horizontal and vertical joints.

Void

- Mounted with airgap

The sample was delivered by the client. SP Fire Research was not involved in the sampling procedure.

5 Limitations

This classification document does not represent type approval or certification of the product.

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Non-combustibility according to EN ISO 1182

(2 appendices)

Introduction

SP has by request of ByggForm AS performed fire tests according to EN ISO 1182. The purpose of the test is to form a basis for technical fire classification.

Product

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Fibersementplate BF	Silica sand Cement Wood pulp	6	9.0	1500	Grey

Manufacturer

Byggform AS, Slemmestad, Norway.

Sampling

The sample was delivered by the client. It is not known to SP Fire Research if the product received is representative of the mean production characteristics.

The sample was received October 8 and November 6, 2015 at SP Fire Research.

Test results

The test results are given in appendix 1.

The test results relate only to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

Note

The accreditation referred to is valid for EN ISO 1182.

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Appendices

1. Test results – "Fibersementplate BF"
2. Calibration results according to EN ISO 1182:2010

Test results – EN ISO 1182:2010

Product

Product	Content	Thickness mm	Area weight kg/m^2	Density kg/m^3	Colour
Fibersementplate BF	Silica sand Cement Wood pulp	6	9.0	1500	Grey

Test results

The table below shows the maximum temperature rise relative to the final temperature recorded by the furnace thermocouple, duration of sustained flaming and mass loss.

Test specimen No.	Max. temperature rise Furnace (°C)	Duration of sustained flaming (s)	Mass loss (%)
1	32	0	19.7
2	51	15	19.4
3	29	0	20.3
4	51	0	19.5
5	51	11	19.7
Average	43	5.2	19.7

Measured data

Thickness 6.4 – 7.3 mm.

Density 1180 – 1270 kg/m^3.

Conditioning

Temperature (60 ± 5) °C.

Time (20 – 24) h.

Date of test

November 18 – 19, 2015.

Calibration results according to EN ISO 1182:2010

Calibration of furnace wall temperature according to EN ISO 1182:2010 part 7.3.1

The average deviation of the temperature on the three vertical axes from the average furnace wall temperature $T_{avg.dev.axis}$ shall be less than 0.5 %.

SP, $T_{avg.dev.axis}$ = 0.1 %.

The average deviation of the temperature on the three levels from the average furnace wall temperature $T_{avg.dev.level}$ shall be less than 1.5 %.

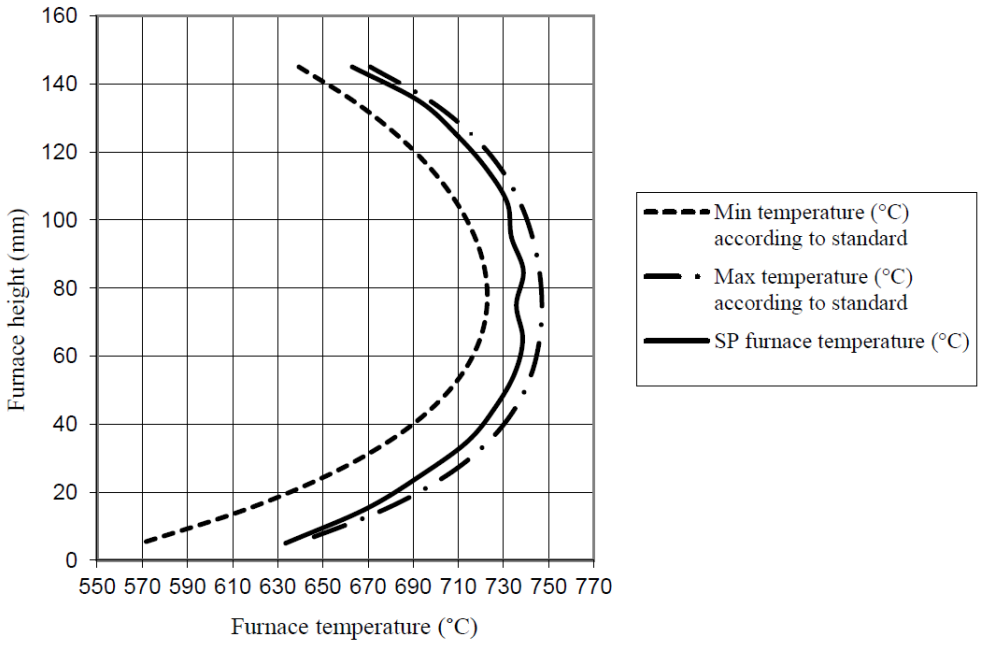
SP, $T_{avg.dev.level}$ = 0.1 %.

The average wall temperature at level (+30 mm) $T_{avg.level\ a}$ is less than the average wall temperature at level (-30 mm), $T_{avg.level\ c}$.

SP, $T_{avg.level\ a}$ = 835 °C.

SP, $T_{avg.level\ c}$ = 837 °C.

Calibration of furnace temperature according to EN ISO 1182:2010 part 7.3.2



Furnace temperature profile along its axis measured with Thermal sensor.