



„MEŽA UN KOKSNES PRODUKTU PĒTNIECĪBAS UN ATTĪSTĪBAS INSTITŪTS” SIA
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Additional Test Report No.1559-1/A/2015

This report is additional to that issued as No. 1559-1/2015 and dated 18.09.2015. and the original report should remain valid and is not replaced by additional report.

Forest and Wood Products Research and Development Institute Testing Laboratory

Customer: JAPAN FACADES OÜ.

Address: Erika tn 2B-27, Harju maakond, 10416, Tallinn, Estonia.

Reg. No. 14492662.

Owner of the test report: JAPAN FACADES OÜ.

Date of the order: 04.09.2015.

Testing was done according contract No. 150-09/15 MU.

Test samples received: 04.09.2015.

Description of product (According to customer's information)

- Product name: Fiber-reinforced lightweight cement board KMEW.
- Manufacturer: KMEW Co., Ltd 13 F Crystal Tower, 1-2-27 Shiromi, Chuo-ku, Osaka 540-6013, Japan.
- Product nominal dimensions: 14 x 455 x 3030 mm.
- Product composition: Cement 40%, Siliceous material (crystalline silica) 55%, Pulp 3.3-3.5%, Polypropylene 0.50%, Expanded polyvinyl chloride and methylcellulose 0.80-1,00%.
- Nominal density: min 1000 kg/m³.
- Top layer paint: acrylic paint consumption 200-220 g/m².

Sampling:

Specimens were manufactured at April of 2015 and sampling was done by INTOPEX TRANSIT OÜ Lao 18, 74114 Maardu, Estonia at 04.09.2015. Specimens were taken from warehouse of ready production and delivered to laboratory by customer.

Application of building product (according to customer's information):

Product is intended to use as decorative facades for buildings. Product is identified by product standard EN 12467:2012.

Specimen preparation for testing:

Specimens were prepared for testing by laboratory at 07.09.2015. and 11.09.2015. according standard EN 12467:2012 requirements. Product was fixed on spruce wood frame with 40 mm cavity behind the product. Horizontal and vertical joints were made in specimen long wing. Steel nails were used for product fixing on wood frame. 50 mm thickness mineral wool of reaction to fire class A2 and density 70 kg/m³ were placed between frame and backing board. 8 mm joint width was made according standard requirements. No protection was used for vertical and horizontal joints.

Substrates used:

No additional substrates were used.

Conditioning of specimens:

Specimens were conditioned according to standard EN 13238:2010.

Conditioning method: constant mass.

Temperature: $t = 23 \pm 1^\circ\text{C}$.

Relative humidity: $\text{RH} = 50 \pm 5\%$.

Conditioning period: 5 days.

Test standard: EN 13823:2010.

Test dates: 11.09.2015 and 16.09.2015.

Test results:

Test results are given in the annex 1 and test protocols in the annexes 2 to 4.

According to EN 13823:2010 test results relate to the behaviour of 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.

Annexes:

Annex 1 (Test results, 2 pp.)

Annex 2 (SBI test protocol No. 1559-1-1, 3 pp.)

Annex 3 (SBI test protocol No. 1559-1-2, 3 pp.)

Annex 4 (SBI test protocol No. 1559-1-3, 3 pp.)

Annex 5 (test parameter explanation, 1 pp.)

Date of issue: 17.06.2019.



Head of the laboratory

K.Būmanis

(signature and name)

Tests carried out by

E.Bukšāns

(signature and name)

TEST RESULTS

Test specimens

- Fiber-reinforced lightweight cement board.
- Measured thickness: 14 mm.
- Number of test specimens and identification: 3 specimens were prepared, specimen identification in laboratory - No 1559-1-1 to 1559-1-3.

Mounting:

Specimens were mounted in SBI trolley in accordance with standard EN 13823:2010+A1:2014 paragraph 5.2.2 a. There was 40 mm ventilated air gap between the specimen and mineral wool substrate, see Fig. 1 Calcium silicate backing board were placed behind substrate. Backing board complies with standard EN 13238:2010 requirements.

Test result summary

All tests were done without technical failure. Data from specimens No. 1559-1-1; 1559-1-2 and 1559-1-3 were used for data statistical analyse. Test result summary is shown in table and graphs are shown in test protocols in annexes 2-4.

Specimen No.	1559-1-1	1559-1-2	1559-1-3	Average	Standard deviation	Standard error
General information						
Test start, min:s	0:00	0:00	0:00	-	-	-
Auxiliary burner ignited, min:s	2:00	2:00	2:00	-	-	-
Main burner ignited, min:s	5:03	5:03	5:03	-	-	-
Main burner stopped, min:s	26:00	26:00	26:00	-	-	-
Observations						
Ignition of specimen	no	no	no	-	-	-
Burning droplets, particles, <10s; min:s	no	no	no	-	-	-
Burning droplets, particles, >10s; min:s	no	no	no	-	-	-
Lateral flame spread, LFS; min:s	no	no	no	-	-	-
Falling specimen parts, min:s	no	no	no	-	-	-
Fire performance,						
FIGRA _{0,2MJ} , W/s	Threshold not reached	8.4	23.7	16.1	10.8	7.7
FIGRA _{0,4MJ} , W/s	Threshold not reached	8.4	23.7	16.1	10.8	7.7
THR _{600s} , MJ	0.8	1.2	0.7	0.9	0.3	0.2
SMOGRA, cm ² /s ²	Threshold not reached	2	1.9	2.0	0.1	0.1
Time of maximal smoke growth rate (SMOGRA), s	-	1452	1197	1325	180	128
TSP _{600s} , m ²	27.9	25.6	30.9	28.1	2.7	1.5

Observations during the test

Flaming droplets were not observed during all tests. There were no lateral flame spread nor specimen collapse during all tests, see Fig. 2. Ignition of fiber-reinforced lightweight cement board was not observed. Ignition of wood frame behind panel occurred during tests of specimens No 1559-1-2 and 1559-1-3 at 1300 s and 1150 s from beginning of the test.

Deviations from standard:

No.

Photo:



Fig. 1 Specimen mounting in SBI.

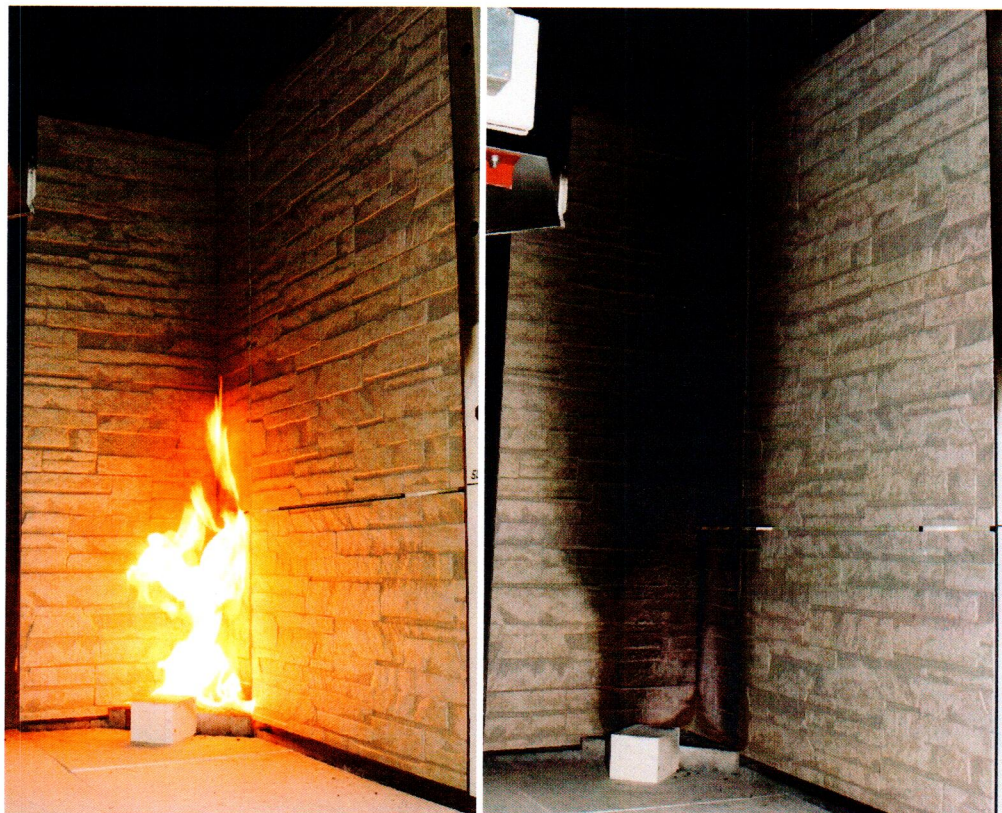


Fig. 2 Specimen No 1559-1-1 during and after the test.

SBI Test Report

Laboratory name MeKA Testing Laboratory
 Operator Edgars Buksans
 Filename C:\SBICALC\Data\1559\1559-1-1.csv
 Report identification 1559-1-1
 Product identification fibre reinforced lightweight cement board KMEW

Test		Pre-test conditions	Specimen conditioning
Standard used	EN 13823:2010	Baseline duct temperature 295.95 K	Method Constant mass
Date of test	11/09/2015	Ambient temperature 295.26 K	Time interval 24 hours
Date of report	11/09/2015	Ambient pressure 104.6 kPa	Mass 1 12931 g
E'	17.2 MJ/m ³	Relative humidity 43%	Mass 2 12926 g
Apparatus specifications		Baseline conditions	Temperature 23°C
kt	0.87	Baseline ambient oxygen 20.710%	RH 50%
kp	1.08	Baseline oxygen 20.950%	
Duct diameter	0.315 m	Baseline carbon dioxide 0.0199%	
O2 calibration delay time	10 s	Baseline smoke 99.95%	
CO2 calibration delay time	10 s		

Specimen information

Thickness	14 mm	Mounting method	5.2.2 a) in EN 13823:2010
Density	1000 kg/m ³	Joints	standard vetrical and horizontal
Surface mass/area		Fixed to substrate?	Yes
Specimen number	1	Fixing method	none
Date of arrival	04/09/2015	Substrate	wood frame mineralwool
		Manufacturer	
		Sponsor	Construction and Distribution Europe OU

Test validity criteria

Test drifts

	Initial	Final	Change
Oxygen	20.950%	20.946%	0.004%
CO2	0.020%	0.021%	0.001%
Smoke	99.95%	99.67%	0.003

Exposure time 1254 s

Synchronisation details

Duct temp. dropped by 2.5 K from baseline of 317.95 K at 303 s
 Oxygen rose by 0.05% from baseline of 20.685% at 303 s
 CO2 dropped by 0.02% from baseline of 0.134% at 306 s

Burner details

Burner HRR	30.341 kW
Burner HRR std. dev.	0.755 kW
Burner CO2/O2 ratio	0.428
Burner SPR	0.031 m ² /s
Burner SPR std. dev.	0.005 m ² /s
Burner response time (s)	12 s

Other checks

Minimum duct flow	0.558 m ³ /s
Maximum duct flow	0.639 m ³ /s
No T/C failure	

Classification results

FIGRA(0.2)	threshold not reached
FIGRA(0.4)	threshold not reached
THR(600)	0.8 MJ
SMOGRA	threshold not reached
TSP(600)	27.9 m ²

Classification observations

LFS to edge?	No
FDP flaming <= 10s?	No
FDP flaming > 10s?	No

Potential classification

Class	A2/B
Smoke production	s1
Flaming droplets/particles	d0

Recorded events

Surface flashes? No; Falling specimen parts? No; Smoke not entering hood? No
 Mutual fixing of backing board failed? No; Distortion/collapse of specimen? No

Pre-test comments

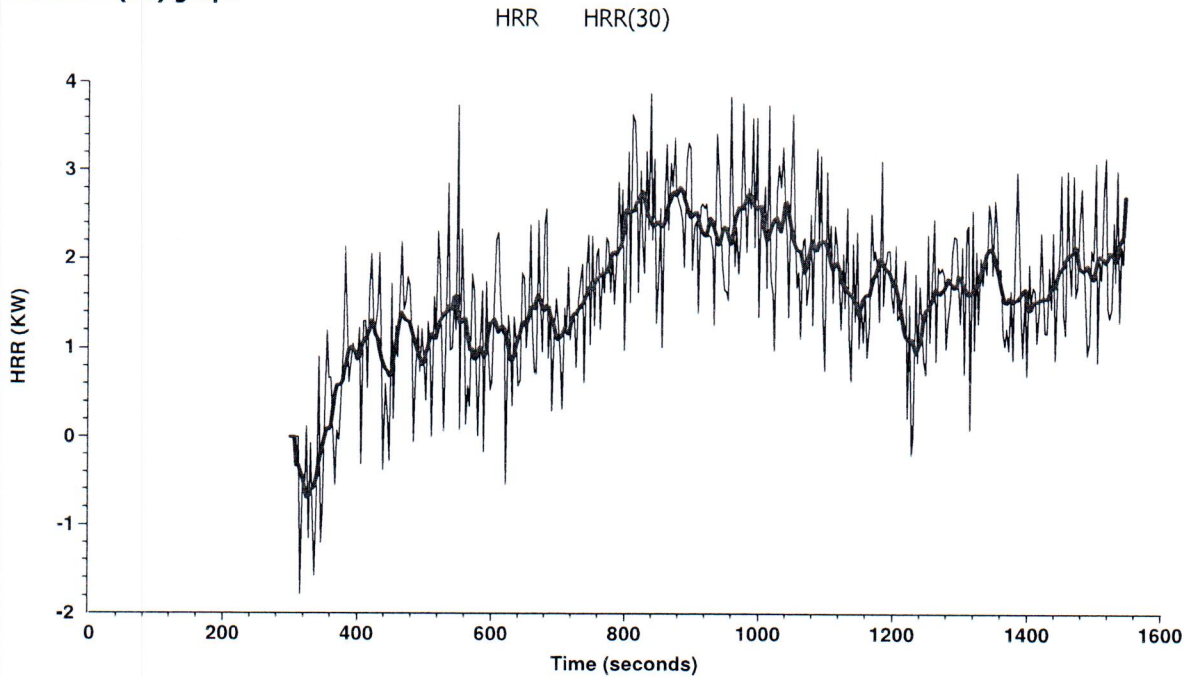
After-test comments

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.

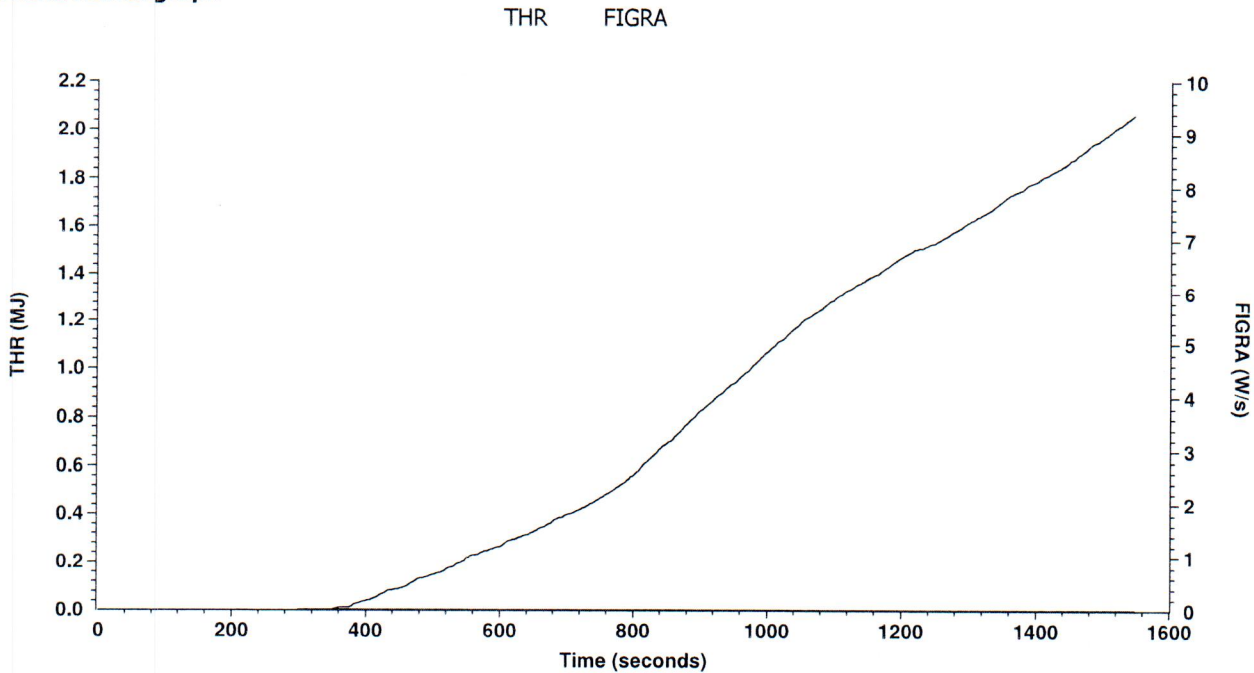
SBI Test Report

Laboratory name	MeKA Testing Laboratory
Operator	Edgars Buksans
Filename	C:\SBICALC\Data\1559\1559-1-1.csv
Report identification	1559-1-1
Product identification	fibre reinforced lightweight cement board KMEW

HRR and HRR(30) graph



THR and FIGRA graph

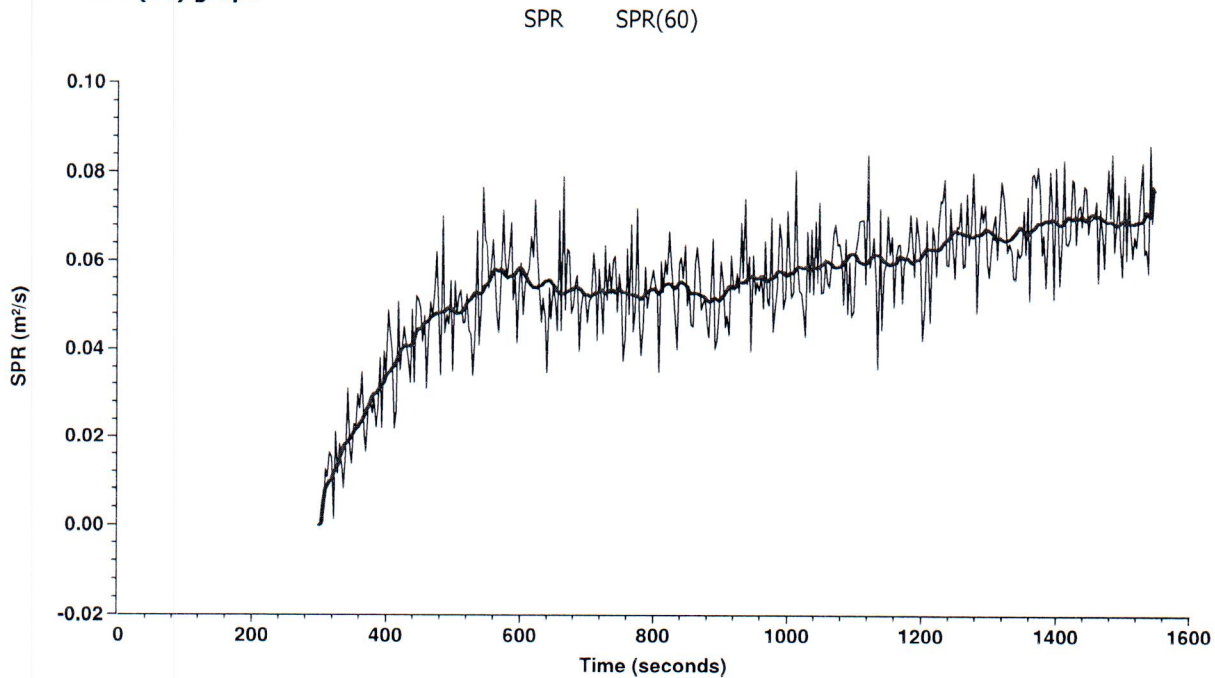


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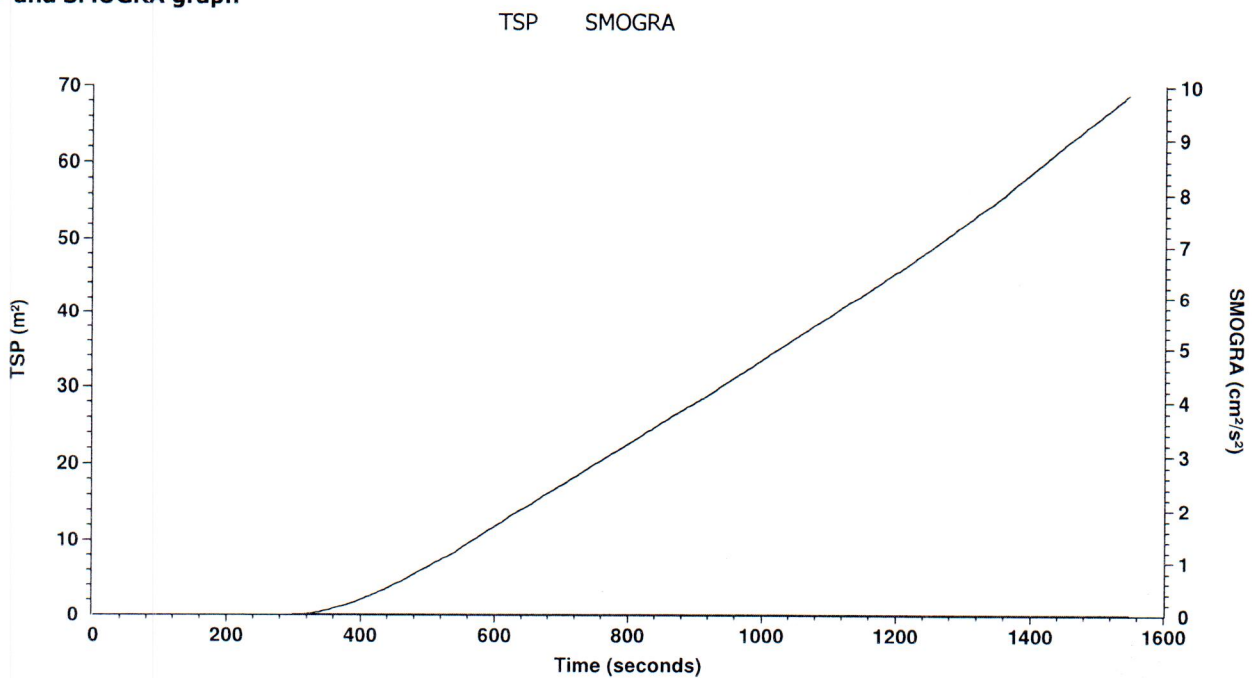
SBI Test Report

Laboratory name	MeKA Testing Laboratory
Operator	Edgars Buksans
Filename	C:\SBICALC\Data\1559\1559-1-1.csv
Report identification	1559-1-1
Product identification	fibre reinforced lightweight cement board KMEW

SPR and SPR(60) graph



TSP and SMOGRA graph



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.

SBI Test Report

Laboratory name MeKA Testing Laboratory
 Operator Edgars Buksans
 Filename C:\SBICALC\Data\1559\1559-1-2.csv
 Report identification 1559-1-2
 Product identification fibre reinforced lightweight cement board KMEW

Test		Pre-test conditions	Specimen conditioning
Standard used	EN 13823:2010	Baseline duct temperature 294.27 K	Method Constant mass
Date of test	16/09/2015	Ambient temperature 293.06 K	Time interval 24 hours
Date of report	16/09/2015	Ambient pressure 102.154 kPa	Mass 1 12458 g
E'	17.2 MJ/m ³	Relative humidity 57%	Mass 2 12448 g
Apparatus specifications		Baseline conditions	Temperature 23°C
kt	0.87	Baseline ambient oxygen 20.657%	RH 50%
kp	1.08	Baseline oxygen 20.951%	
Duct diameter	0.315 m	Baseline carbon dioxide 0.0235%	
O2 calibration delay time	10 s	Baseline smoke 100.00%	
CO2 calibration delay time	10 s		

Specimen information

Thickness	14 mm	Mounting method	5.2.2 a) in EN 13823:2010
Density	1000 kg/m ³	Joints	standard vetrical and horizontal
Surface mass/area		Fixed to substrate?	Yes
Specimen number	2	Fixing method	none
Date of arrival	04/09/2015	Substrate	wood frame mineralwool
		Manufacturer	
		Sponsor	Construction and Distribution Europe OU

Test validity criteria

Test drifts

	Initial	Final	Change
Oxygen	20.951%	20.938%	0.013%
CO2	0.023%	0.023%	0.001%
Smoke	100.00%	99.59%	0.004

Exposure time 1254 s

Synchronisation details

Duct temp. dropped by 2.5 K from baseline of 316.95 K at 303 s
 Oxygen rose by 0.05% from baseline of 20.668% at 306 s
 CO2 dropped by 0.02% from baseline of 0.145% at 306 s

Burner details

Burner HRR	31.542 kW
Burner HRR std. dev.	0.643 kW
Burner CO2/O2 ratio	0.427
Burner SPR	0.030 m ² /s
Burner SPR std. dev.	0.004 m ² /s
Burner response time (s)	12 s

Other checks

Minimum duct flow	0.548 m ³ /s
Maximum duct flow	0.633 m ³ /s
No T/C failure	

Classification results

FIGRA(0.2)	8.4 W/s at 1455 s
FIGRA(0.4)	8.4 W/s at 1455 s
THR(600)	1.2 MJ
SMOGR	2.0 cm ² /s ² at 1452 s
TSP(600)	25.6 m ²

Classification observations

LFS to edge?	No
FDP flaming <= 10s?	No
FDP flaming > 10s?	No

Potential classification

Class	A2/B
Smoke production	s1
Flaming droplets/particles	d0

Recorded events

Surface flashes? No; Falling specimen parts? No; Smoke not entering hood? No
 Mutual fixing of backing board failed? No; Distortion/collapse of specimen? No

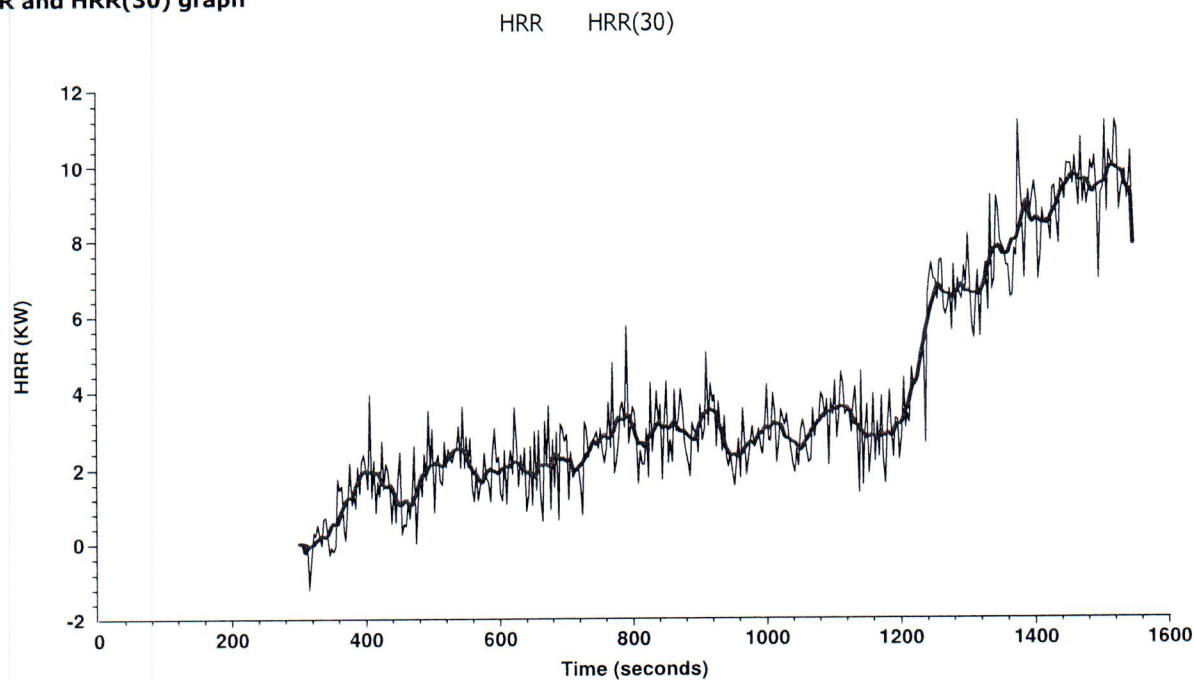
Pre-test comments

After-test comments

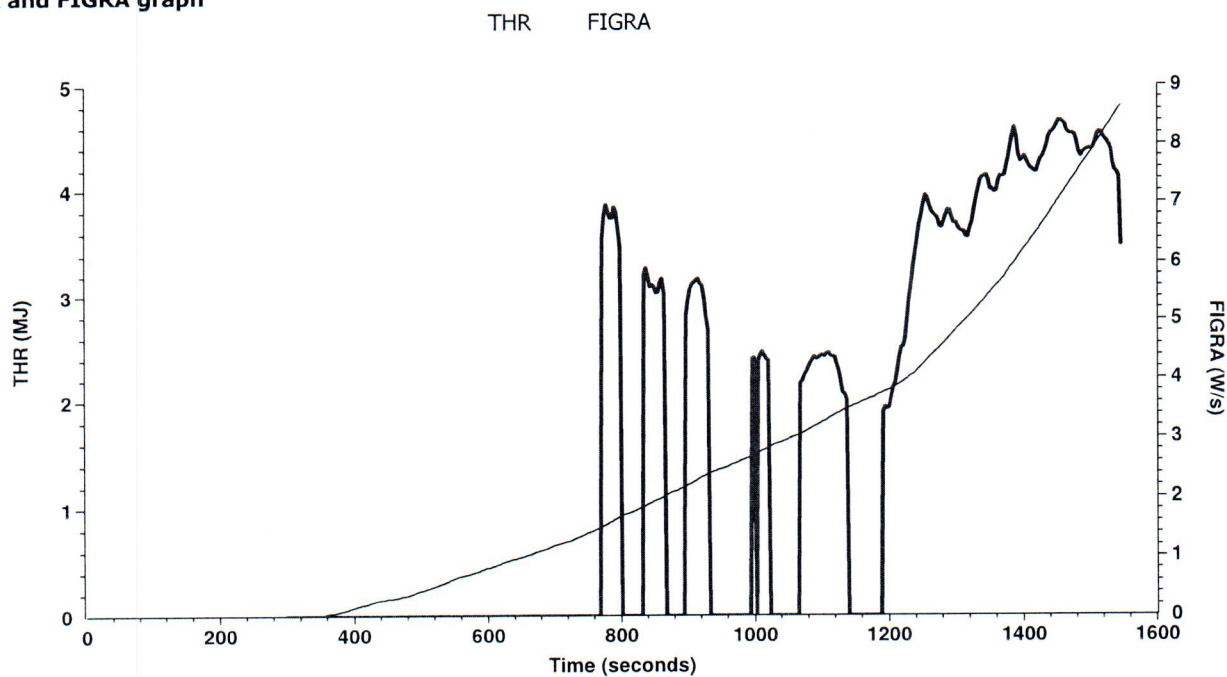
SBI Test Report

Laboratory name MeKA Testing Laboratory
Operator Edgars Buksans
Filename C:\SBICALC\Data\1559\1559-1-2.csv
Report identification 1559-1-2
Product identification fibre reinforced lightweight cement board KMEW

HRR and HRR(30) graph



THR and FIGRA graph

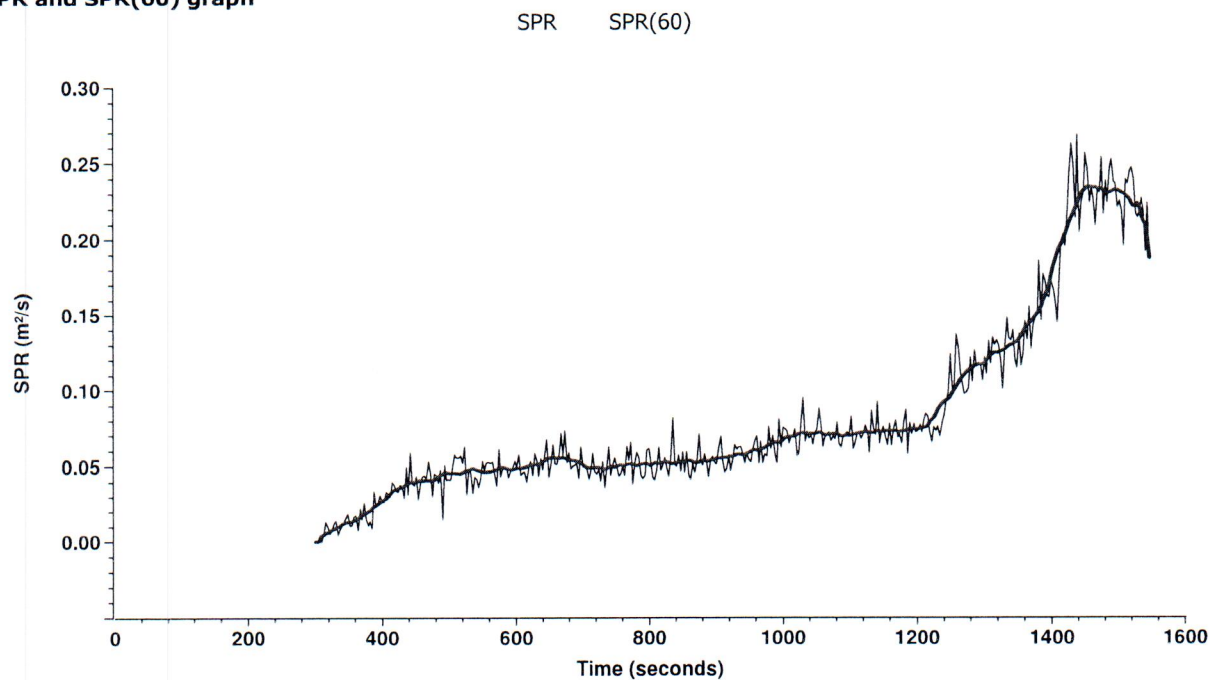


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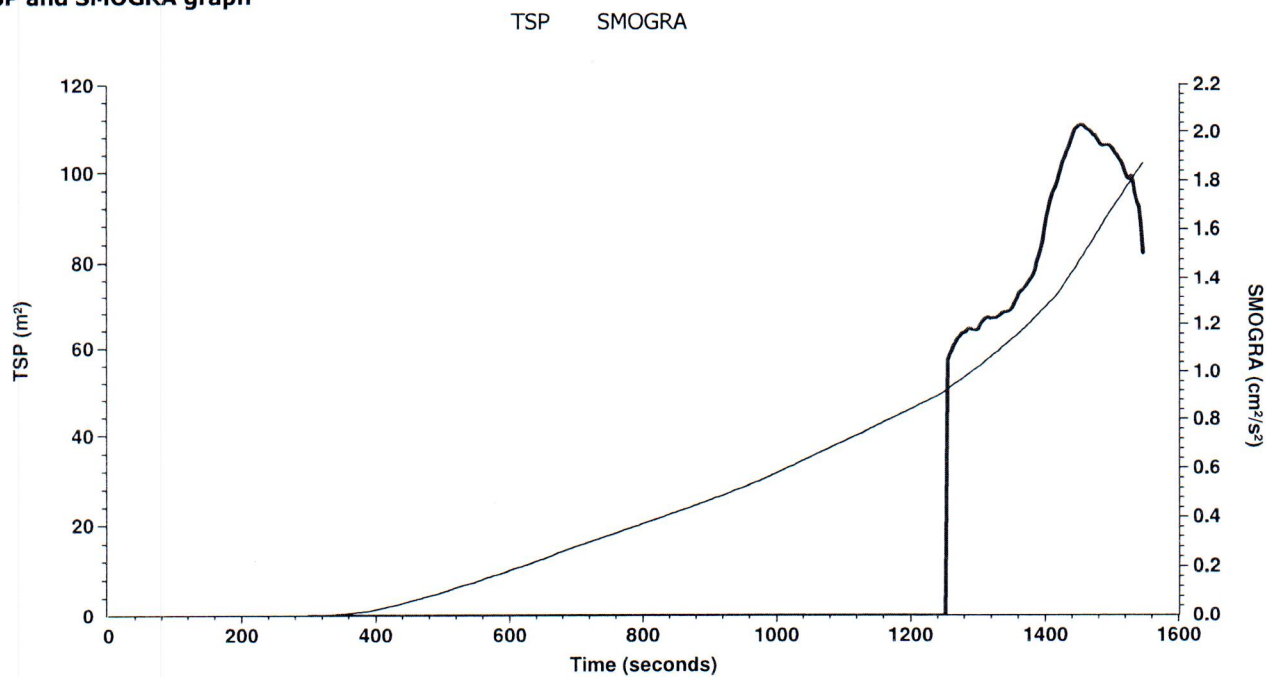
SBI Test Report

Laboratory name MeKA Testing Laboratory
Operator Edgars Buksans
Filename C:\SBICALC\Data\1559\1559-1-2.csv
Report identification 1559-1-2
Product identification fibre reinforced lightweight cement board KMEW

SPR and SPR(60) graph



TSP and SMOGRA graph



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.

SBI Test Report

Laboratory name MeKA Testing Laboratory
 Operator Edgars Buksans
 Filename C:\SBICALC\Data\1559\1559-1-3.csv
 Report identification 1559-1-3
 Product identification fibre reinforced lightweight cement board KMEW

Test		Pre-test conditions		Specimen conditioning	
Standard used	EN 13823:2010	Baseline duct temperature	295.39 K	Method	Constant mass
Date of test	16/09/2015	Ambient temperature	293.29 K	Time interval	24 hours
Date of report	16/09/2015	Ambient pressure	102.149 kPa	Mass 1	12458 g
E'	17.2 MJ/m ³	Relative humidity	60%	Mass 2	12448 g
Apparatus specifications		Baseline conditions		Temperature	23°C
kt	0.87	Baseline ambient oxygen	20.615%	RH	50%
kp	1.08	Baseline oxygen	20.947%		
Duct diameter	0.315 m	Baseline carbon dioxide	0.0220%		
O2 calibration delay time	10 s	Baseline smoke	100.00%		
CO2 calibration delay time	10 s				

Specimen information

Thickness	14 mm	Mounting method	5.2.2 a) in EN 13823:2010
Density	1000 kg/m ³	Joints	standard vetrical and horizontal
Surface mass/area		Fixed to substrate?	Yes
Specimen number	3	Fixing method	none
Date of arrival	04/09/2015	Substrate	wood frame mineralwool
		Manufacturer	
		Sponsor	Construction and Distribution Europe OU

Test validity criteria

Test drifts

	Initial	Final	Change
Oxygen	20.947%	20.954%	0.008%
CO2	0.022%	0.021%	0.001%
Smoke	100.00%	99.36%	0.006

Exposure time 1254 s

Synchronisation details

Duct temp. dropped by 2.5 K from baseline of 317.97 K at 303 s
 Oxygen rose by 0.05% from baseline of 20.676% at 306 s
 CO2 drop by 0.02% from baseline of 0.139% not detected

Burner details

Burner HRR	30.590 kW
Burner HRR std. dev.	0.666 kW
Burner CO2/O2 ratio	0.435
Burner SPR	0.028 m ² /s
Burner SPR std. dev.	0.004 m ² /s
Burner response time (s)	12 s

Other checks

Minimum duct flow	0.530 m ³ /s
Maximum duct flow	0.639 m ³ /s
No T/C failure	

Classification results

FIGRA(0.2)	23.7 W/s at 1473 s
FIGRA(0.4)	23.7 W/s at 1473 s
THR(600)	0.7 MJ
SMOGRA	1.9 cm ² /s ² at 1197 s
TSP(600)	30.9 m ²

Classification observations

LFS to edge?	No
FDP flaming <= 10s?	No
FDP flaming > 10s?	No

Potential classification

Class	A2/B
Smoke production	s1
Flaming droplets/particles	d0

Recorded events

Surface flashes? No; Falling specimen parts? No; Smoke not entering hood? No
 Mutual fixing of backing board failed? No; Distortion/collapse of specimen? No

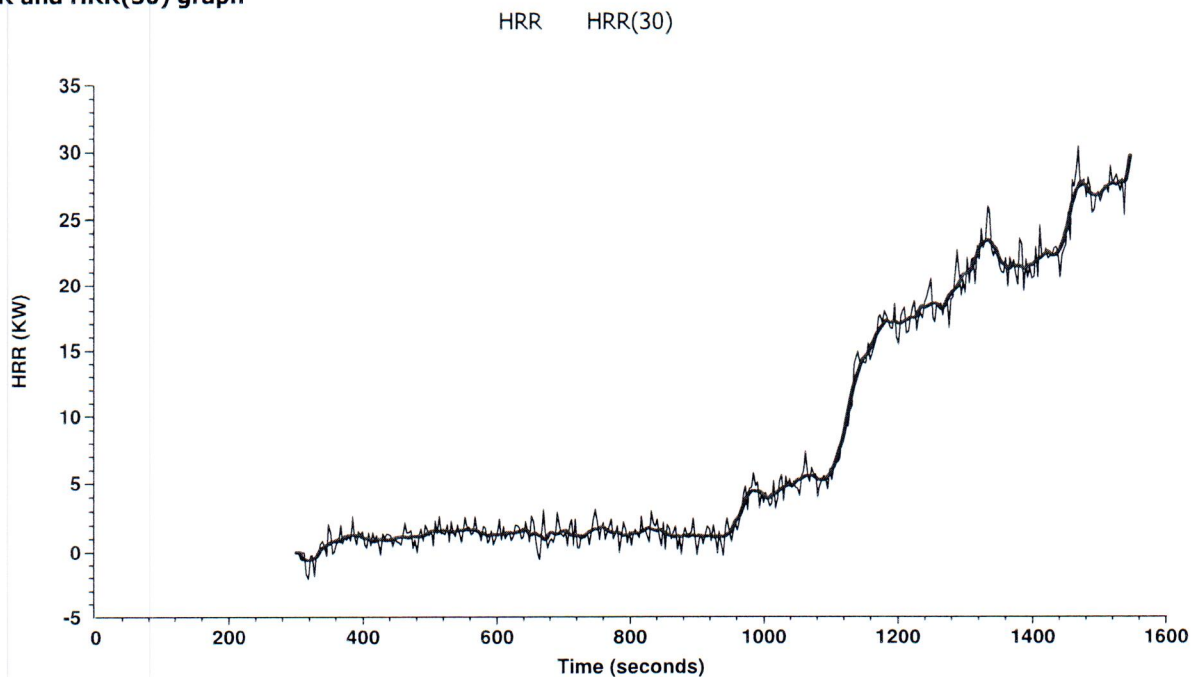
Pre-test comments

After-test comments

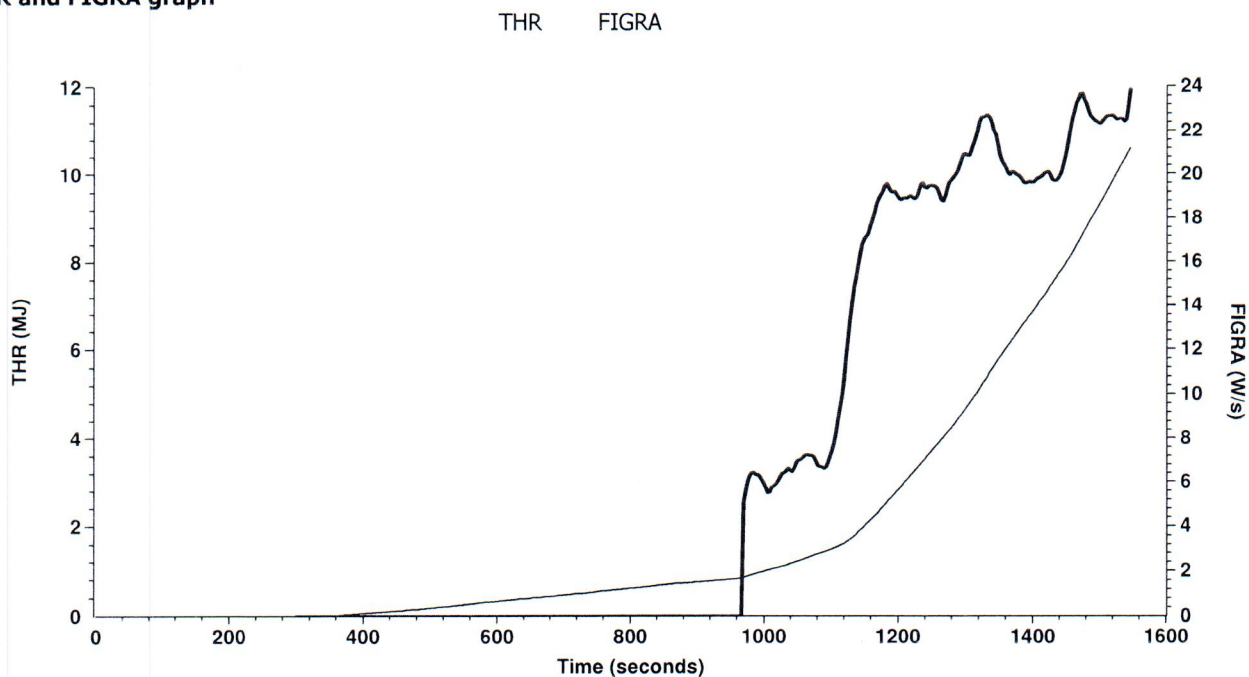
SBI Test Report

Laboratory name MeKA Testing Laboratory
Operator Edgars Buksans
Filename C:\SBICALC\Data\1559\1559-1-3.csv
Report identification 1559-1-3
Product identification fibre reinforced lightweight cement board KMEW

HRR and HRR(30) graph



THR and FIGRA graph

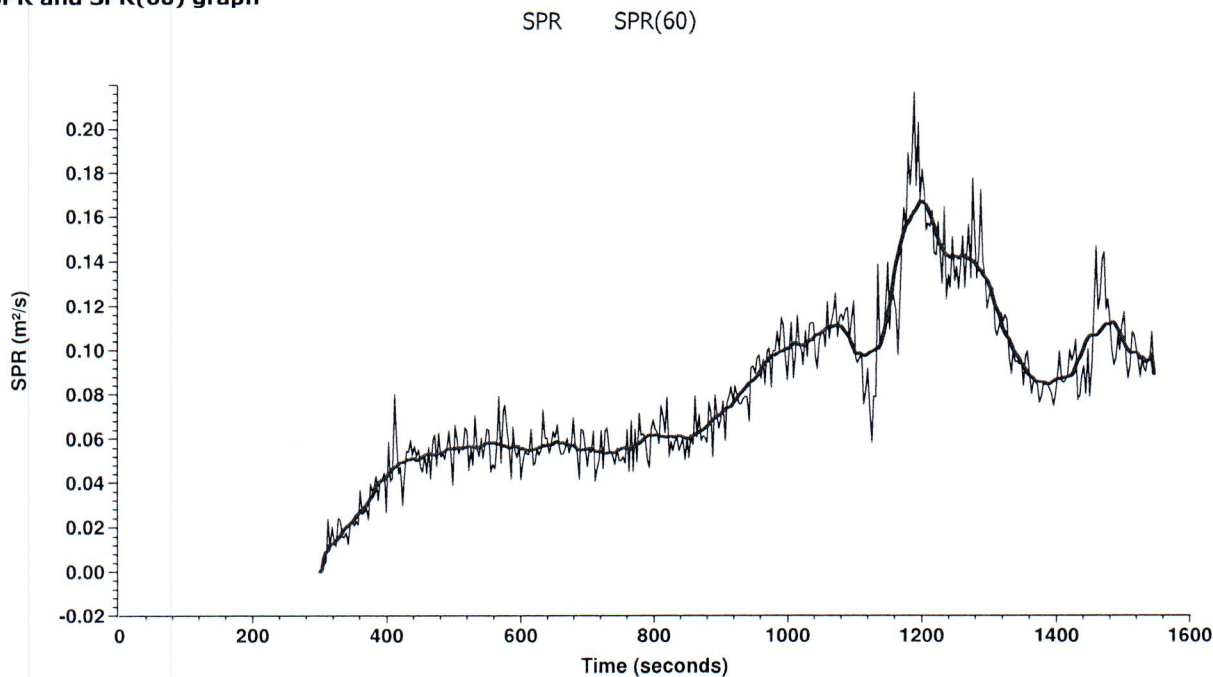


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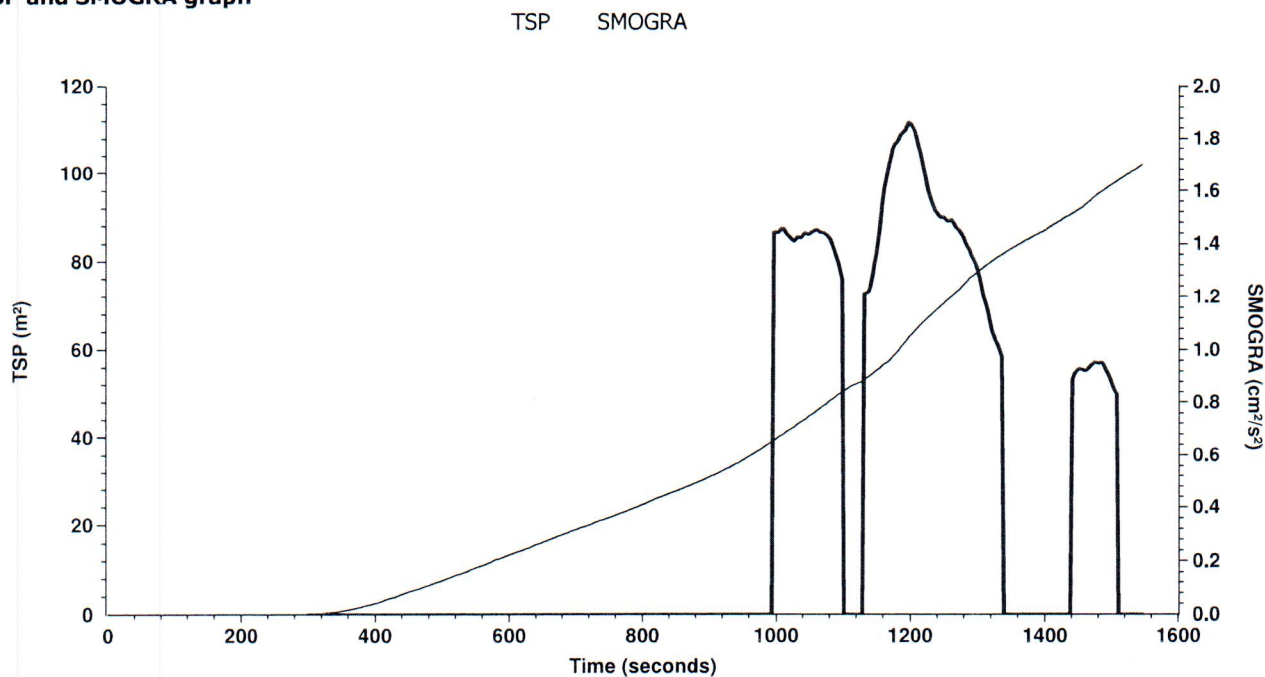
SBI Test Report

Laboratory name MeKA Testing Laboratory
Operator Edgars Buksans
Filename C:\SBICALC\Data\1559\1559-1-3.csv
Report identification 1559-1-3
Product identification fibre reinforced lightweight cement board KMEW

SPR and SPR(60) graph



TSP and SMOGRA graph



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.

Test parameter explanation

Parameter	Explanation
Specimen	Specimen consisting of two wings (short wing - 495 x1500mm and long wing 1000x1500mm) mounted perpendicular each to other.
Test start	Start of data collection
Ignition of the specimen	Ignition of specimen long wing initiated by main burner
Flaming particles and droplets	Specimen particles which have fall down on trolley at distance more than 300 mm distance from specimen corner and continue burning. It should be observed if flaming time is less or more than 10 s.
Lateral flame spread on the long wing LFS 1000 mm	Lateral flame spread is recorded when sustained flames reach's the far edge of specimen at height between 500 to 1000mm.
HRR, kW	Heat release rate of material between ignition of main burner and end of the test, burner heat output excluded, as a 60 s running average value.
SPR, m^2/s^2	Smoke production rate of material between ignition of the main burner and end of test burner smoke production output excluded, as 60 s running average value.
FIGRA _{0,2MJ} , W/s	Fire growth rate is maximum of the quotient of heat release rate from the specimen and time of its occurrence using a THR-threshold of 0.2 MJ.
FIGRA _{0,4MJ} , W/s	Fire growth rate is maximum of the quotient of heat release rate from the specimen and time of its occurrence using a THR-threshold of 0.4 MJ.
THR _{600s} , MJ	Total heat release of the sample at first 600 s from ignition of main burner.
SMOGRA, cm^2/s^2	Maximum of the quotient of smoke production rate from the specimen and the time of its occurrence.
TSP _{600s} , m^2	Total smoke production from the specimen in the first 600 s of exposure to the main burner flames.