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SWEDAC ACKREDITERING 1002 ISO/IEC 17025

Alutile Norge AS
Fedjedalen 46
NO- 5534 Hangesund
Norge

Fire test according to EN 13823 (SBI Method) and EN ISO 11925-2

(5 appendices)

Introduction

SP has by request of Alutile Norge AS performed a fire test according to EN 13823:2010 (SBI method) and EN ISO 11925-2. The purpose of the test is as a basis for technical fire classification.

Product

According to the client:

Product called "ALUTILE Fire Resistance (FR) Panel" compounded with top and bottom layers of aluminium sheet, each with a nominal thickness of 0.4 mm. The core material is a compound of inorganic flame retardant and nanometer fire-resistance material made of Magnesium Hydrate and Aluminium Hydroxide. The thickness of the core material is 3.2 mm and has a density of 1600 kg/m^3. The nominal amount of inorganic flame retardants is 70 %, as measured in weight percentage. Both aluminium surfaces are coil coated with baking varnish type PVDF, nominal area weight 5 g/m^2.

The vertical joints are sealed with gaskets of PE with a nominal thickness of 0.35 mm and 60 mm wide. The horizontal joints are open or sealed with the same material.

The product as a whole has a nominal thickness of 4 mm.

Manufacturer

Jiangxi Hongtai Group Co, Jiangxi, China.

Sampling

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

The sample was received October 30, 2013 at SP Fire Technology.

Test results

The test results are given in appendix 1 – 3 and photographs are shown in appendix 4. An explanation of the SBI-test parameters is given in appendix 5.

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.

Note

The accreditation referred to is valid for EN 13823 and EN ISO 11925-2.

SP Technical Research Institute of Sweden
Fire Technology - Fire Dynamics

Performed by

Johan Post

Examined by

Per Thureson

Appendices

1 Test results, EN 13823

2 Test results, EN 13823

3 Test results, EN ISO 11925-2

4 Photographs

5 Test parameter explanation, EN 13823

Test results, EN 13823:2010

Product

According to the client:

Product called "ALUTILE Fire Resistance (FR) Panel" compounded with top and bottom layers of aluminium sheet, each with a nominal thickness of 0.4 mm. The core material is a compound of inorganic flame retardant and nanometer fire-resistance material made of Magnesium Hydrate and Aluminium Hydroxide. The thickness of the core material is 3.2 mm and has a density of 1600 kg/m^3. The nominal amount of inorganic flame retardants is 70 %, as measured in weight percentage. Both aluminium surfaces are coil coated with baking varnish type PVDF, nominal area weight 5 g/m^2.

The vertical and horizontal joints are sealed with gaskets of PE with a nominal thickness of 0.35 mm and 60 mm wide.

The product as a whole has a nominal thickness of 4 mm.

Mounting

See photo 1 – 2, appendix 4.

The product was mounted according to EN 13823:2010, 5.2.2 b and e. The panels were fixed mechanically to vertical and horizontal metal studs creating a cavity of 70 mm between the product and the substrate. A paper faced plaster board was used as a substrate. Both vertical and horizontal joints were used with a joint distance of 5 mm approximately.

The backing board was standing directly behind the plasterboard. The plasterboard fulfil the requirements given in EN 13238.

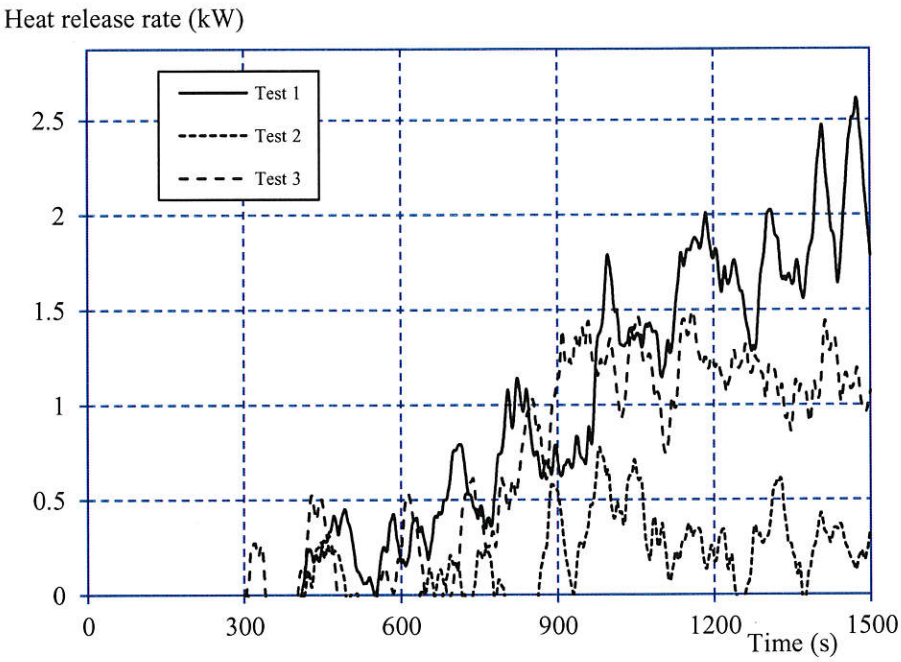
Test results

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	0	0	0	0
$FIGRA_{0,4MJ}$, W/s	0	0	0	0
$SMOGRA$, m^2/s^2	1.6	1.4	1.3	1.4
THR_{600s}, MJ	0.2	0.1	0.2	0.2
TSP_{600s}, m^2	26	29	23	26

Method of smoke calculation

The smoke production rate, SPR, of the burner was calculated using data from the auxiliary (secondary) burner.

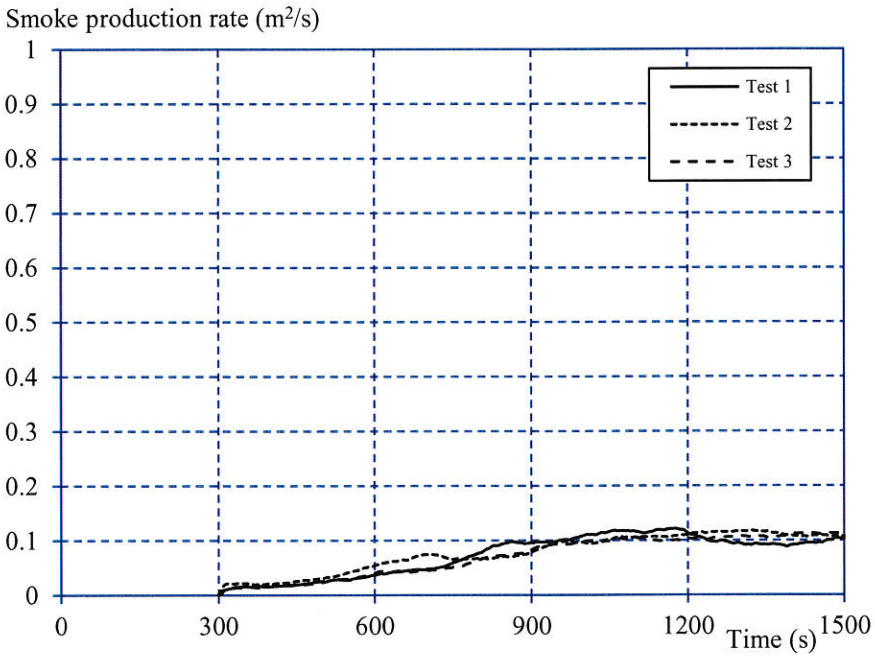
Graph of heat release rate (HRR_{av})



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

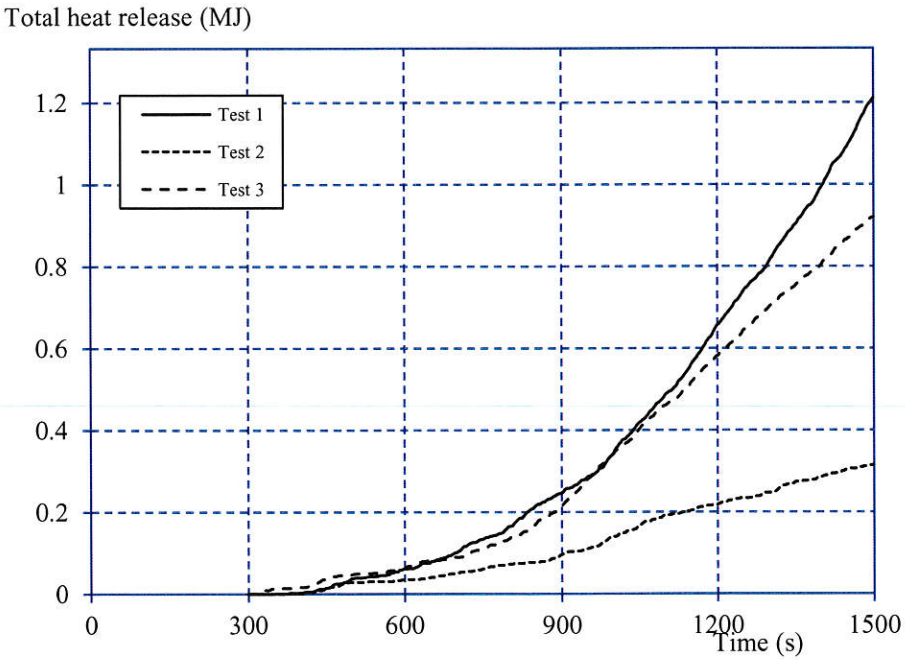
Appendix 1

Graph of smoke production rate (SPR_{av})



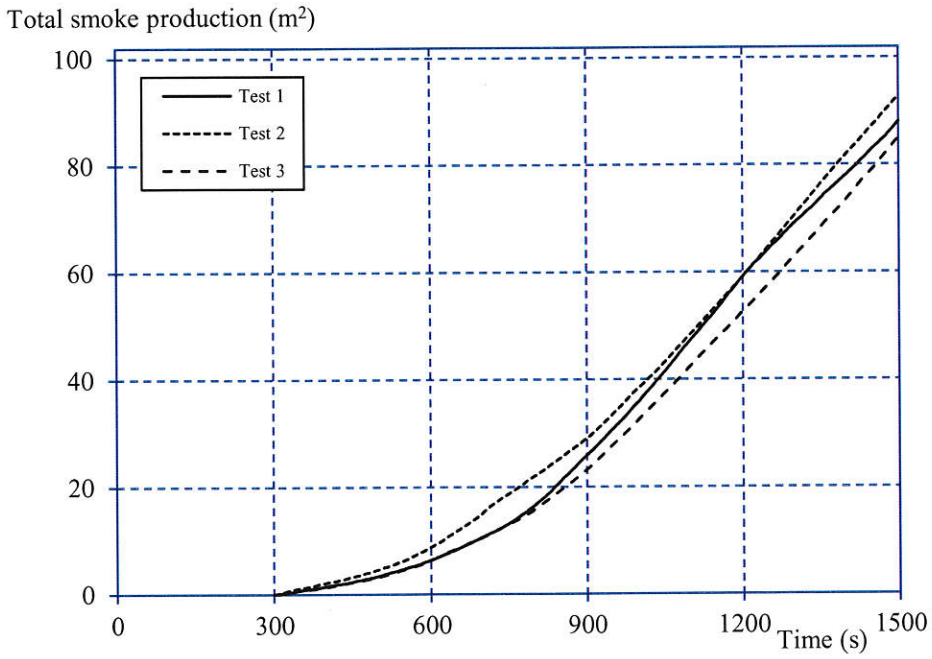
Graph 2 Smoke production rate (burner excluded), 60 seconds running average value.

Graph of total heat release (*THR*)



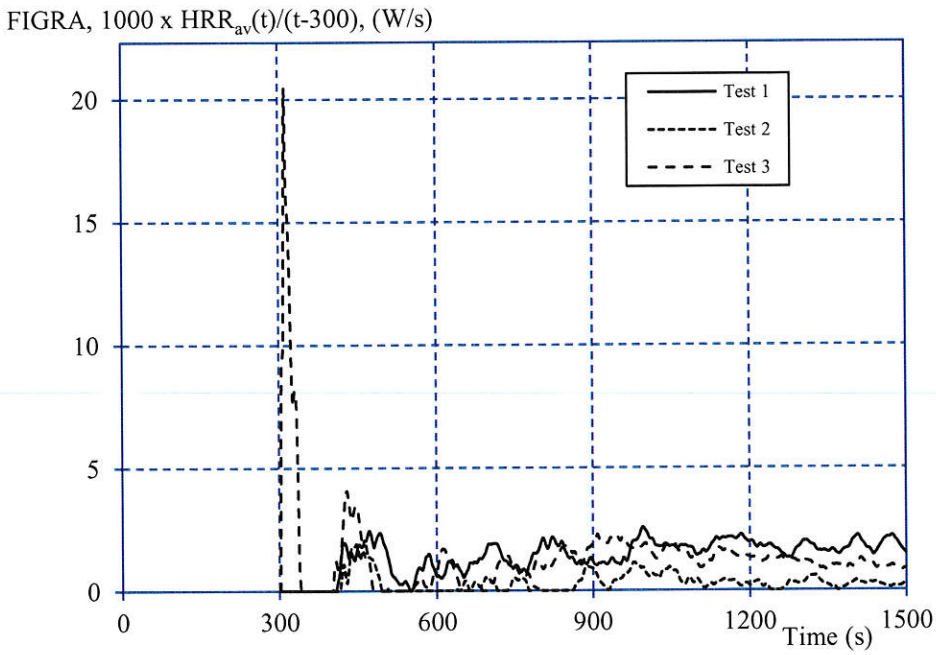
Graph 3 Total heat release (burner excluded).

Graph of total smoke production (*TSP*)



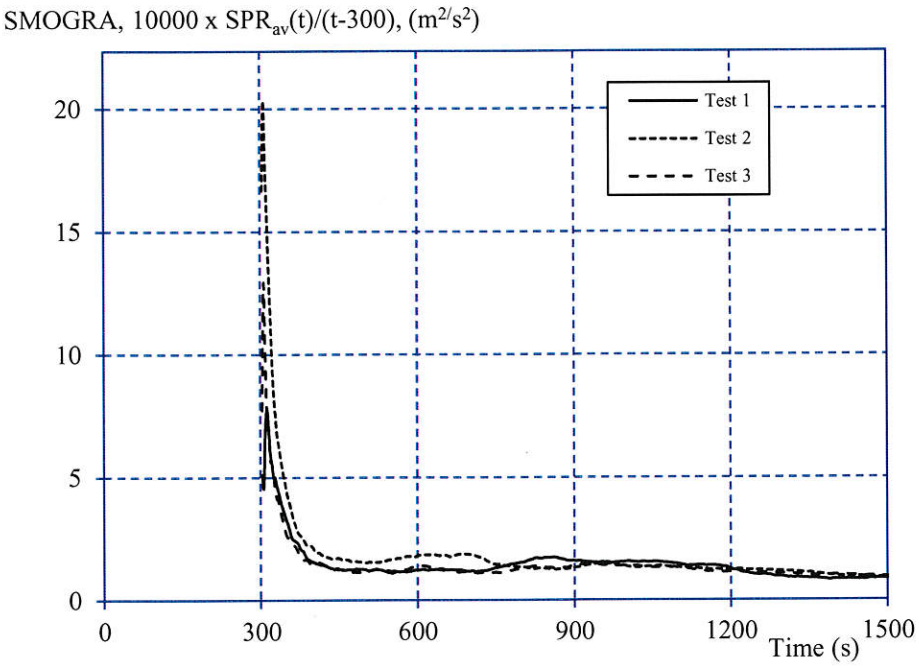
Graph 4 *Total smoke production (burner excluded).*

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

Measurements of the ALUTILE Fire Resistance (FR) Panel.

Thickness 5.1 – 5.2 mm.

Area weight 9.0 – 9.6 kg/m^2.

Measurements of the PE seal.

Thickness 0.30 – 0.33 mm.

Conditioning

According to EN 13238 and EN 13823:2010.
Temperature (23 ± 2) °C.
Relative humidity (50 ± 5) %.

Date of test

December 4, 2013.

Appendix 2

Test results, EN 13823:2010

Product

According to the client:

Product called "ALUTILE Fire Resistance (FR) Panel" compounded with top and bottom layers of aluminium sheet, each with a nominal thickness of 0.4 mm. The core material is a compound of inorganic flame retardant and nanometer fire-resistance material made of Magnesium Hydrate and Aluminium Hydroxide. The thickness of the core material is 3.2 mm and has a density of 1600 kg/m^3. The nominal amount of inorganic flame retardants is 70 %, as measured in weight percentage. Both aluminium surfaces are coil coated with baking varnish type PVDF, nominal area weight 5 g/m^2.

The vertical joints are sealed with gaskets of PE with a nominal thickness of 0.35 mm and 60 mm wide. The horizontal joints are open.

The product as a whole has a nominal thickness of 4 mm.

Mounting

See photo 1 – 2, appendix 4.

The product was mounted according to EN 13823:2010, 5.2.2 b and e. The panels were fixed mechanically to vertical and horizontal metal studs creating a cavity of 70 mm between the product and the substrate. A paper faced plaster board was used as a substrate. Both vertical and horizontal joints were used with a joint distance of 5 mm approximately.

The backing board was standing directly behind the plasterboard. The plasterboard fulfil the requirements given in EN 13238.

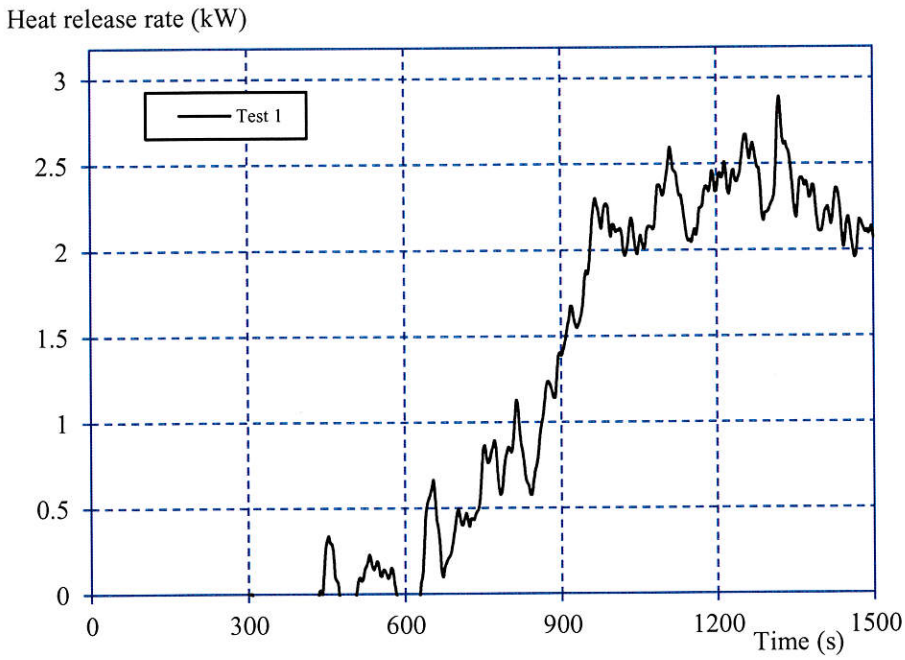
Test results

Test no	Test 1	Test 2	Test 3	Average
General information				
Test start, min:s	0:00	-	-	
Auxiliary burner ignited and adjusted, min:s	2:00	-	-	
Main burner ignited, min:s	5:00	-	-	
Main burner stopped, min:s	26:00	-	-	
Observations				
Flaming droplets or particles	No	-	-	
Burning droplets or particles, > 10 s	No	-	-	
Lateral flame spread until the edge, LFS	No	-	-	
Fire performance, see graph no 3 to 6				
$FIGRA_{0,2MJ}$, W/s	0	-	-	-
$FIGRA_{0,4MJ}$, W/s	0	-	-	-
$SMOGRA$, m^2/s^2	1.3	-	-	-
THR_{600s}, MJ	0.2	-	-	-
TSP_{600s}, m^2	23	-	-	-

Method of smoke calculation

The smoke production rate, SPR, of the burner was calculated using data from the auxiliary (secondary) burner.

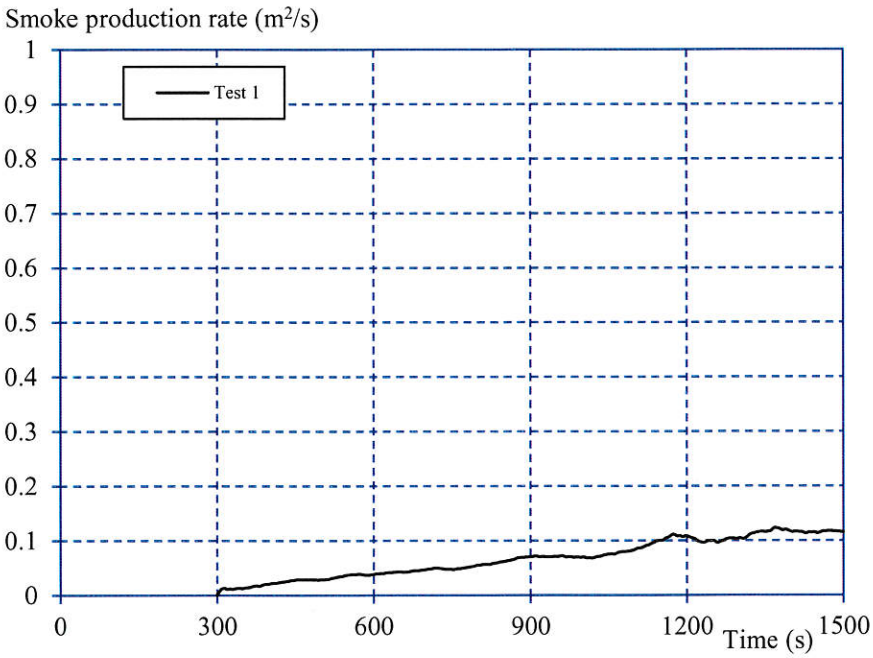
Graph of heat release rate (HRR_{av})



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

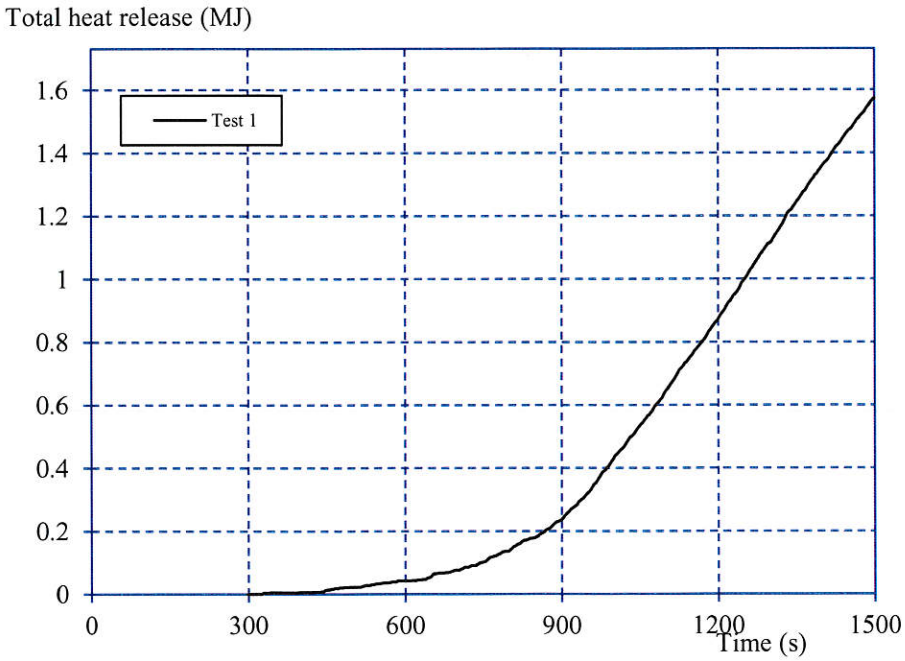
Appendix 2

Graph of smoke production rate (SPR_{av})



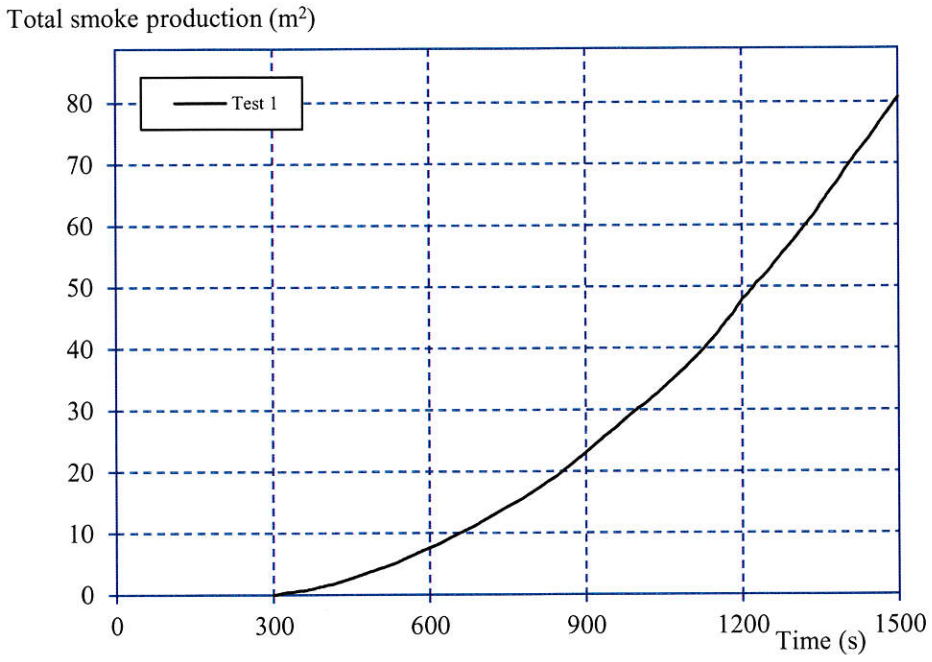
Graph 2 Smoke production rate (burner excluded), 60 seconds running average value.

Graph of total heat release (*THR*)



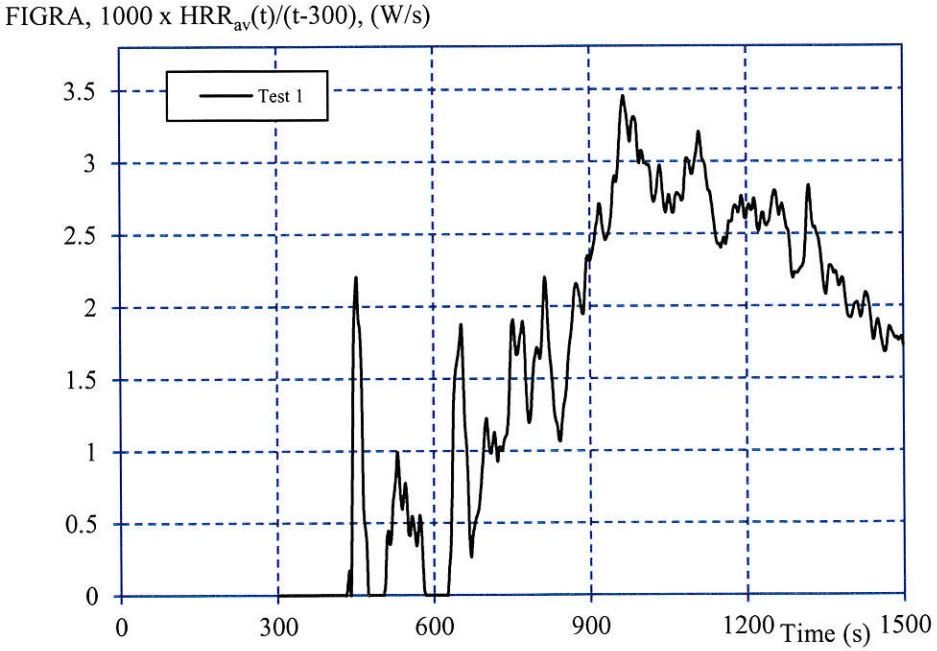
Graph 3 Total heat release (burner excluded).

Graph of total smoke production (*TSP*)



Graph 4 Total smoke production (burner excluded).

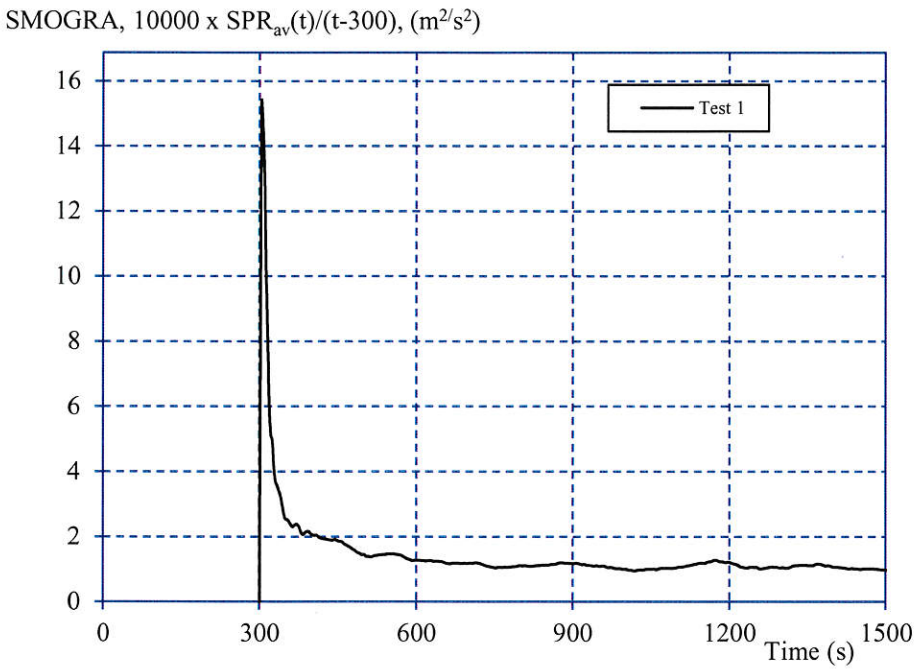
Graph of FIre Growth RAte index (*FIGRA*)



Graph 5 Fire growth rate index.

Appendix 2

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

Measurements of the ALUTILE Fire Resistance (FR) Panel.

Thickness 5.1 – 5.2 mm.

Area weight 9.0 – 9.6 kg/m^2.

Measurements of the PE seal.

Thickness 0.30 – 0.33 mm.

Conditioning

According to EN 13238 and EN 13823:2010.
Temperature (23 ± 2) °C.
Relative humidity (50 ± 5) %.

Date of test

December 4, 2013.

Appendix 3

Product

According to the client:

Product called "ALUTILE Fire Resistance (FR) Panel" compounded with top and bottom layers of aluminium sheet, each with a nominal thickness of 0.4 mm. The core material is a compound of inorganic flame retardant and nanometer fire-resistance material made of Magnesium Hydrate and Aluminium Hydroxide. The thickness of the core material is 3.2 mm and has a density of 1600 kg/m^3. The nominal amount of inorganic flame retardants is 70 %, as measured in weight percentage. Both aluminium surfaces are coil coated with baking varnish type PVDF, nominal area weight 5 g/m^2.

The product as a whole has a nominal thickness of 4 mm.

The product is tested at a joint which is sealed with a PE gasket, 60 mm wide and 0.35 mm thick.

Application

Edge exposure. Flame exposure time was 30 seconds.

Test results

Test no	1	2	3	4	5	6
Direction	↑	↑	↑	→	→	→
The sample ignited, s	NI	NI	NI	NI	NI	NI
The flames reach 150 mm, s	-	-	-	-	-	-
Burning droplets	No	No	No	No	No	No
Time when filter paper ignited, s	-	-	-	-	-	-

NI = No ignition.

Application

Surface exposure. Flame exposure time was 30 seconds.

Test results

Test no	1	2	3	4	5	6
Direction	↑	↑	↑	→	→	→
The sample ignited, s	NI	NI	NI	NI	NI	NI
The flames reach 150 mm, s	-	-	-	-	-	-
Burning droplets	No	No	No	No	No	No
Time when filter paper ignited, s	-	-	-	-	-	-

NI = No ignition.

Measured data

Measurements of the ALUTILE Fire Resistance (FR) Panel.

Thickness 5.1 – 5.2 mm.

Area weight 9.0 – 9.6 kg/m^2.

Measurements of the PE seal.

Thickness 0.30 – 0.33 mm.

Conditioning

According to EN 13238:2010.

Temperature (23 ± 2) °C.

Relative humidity (50 ± 5) %.

Date of test

December 12, 2013.

Appendix 4

Photo no 1 Prior to test "ALUTILE Fire Resistance (FR) Panel". Both vertical and horizontal rubber gaskets.

The exposed surface of the long wing.

Photo no 2 Prior to test "ALUTILE Fire Resistance (FR) Panel". Both vertical and horizontal rubber gaskets.

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

Appendix 4

Photo no 3 After test "ALUTILE Fire Resistance (FR) Panel". Both vertical and horizontal rubber gaskets.

Impact of flames in the burner corner.

Appendix 4

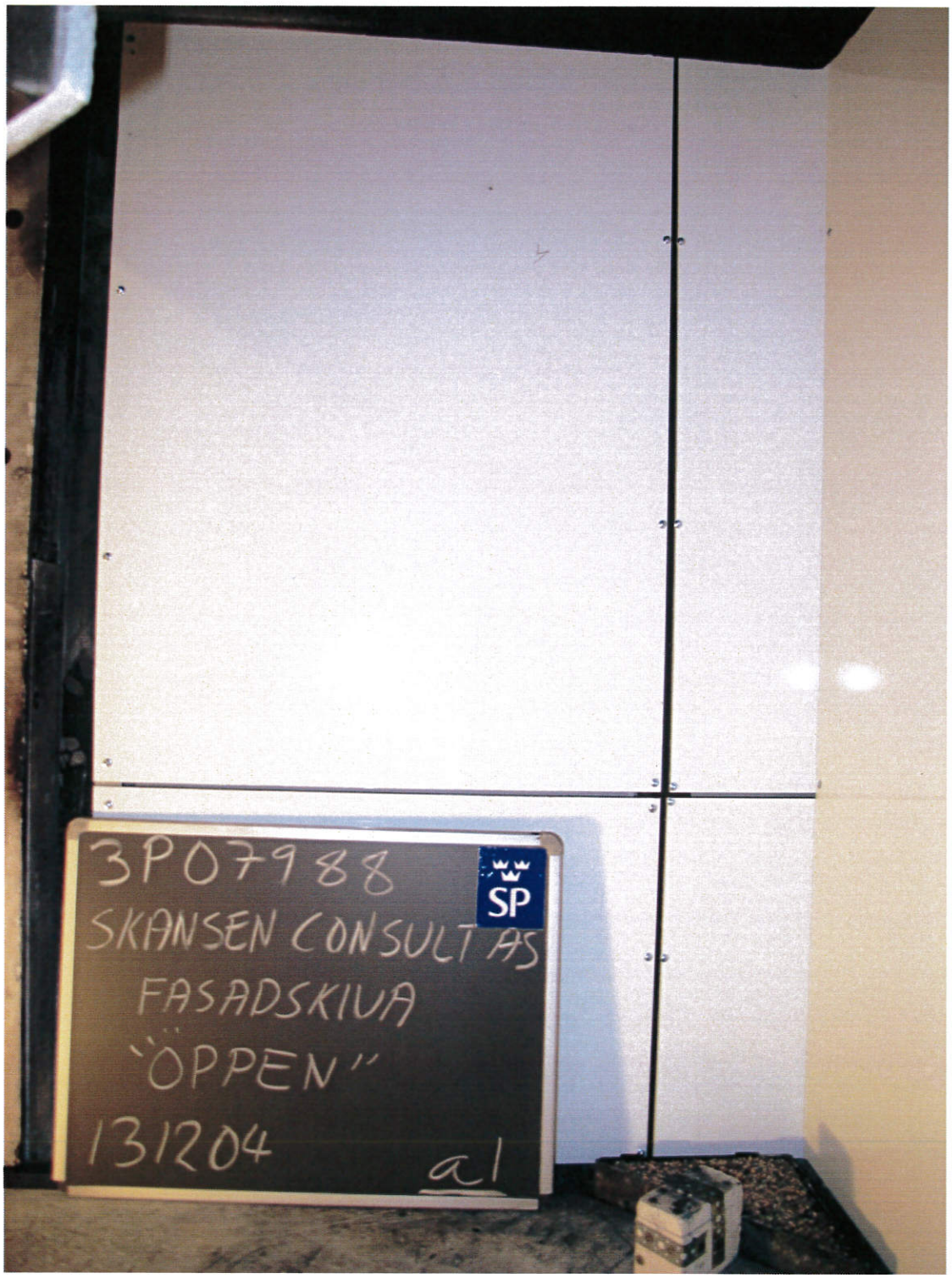


Photo no 1 Prior to test "ALUTILE Fire Resistance (FR) Panel" Vertical rubber gaskets.

The exposed surface of the long wing.

Appendix 4

Photo no 2 Prior to test "ALUTILE Fire Resistance (FR) Panel" Vertical rubber gaskets.

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

Appendix 4

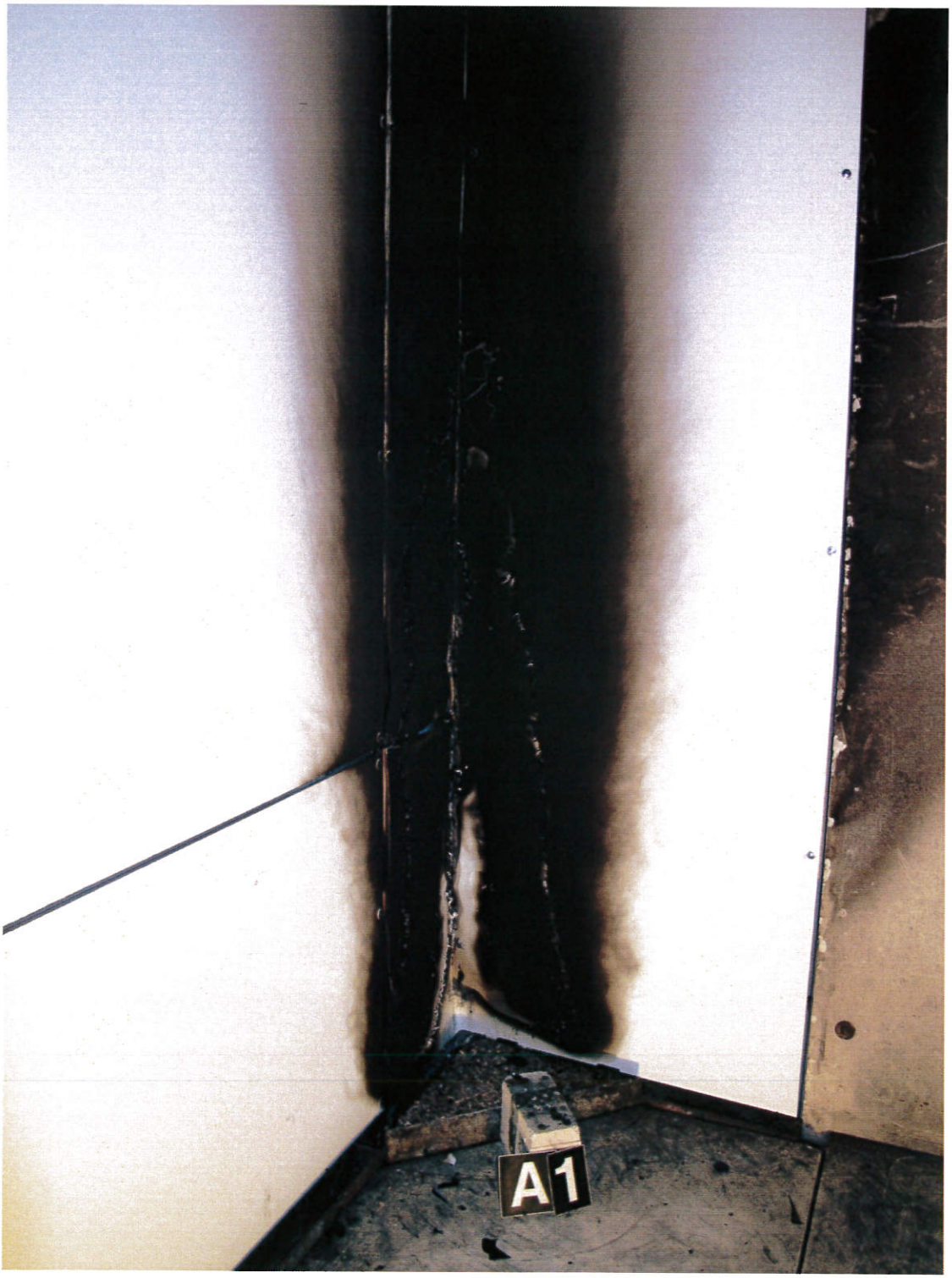


Photo no 3 After test "ALUTILE Fire Resistance (FR) Panel" Vertical rubber gaskets.

Impact of flames in the burner corner.

Appendix 5

Test parameter explanation – EN 13823:2010 (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.