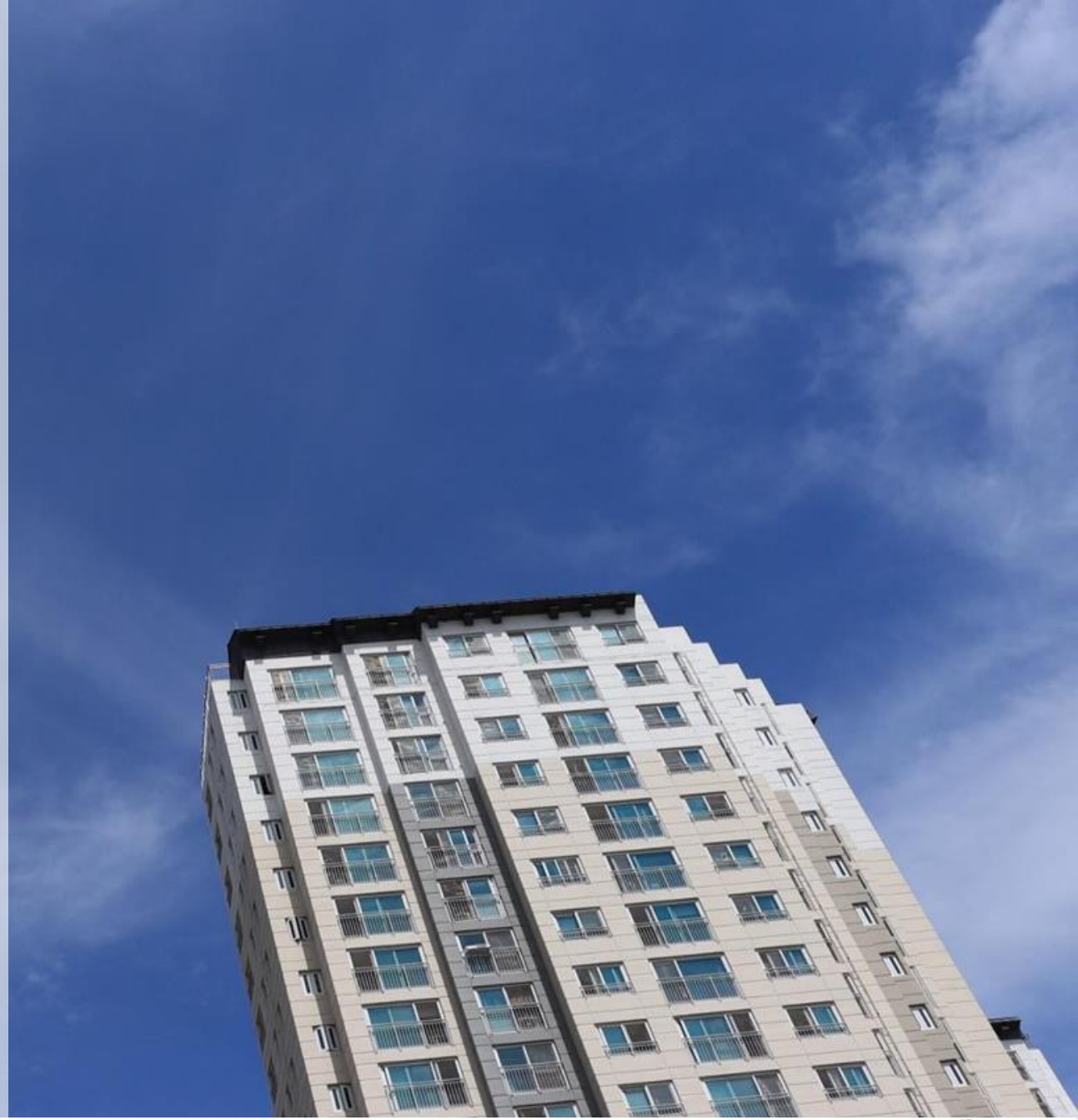
Welkom

Roy Weghorst

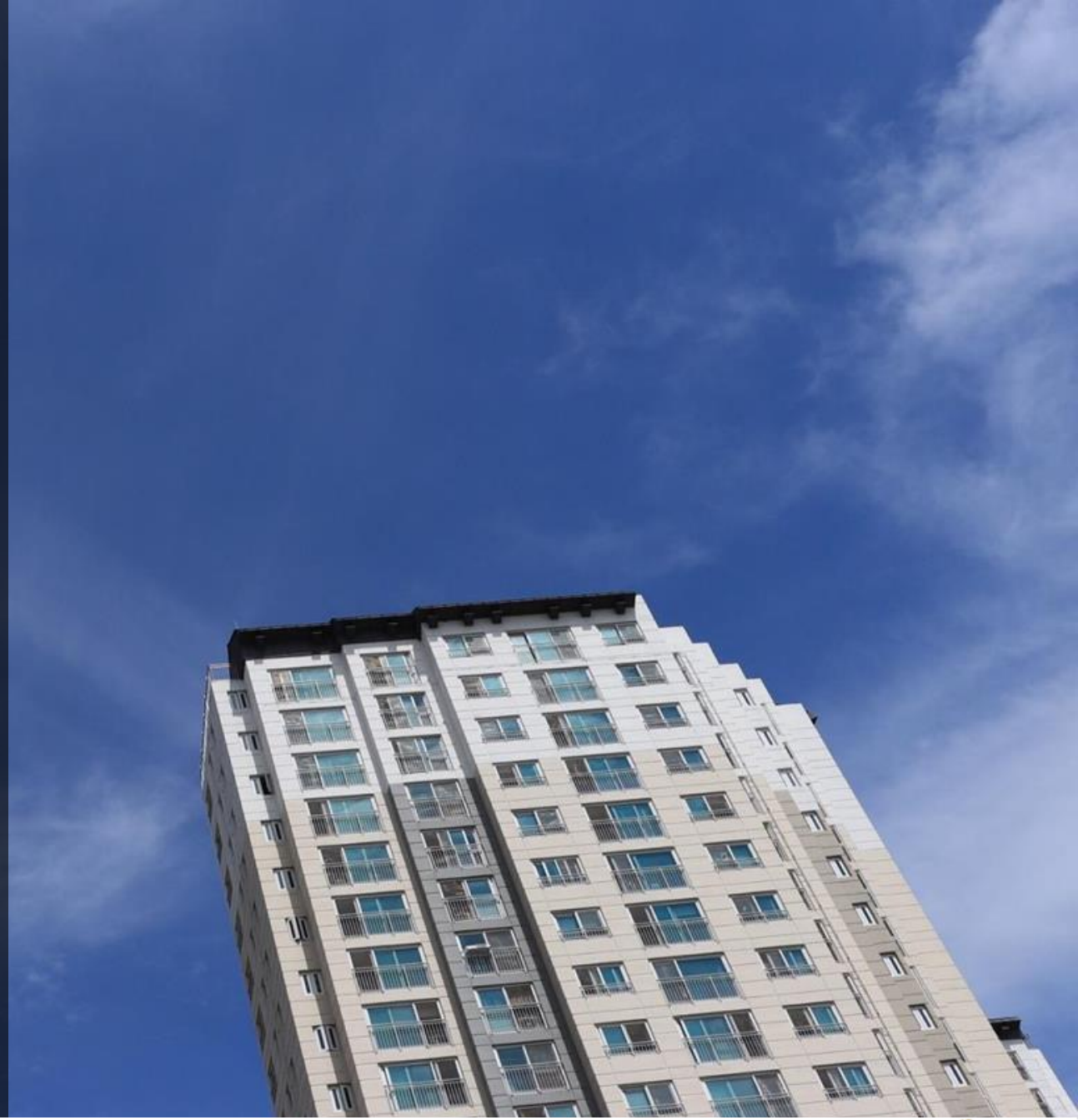
Head of Regulatory Affairs - Fire

Kingspan



BRANDRISICO'S BIJ GEVELBEKLEDING

Roy Weghorst

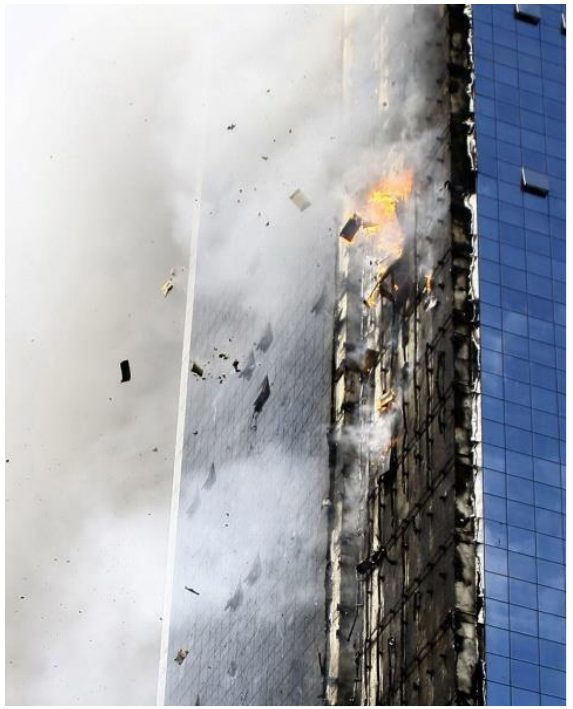


Kingspan

Façade branden met ACM PE, is dit nieuw?

Tamweel tower Dubai 2012

Hotel Grozny 2013



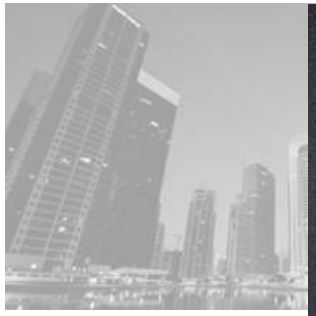
Polat tower Istanbul 2012

Address hotel Dubai 2016

The Torch tower Dubai 2015

Kingspan

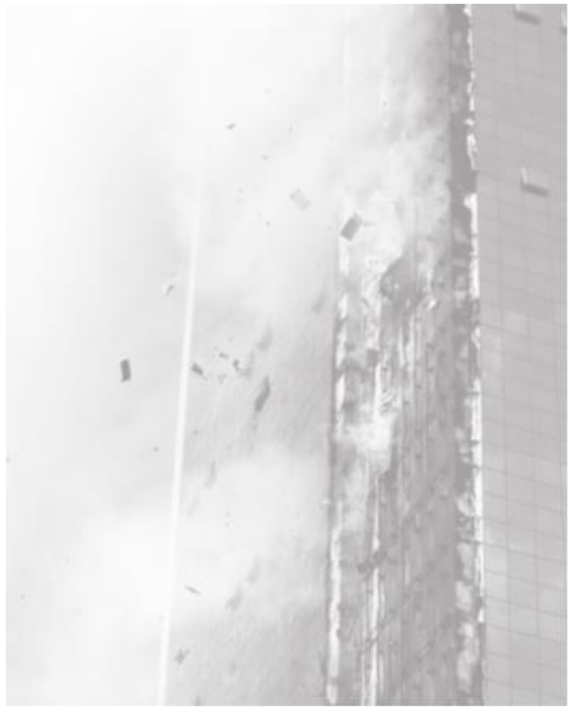
Façade branden met ACM PE, is dit nieuw?



Tamweel towe

Address hotel Dubai 2015

The Torch tower Dubai 2017

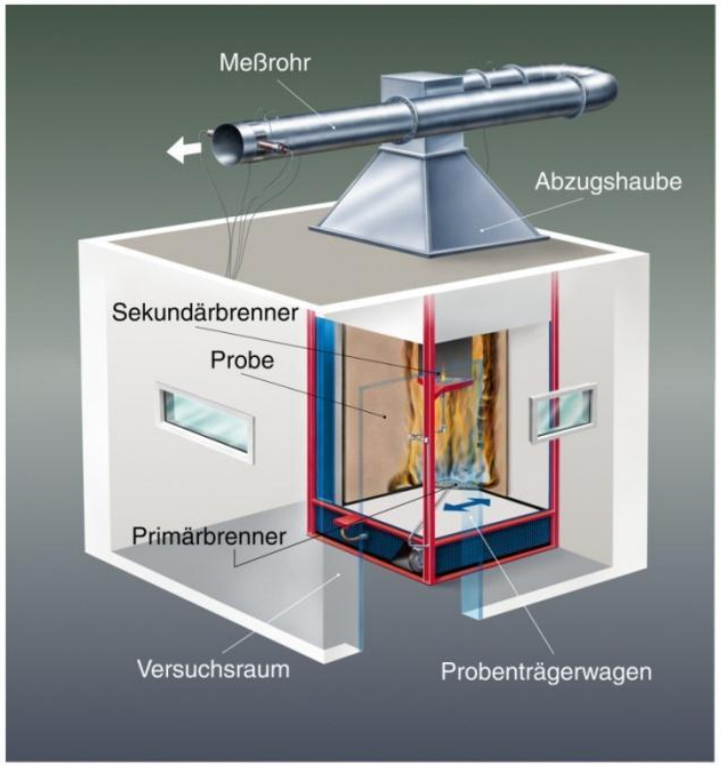


Polat tower Istanbul 2012

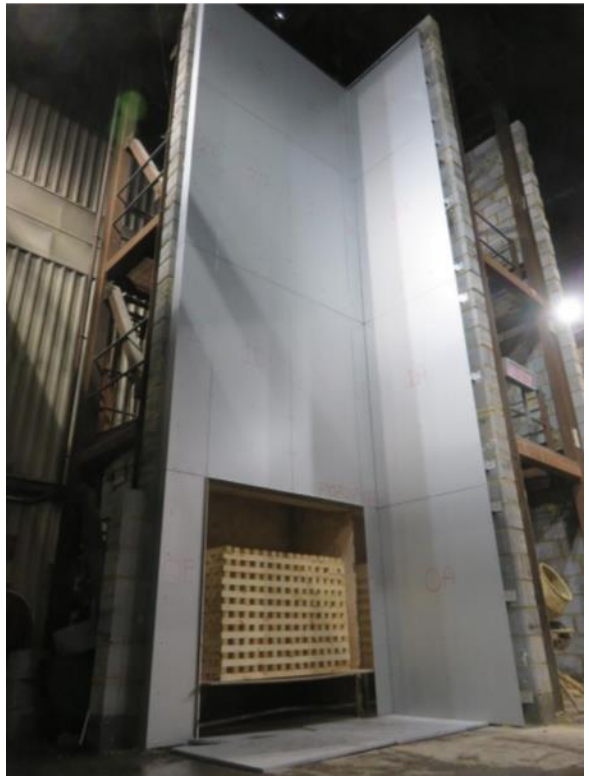
Kingspan

Regelgeving gevels in Nederland?

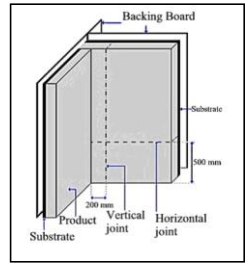
Single Burning Item



Grootschalig testen



Schaal naar SBI



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Regelgeving gevels in Nederland?

Eisen gevel gebaseerd op Euroklasse via de Single Burning Item

Eisen Bouwbesluit:

- Beperking brand ontwikkeling
  - Gevel voldoet aan klasse D (soms C of B)
  - Hoger dan 13m brandklasse B
  - Lager dan 2,5m brandklasse B
  - Deuren, ramen e.d. brandklasse D

Indien NEN6068 van toepassing is i.v.m. brandoverslag dan is de eis volgens paragraaf 6.1 dat ten minste 95% van het totale geveloppervlak Euroklasse B is

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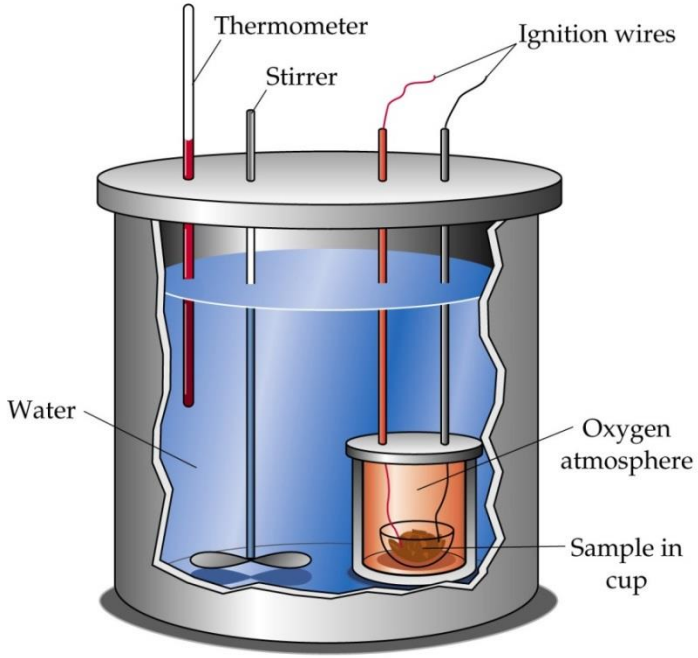
A + A = **Veilig?** — "Setting the scene"

- Bepaling bruto warmte-gevend potentieel
- van een materiaal bij volledige verbranding

- Ook wel *calorische waarde* bepaling;
- Eis;
- *≤ 3 MJ/kg voor A2*
- *≤ 2 MJ/kg voor A1*

- *Monster is 10 tot 50 gram*
- *Vermalen tot poeder waarvan 0,5 gram uiteindelijk gebruikt wordt in de calorische bom test onder pure zuurstof met een druk van 3 MPa)*

Gross calorific potential
EN-ISO 1716



Alles onbrandbaar?

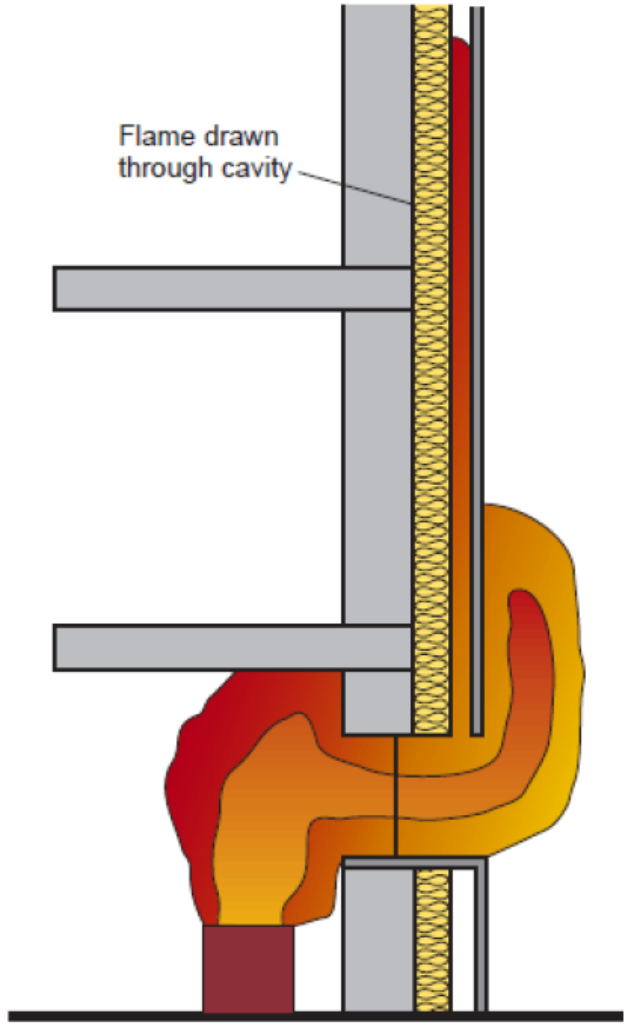
- ✓ (tick the box) Oplossing
- Nauwkeurigheid en verschaling van deze kleine test is twijfelachtig
- ‘vereenvoudigde’ benadering van het design

❖ Een materiaal prestatie geen systeem benadering..

Systeem testen?

Small Scale Testing ignores the chimney Effect

"If flames become confined or restricted by entering cavities within the external cladding system, they will become elongated as they seek oxygen and fuel to support the combustion process. This process can lead to flame extension of five to ten times that of the original flame lengths regardless of the materials used to line the cavities." BR 135



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Cavity Barriers – Nut en noodzaak!

e Barrier

cade

Lamatherm by Siderise

Kingspan

Performance based:
Largescale systeem testen

Enkele internationale voorbeelden:

- BS8414 (UK en Australië….)
- SP Fire105 (Nordics)
- LEPIR2 (Frankrijk)
- NFPA285 (US)

Afwijkingen van geteste systeem?
Kunnen we EXAP beoordelingen doen?

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Interflam 2016

DETERMINATION OF FIRE PERFORMANCE OF VENTILATED FAÇADE SYSTEMS ON COMBUSTIBLE INSULATION USING LEPIR2. EXTENDED APPLICATIONS APPROACH BASED ON MULTISCALE TESTS

Roy Weghorst[*,1], Bénédicte Heuzé[2], and Eric Guillaume[3]

[1]Kingspan Insulation ltd., [2]LNE, [3]Efectis France
* Corresponding author: roy.weghorst@kingspan.com

ABSTRACT

Tighter energy regulations across the globe force building designers to ir thickness in façade systems; modern façade constructions include extra insu energy performance, reduce water and air infiltration. The use of high perfo materials increases with these demands to allow for aesthetic and slim flexibility. Recent events in façade fires like the Polat tower in Istanbul Dubai show that aesthetics can cause risk and proper evaluation of the bel systems in event of a fire is very important.

Fire behaviour of façade systems is construction performance irrespectiv classifications of the single components [1]. Details like airgap, fire barrier window frames and construction details are very important in the overall pe façade construction.

With respect to all different building designs it is hardly impossible to test al large scale tests like the BS 8414 [2] (needed for UK market) or LEPIR French market). This paper describes how a project in France has been appr create a range assessment from bench scale tests in combination with lar experiments. On a combustible insulation foam covered by a large variety ventilated system, corresponding to three families: with gap joints, without claddings.

REGULATORY CONTEXT

In France, Façade tests are required by the regulation as a specific construction, and not to construction products [4]. This requirement is for from the outside between superposed windows. As a consequence, it is app equipped with windows. The performance is established either on a prescrip way for systems on masonry ("C+D" rule), or assessed by tests. By combustible insulation solutions have been introduced in technical instruc supposed to be satisfactory. Nevertheless, as variety of systems and use of e increased in France in the last 10 years, mainly as a consequence of therma

Fig. 1.

Sample during the fire test, with ignition horizontal and vertical joints. Furnace is centered at the joints crossing.

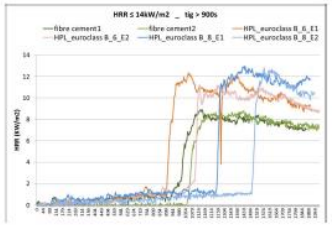


Fig. 2.

HRR curves from one family of systems in the ISO 21367 tests

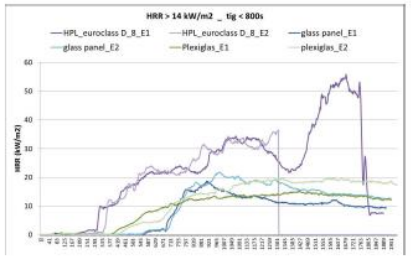
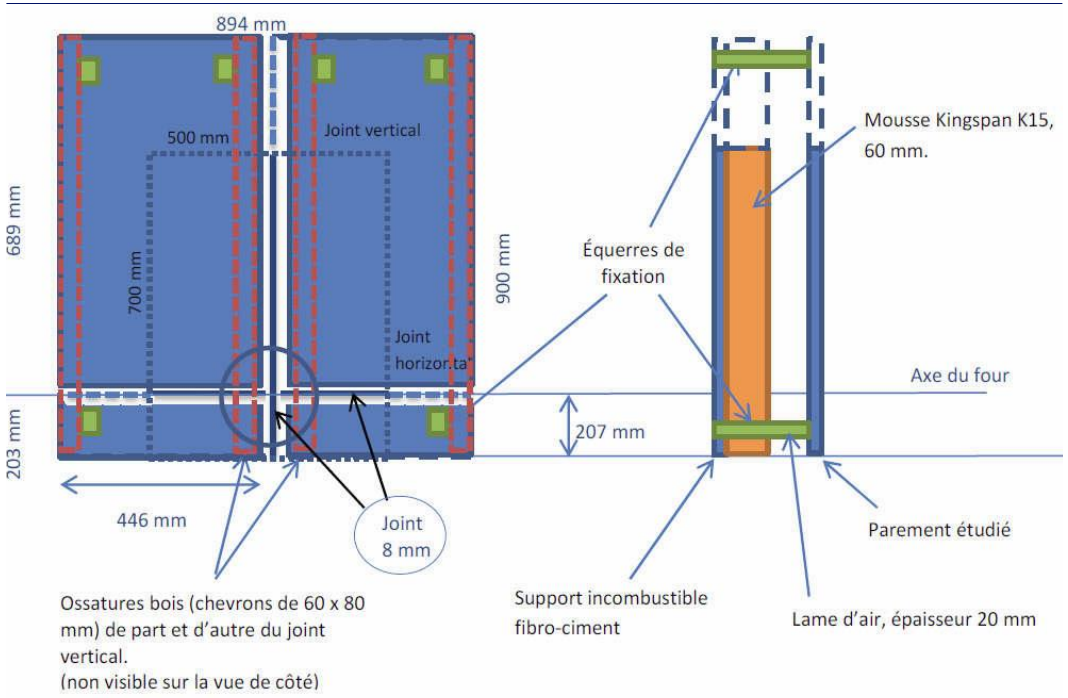


Fig. 3.

HRR curves from second family of systems in the ISO 21367 tests

Medium Scale testen om onderscheid te maken tussen verschillende claddings



- Kan een medium scale test (ISO 21367) voldoende nauwkeurig prestatie volgens LEPIR2 voorspellen?
- 12 verschillende cladding systemen geselecteerd
- Houten regelwerk, Kingspan K15 isolatie en een 20 mm luchtspouw

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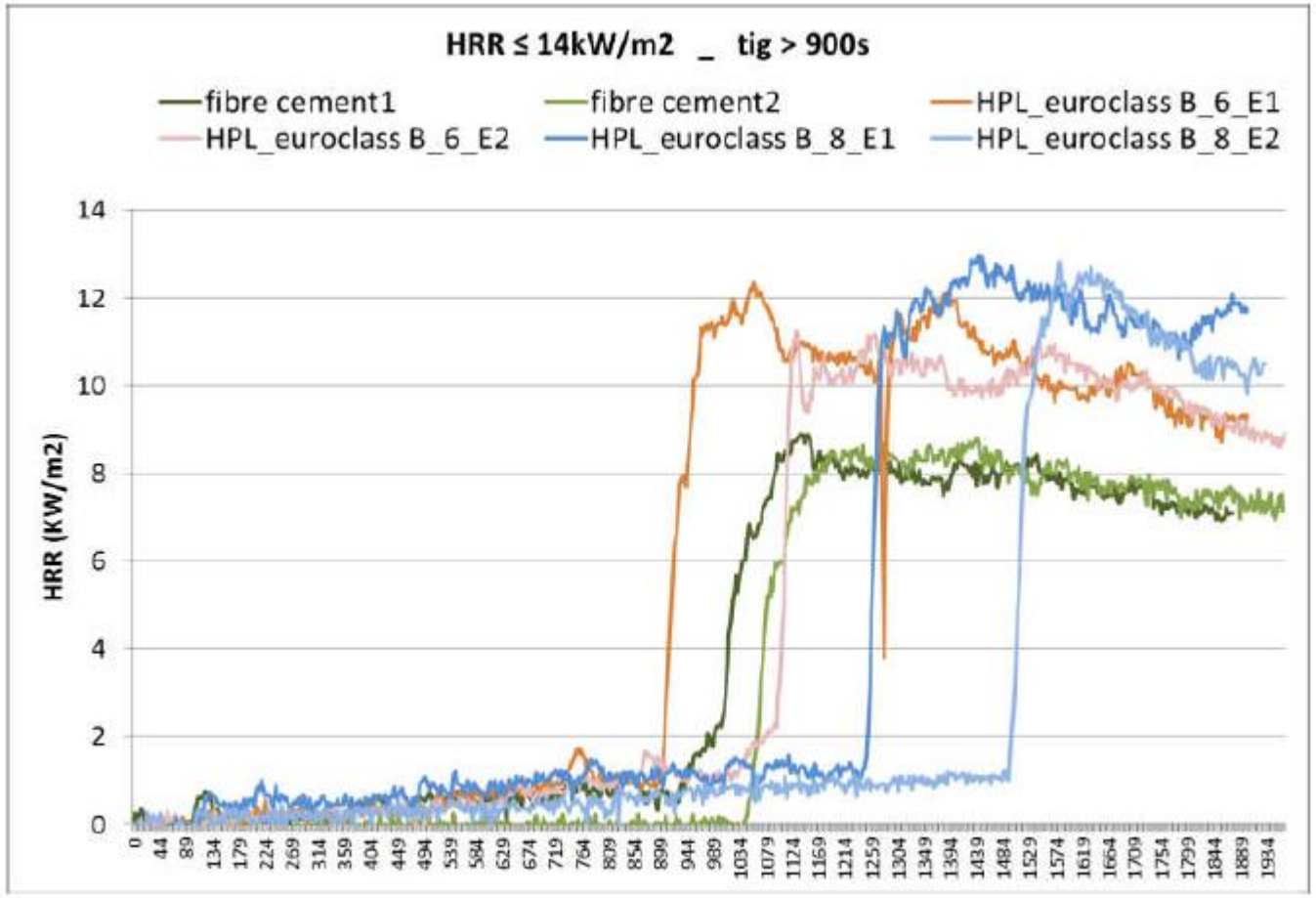
Resultaten

Resultaten



FAMILLES de PRODUITS	CARACTERISTIQUES
ETICS enduit minéral	euroclasse : A2-s3,d0 épaisseur 16 mm sans joint ouvert DTA : 2/15-1666
ETICS Enduit organique	euroclasse : B-s2,d0 épaisseur 16 mm sans joint ouvert DTA : 2/15-1666
Panneau fibres-ciment	euroclasse A2-s3,d0 minimum avec ou sans joint ouvert épaisseur 8 mm DTA : 2/13-1558
Plaquette de terre cuite sur support polyuréthane	euroclasse : B-s3,d0 épaisseur 25 mm sans joint ouvert DTA : 2/12-1528
Mosaïque de verre sur support de résine époxy	euroclasse : A2-s3,d0 épaisseur 23 mm avec ou sans joint ouvert DTA : 2/14-1627
panneauStratifié (HPL)	euroclasse : B-s2,d0 épaisseur _ et 10 mm MCM ≤25 MJ/m^2.mm avec ou sans joint ouvert DTA : 2/14-1627 et 2/12-1504
Panneau Composite aluminium (ACM Ame polyéthylène ignifugé)	euroclasse : B-s1,d0 épaisseur 4 mm avec ou sans joint ouvert DTA : 2/11-1442

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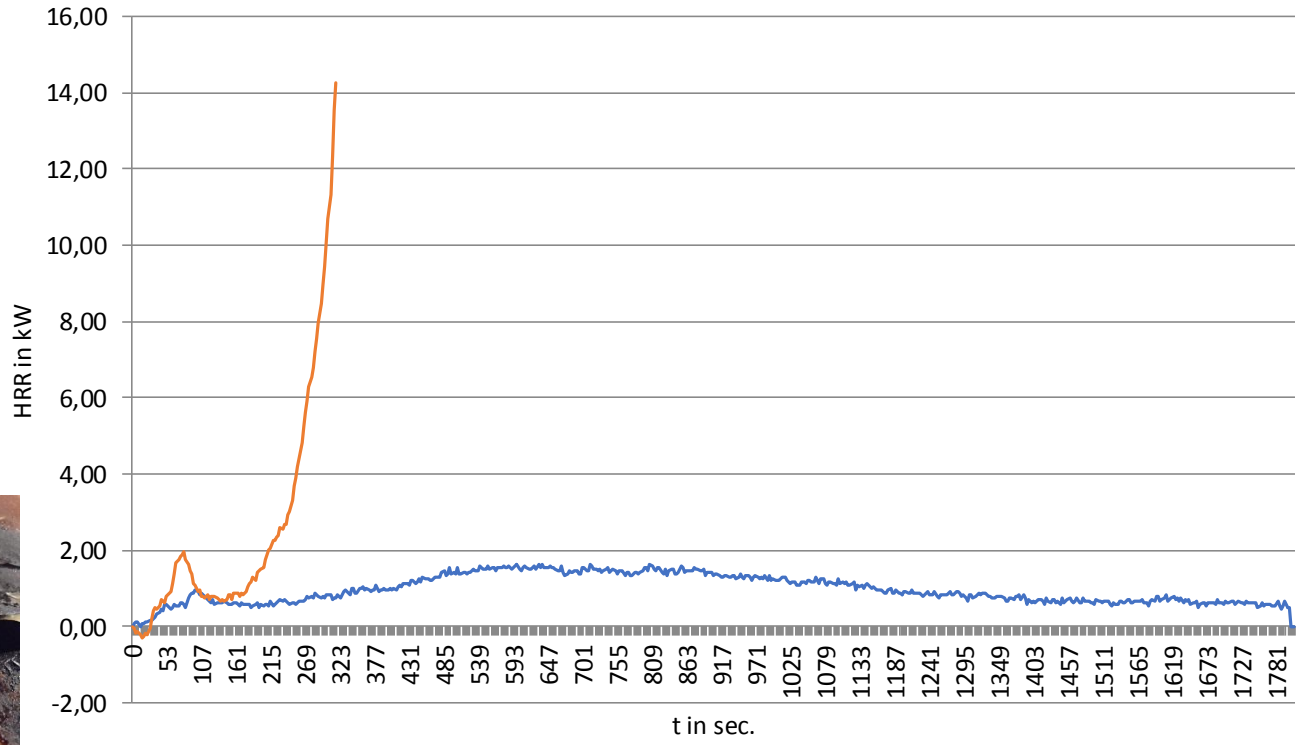
ACM FR Euroclass B vs PE



Getest: eind mei 2017

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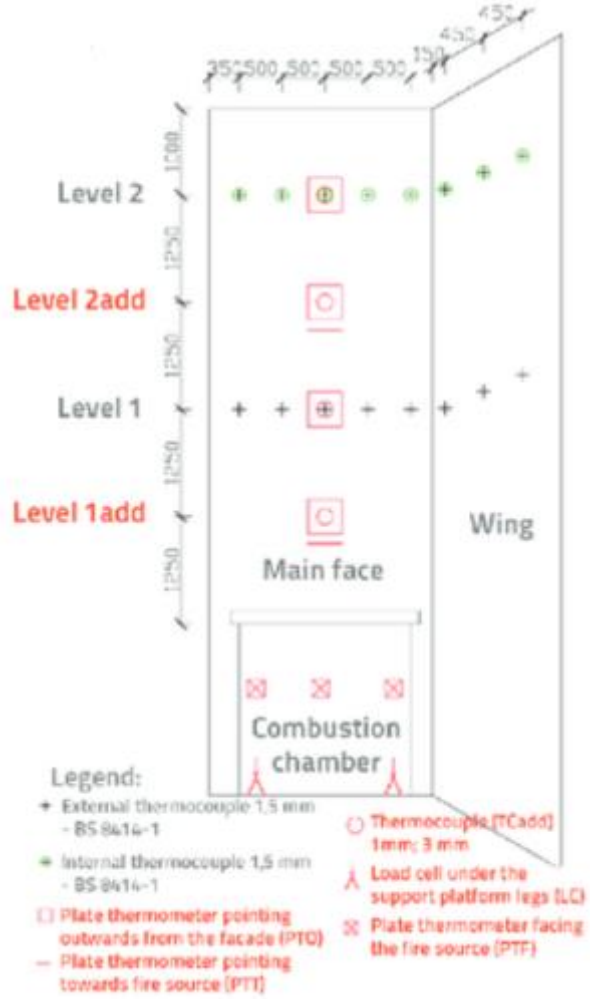
BRAND TESTEN MET ACM

UITGEVOERD DOOR DCLG

BR 135 i.c.m. BS8414



DCLG Testen volgens BS8414-1

Test	Build up	Result
Test 1	100 mm PIR – PE core ACM	Fail - 8,45 mins
Test 2	180 mm MF – PE Core ACM	Fail - 7,09 mins
Test 3	100 mm PIR – FR core ACM	Fail - 25,12 mins
Test 4	180 mm MF – FR Core ACM	Pass
Test 5	100 mm PIR – A2 core ACM	Pass
Test 6	180 mm MF – A2 Core ACM	Pass
Test 7	100 mm PF – FR core ACM	Fail – 28,14 mins

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DCLG Testen volgens BS8414-1

Test	Build up	Result
Test 1	100 mm PIR – PE core ACM	Fail - 8,45 mins
Test 2	180 mm MF – PE Core ACM	Fail - 7,09 mins
Test 3	**100 mm PIR – FR core ACM**	**Fail - 25.12 mins**
Test 4	**180 mm MF – FR Core ACM**	**Pass**
Test 5	100 mm PIR – A2 core ACM	Pass
Test 6	180 mm MF – A2 Core ACM	Pass
Test 7	**100 mm PF – FR core ACM**	**Fail – 28,14 mins**

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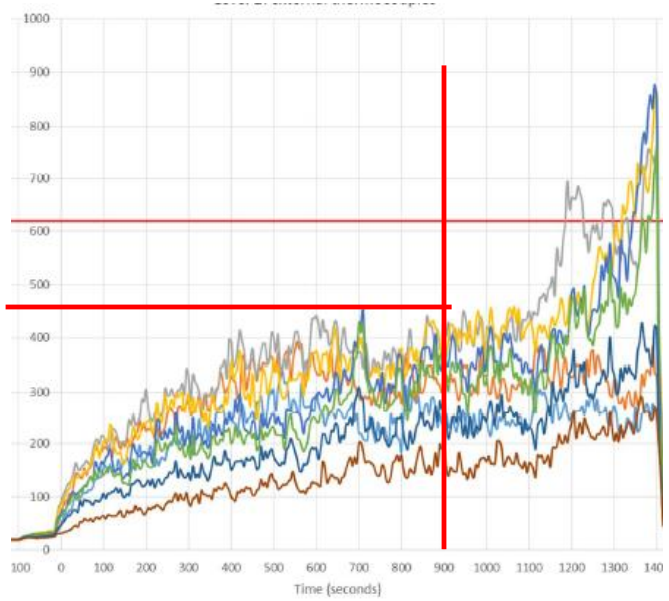
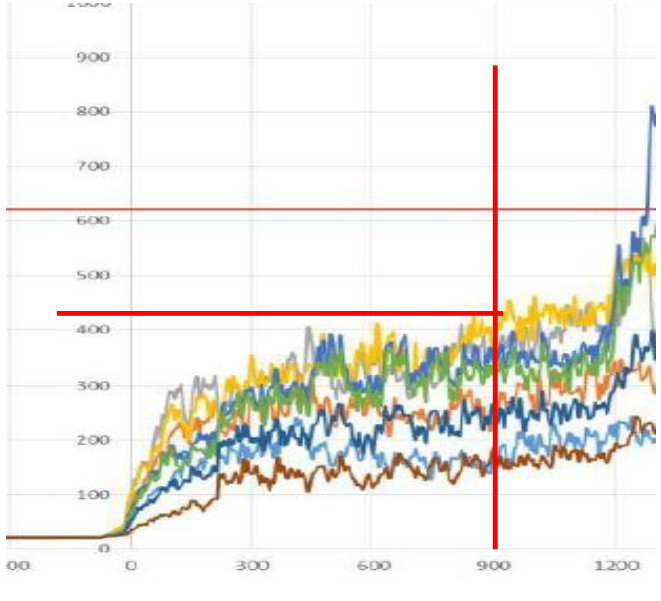
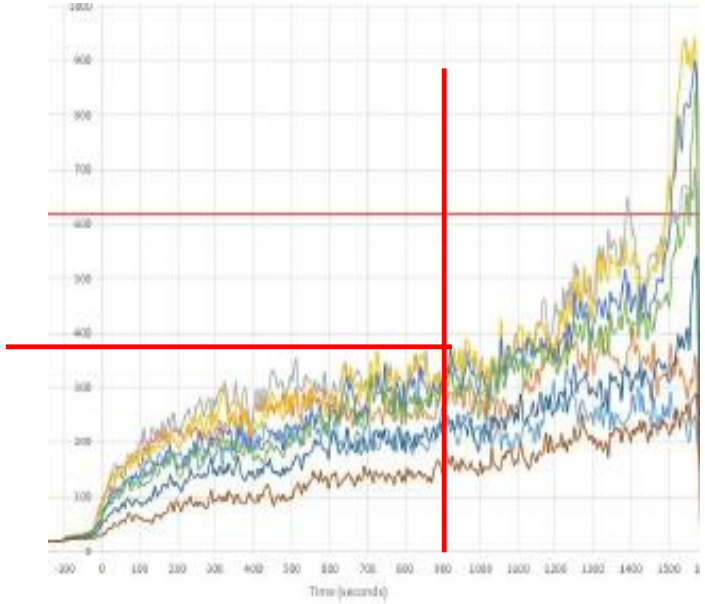
DCLG Testen volgens BS8414-1



PIR – FR ACM [Test 4]



RockFibre – FR ACM [Test 5]



Phenolic – FR ACM [Test 7]

DCLG Testen volgens BS8414-1

PIR – FR ACM

RockFibre – FR ACM

Phenolic – FR ACM

DCLG Testen volgens BS8414-1

PIR – FR ACM

eight photograph of cladding system following removal of ACM panels

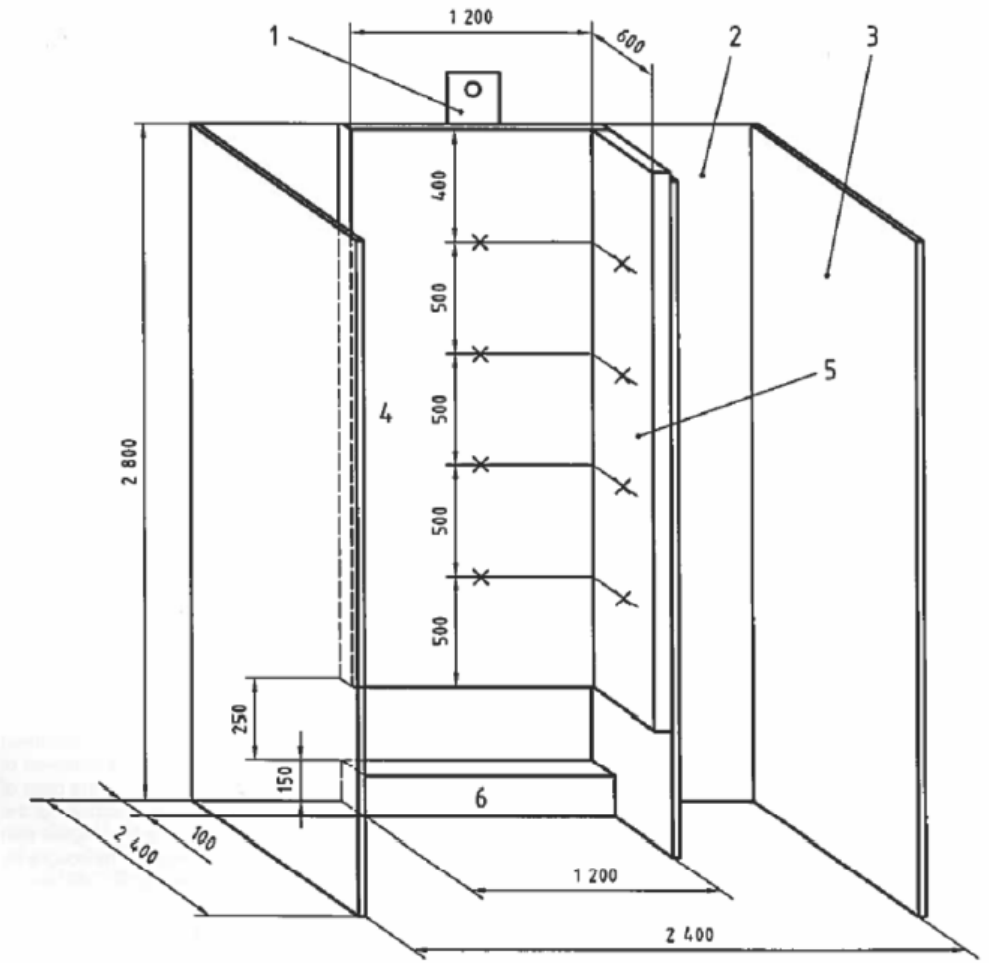
RockFibre – FR ACM

Phenolic – FR ACM

MEDIUM SCALE TEST ISO13785-1

- Vergelijkende testen
- Zelfde opbouw als DCLG testen
- 3 isolatiematerialen / 3 ACM types
- 30 minuten / 100 KW
- 3 brandstadia (groeifase, ontwikkeld, dooffase)

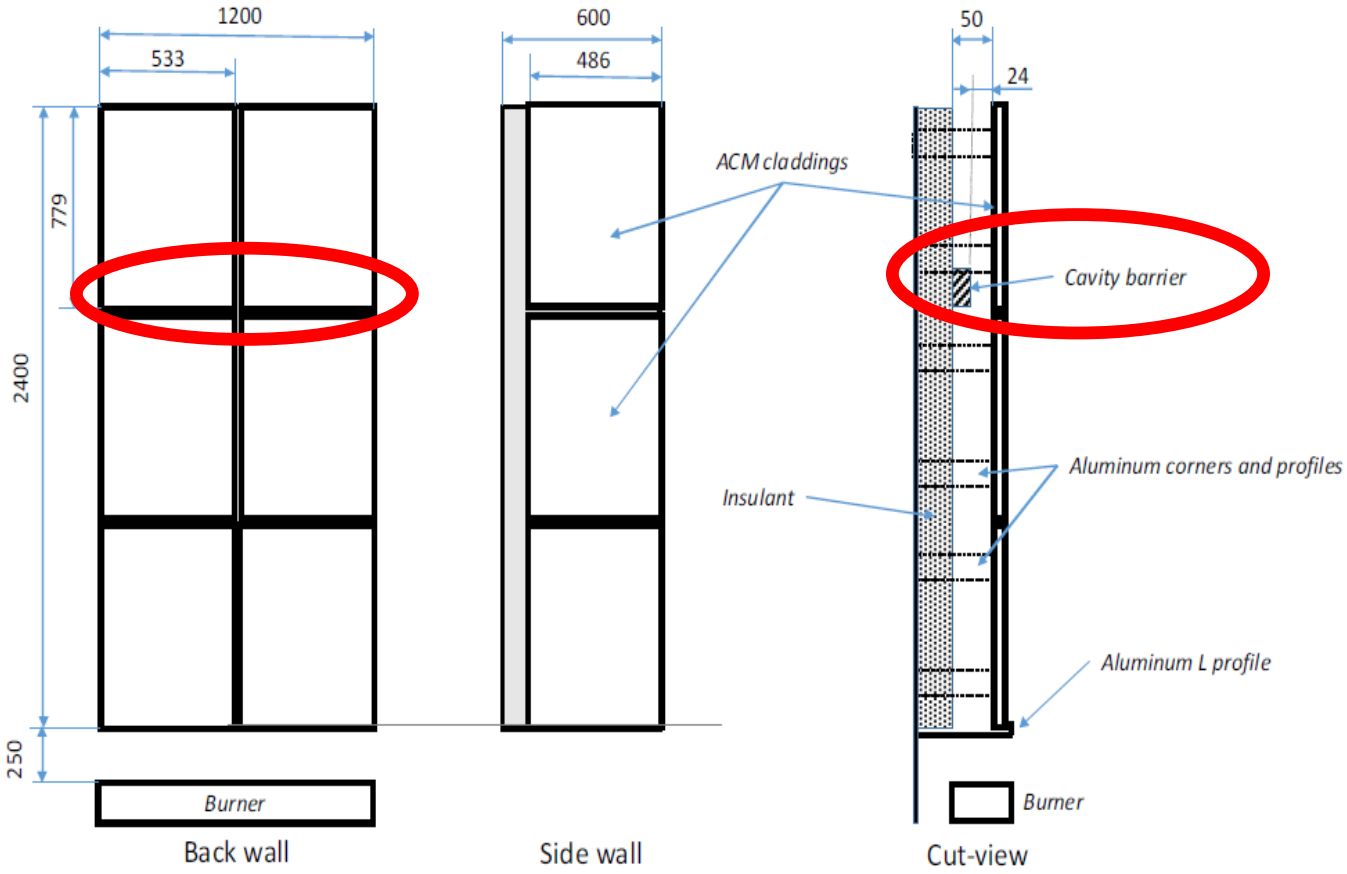
MEDIUM SCALE TEST ISO13785-1



Opbouw

- Isolatiemateriaal
  - PIR (50 mm)
  - Kooltherm Phenol (50 mm)
  - Steenwol (100 mm)

- Cladding Types
  - ACM v.v. Polyethyleen kern
  - ACM v.v. FR kern
  - ACM Limited combustible A2



Testen uitgevoerd bij Ulster FireSERT

Efectis

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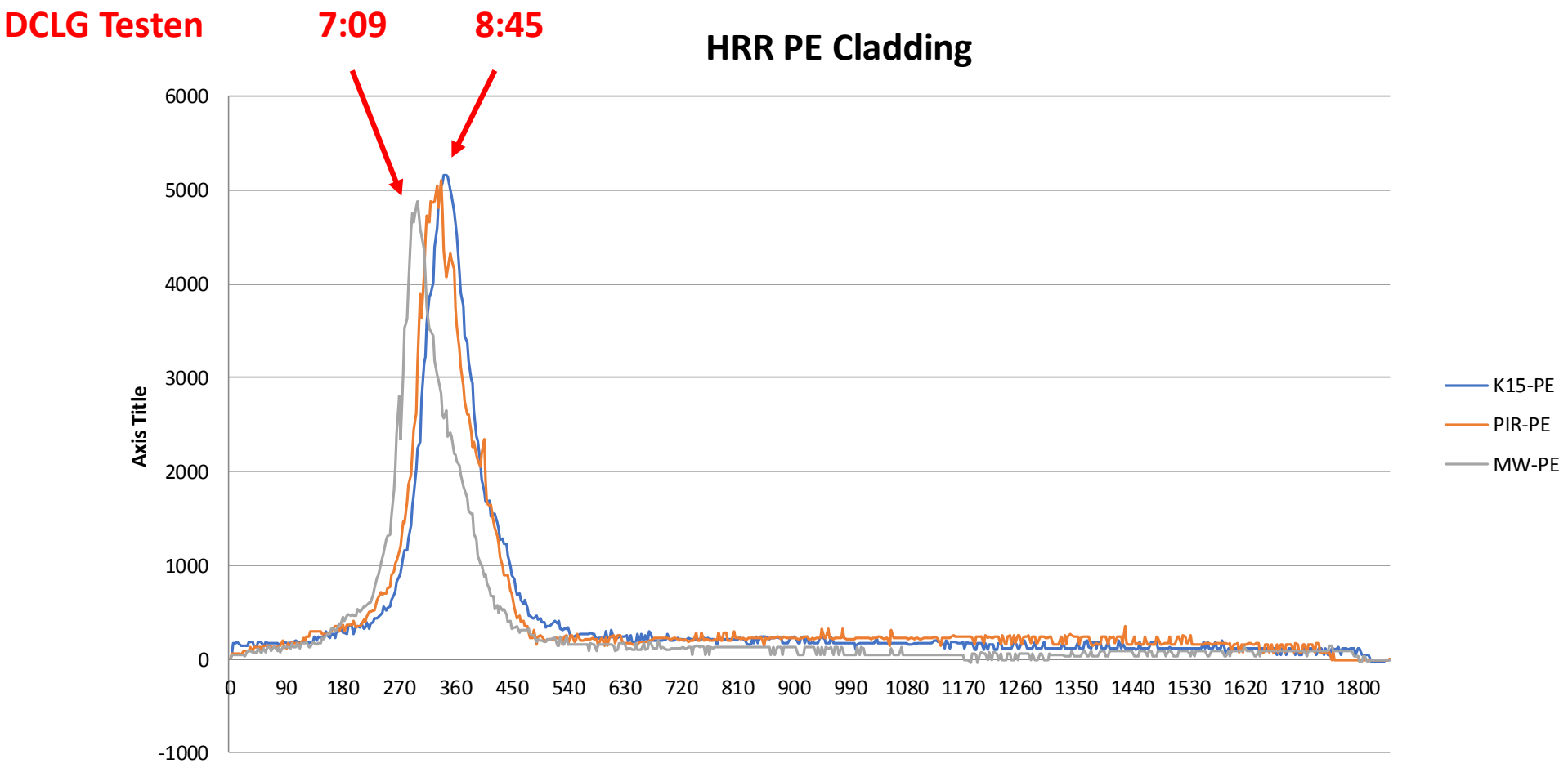
ACM v.v. Polyethyleen kern

PIR

K15

Stonewool

ACM v.v. Polyethyleen kern



ACM v.v. Polyethyleen kern

PIR

K15

Steenwol

Kooltherm K15 Phenol

PE

FR

A2

https://www.youtube.com/watch?v=K7XVt42C-V0&app=desktop

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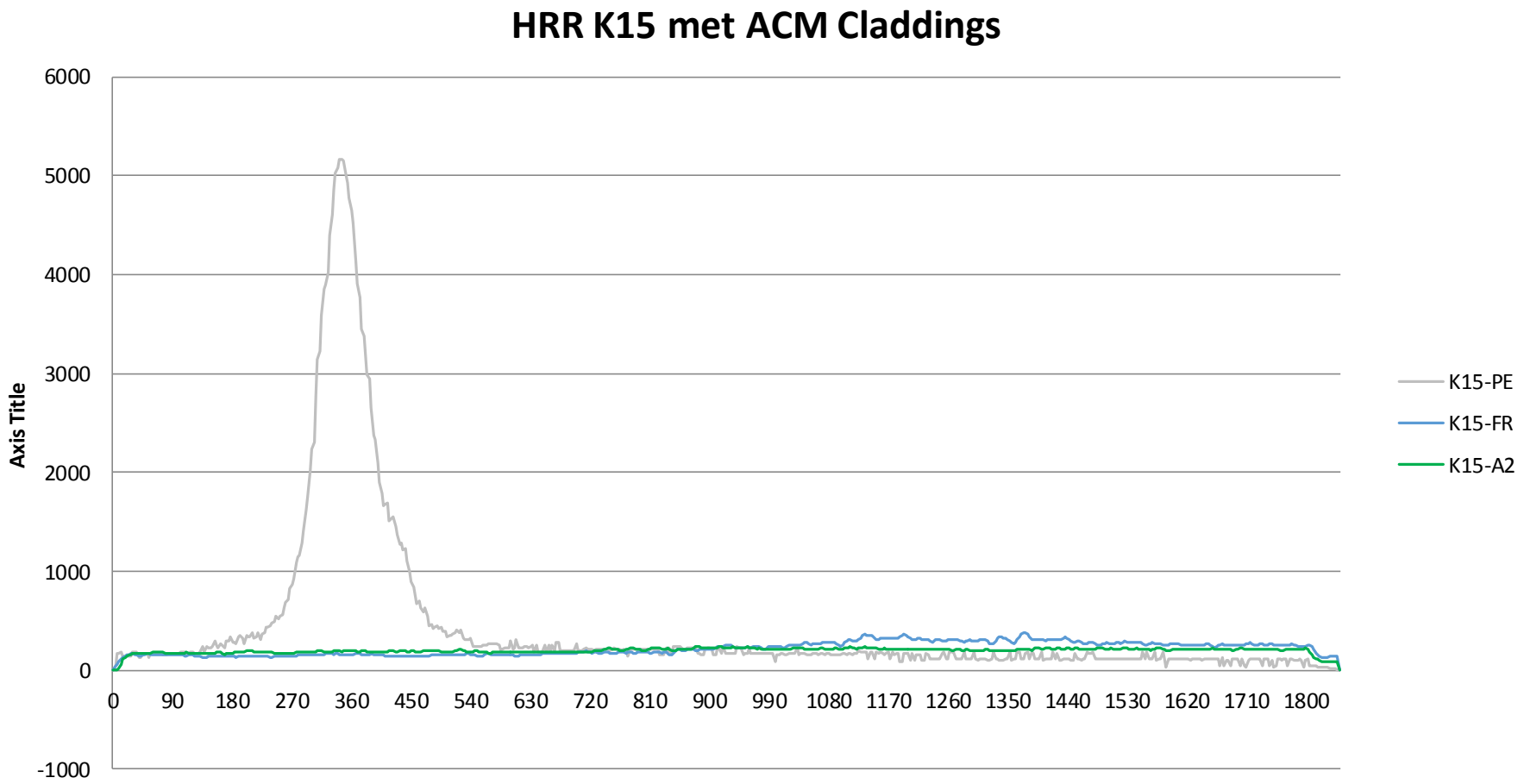
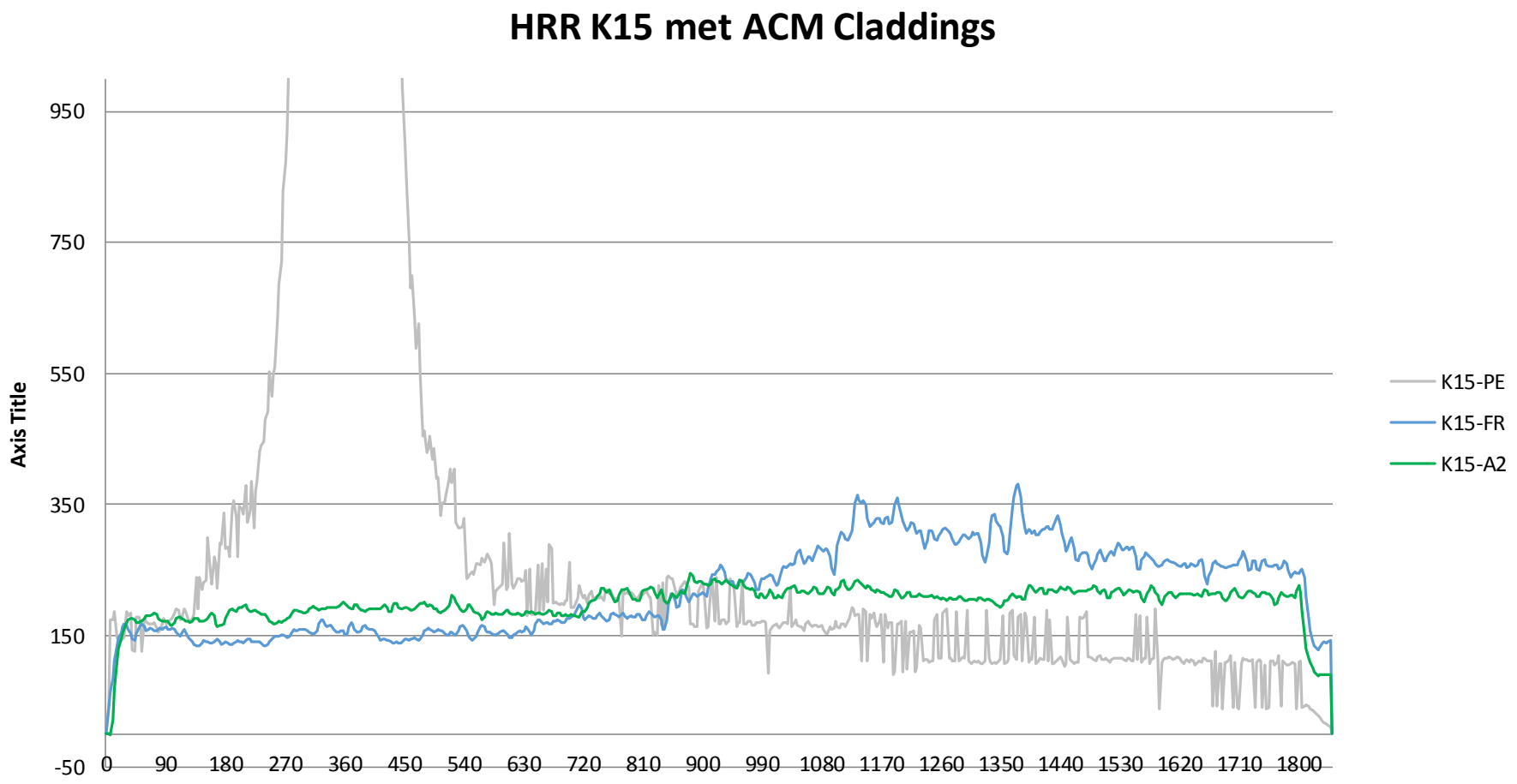
K15 met verschillende ACM Claddings



K15 met verschillende ACM Claddings



Maximum HRR van de 9 testen

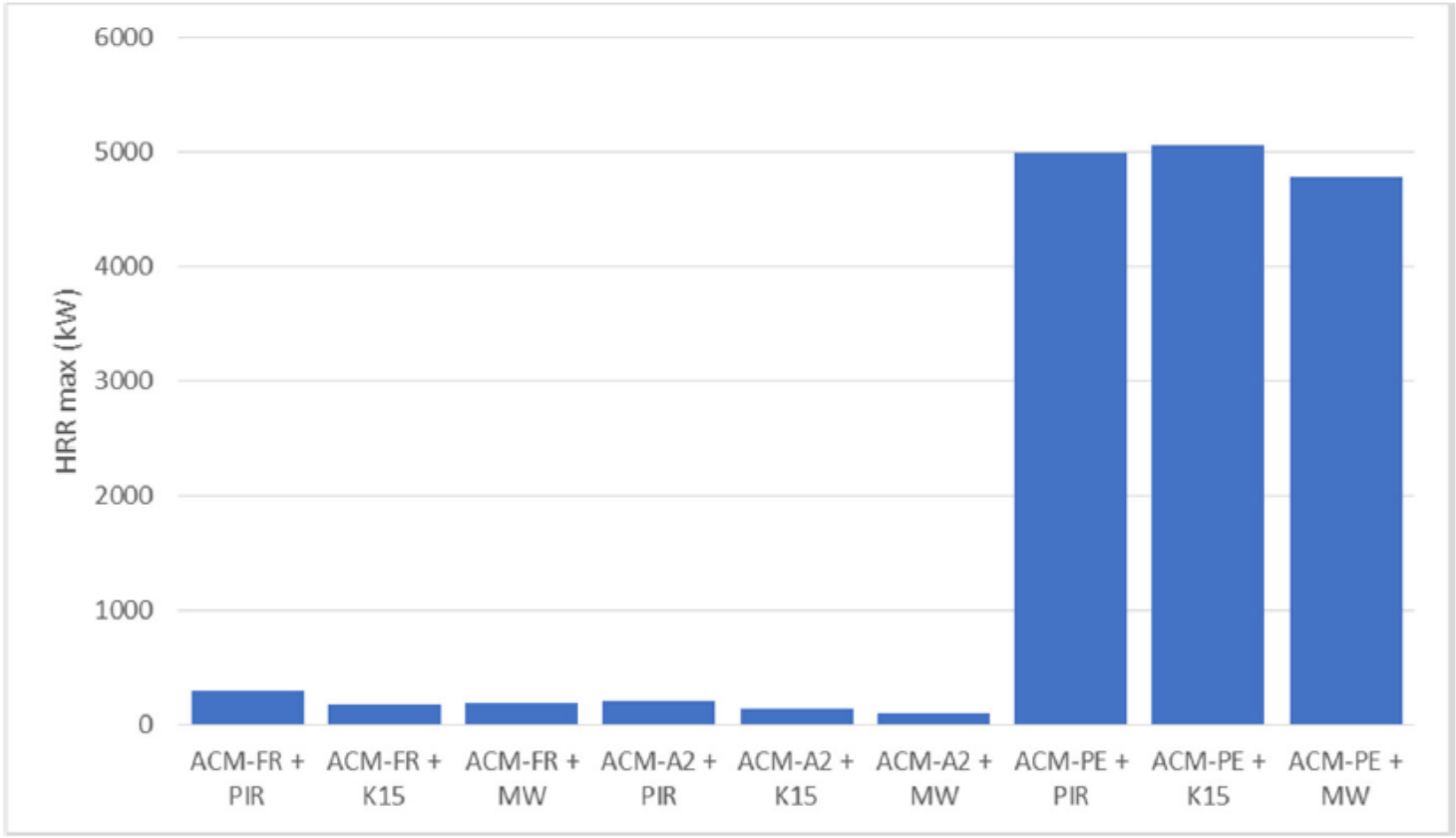
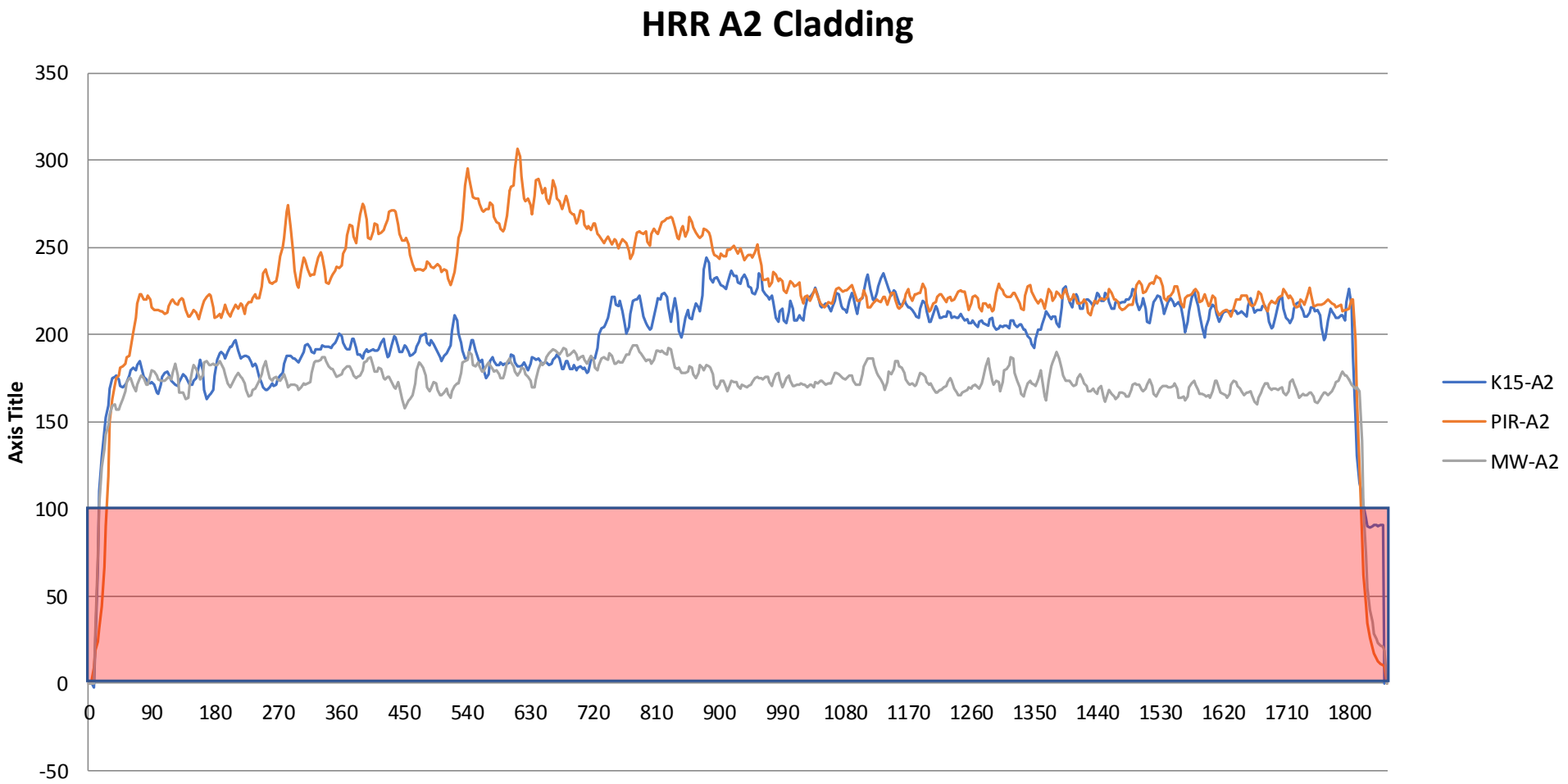


Figure 7 - Maximum heat release rate (contribution of burner removed)

HRR van de 3 isolatiematerialen met A2 ACM



Volledige paper gepubliceerd in Fire and Materials

Received: 22 December 2017 | Revised: 27 March 2018 | Accepted: 20 April 2018
DOI: 10.1002/fam.2635

SPECIAL ISSUE PAPER

WILEY

Study of fire behaviour of facade mock-ups equipped with aluminium composite material-based claddings, using intermediate-scale test method

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Summary

The fire behaviour of a building façade is dependent on the overall system's performance, rather than the performance of the individual components. A façade system includes the cladding and the insulant's characteristics, but also the cavities, cavity barriers, mounting and fixings, substrate, and any singularities, such as window frames. This publication presents façade fire propagation test according to the ISO 13785-1 standard, with additional heat release rate and gases analysis using FTIR. Tests have been performed on 9 different compositions of aluminium composite panels (ACM) with several insulants. For tested compositions, the cladding is the most important parameter driving global fire behaviour of façade mock-ups. ACM-PE-based cladding systems gave very different results from the other solutions tested. This was especially visible in heat release rates, where fire intensity was very high, whatever the insulant used in the system. The contribution of the insulant was only remarkable in these tests during the decay phase. The cavity barrier was largely ineffectual in the 3 tests with ACM-PE cladding, as the integrity of the cavity was not ensured.

KEYWORDS

façade fires, intermediate-scale testing, fire behaviour, gases evolved, heat released

1 | INTRODUCTION

Aluminium composite materials (ACMs) are increasingly commonly used as cladding when designing building facades nowadays, but different types of cladding can achieve very different levels of performance.

Assessment of a particular façade system's fire performance can be undertaken using large-scale testing in accordance with BS 8414-1, but there is currently no commonly accepted method of extending the scope of a large-scale tested system, to account for variances from the configuration that has been tested; it is therefore proposed that intermediate testing could allow a route for assessing the significance of different system configurations and components to extend the scope of large-scale tested systems.

The test protocol proposed for such intermediate level testing is a façade fire propagation test according to the ISO 13785-1 standard, with additional heat release rate and gases analysis using FTIR. Tests results have been compared with real-scale data available to estimate measurement relevance of such intermediate-scale tests.

In order to appreciate the variability of different system configurations, as well as the effect of different interactions between panels and insulants, a test campaign of 9 combinations of cladding and insulants was performed using intermediate level testing; this involved 3 different ACM-based cladding systems in combination with 3 different insulants within each system.

The global market for façade insulation and especially ventilated facades is growing quickly and likely to double in size by 2024.[1] In this growing market, the proportion of ACMs is currently estimated as

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Efectis

Special thanks to the authors of the Fire and Material paper:

Eric Guillaume, Talal Fateh, Renaud Schillinger, Roman Chiva, Sebastian Ukleja

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Aanbevelingen in Nederland

1. Large Scale Testing ipv SBI op alle systemen
   => voor risico gebouwen b.v. slaapfunctie > 13 meter
2. Goed na denken over EXAP en goed beschrijven
   => empirische bewijslast
3. Goede handhaving om te verzekeren dat 'As Built' overeenkomet met het design
   => "Real enforcement of design", geen papierwinkel

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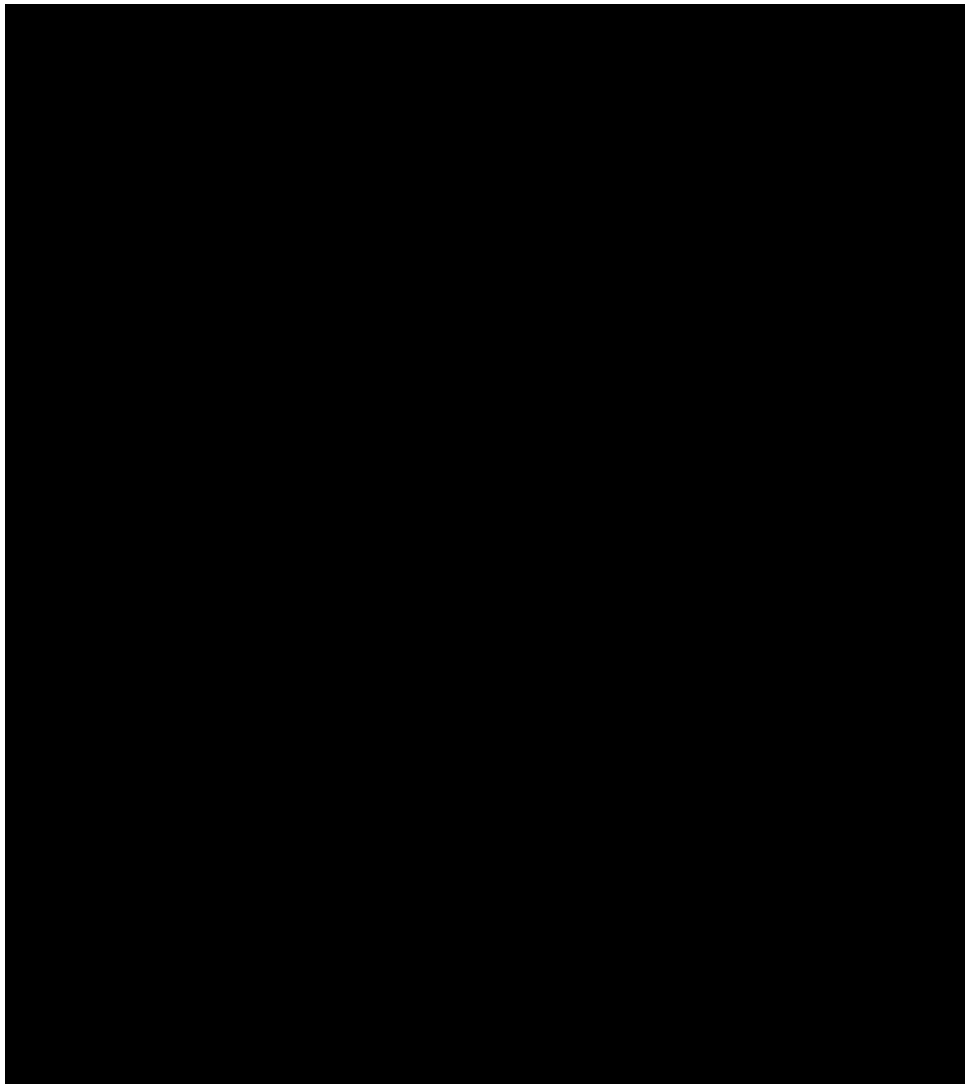
Steenwol A1 vs Kingspan K15 met Alpolic ACM A2



Bedankt voor uw aandacht

Vragen?

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