



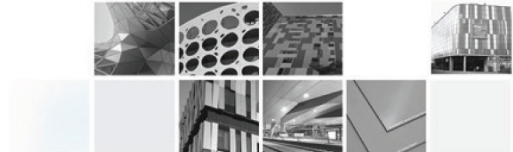
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FIRE – AN ALUCOBOND® PERSPECTIVE

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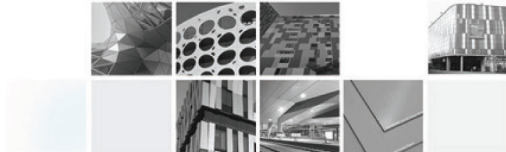


LETS TALK ABOUT FIRE!..... IN THE CONTEXT OF BUILDINGS

- What is Fire Retardant (FR) Aluminium Composite Material (ACM)?
- Why choose a FR ACM for any building?
- What are the various International Standards for qualification of FR ACMs?
- Regulations/ Building Codes followed by certain countries
- Testing methodologies used to determine the FR ACM Panel
- Common Myths and Realities around 'Real' FR ACM Panels
- ALUCOBOND® plus
- ALUCOBOND® A2
- Sustainability
- References
- Take Away

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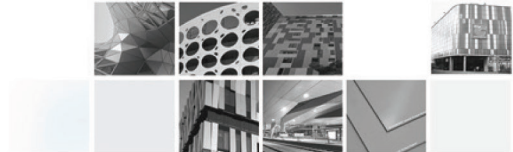


EXTERNAL CLADDING CAN POTENTIALLY BE AN
"ELEVATOR" FOR FIRE...



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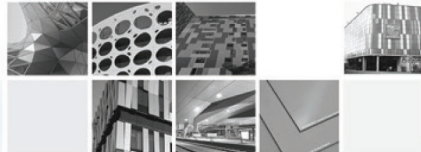


DEPENDING ON THE MATERIALS USED!

- Plastic foam insulation
- Stone wool insulation
- Glass wool insulation
- Timber/ Wood
- Concrete or other Cement based products
- Stone
- Plastics
- GRP
- Glass
- Metal
- Aluminium Composite Materials

So the main determinants are:

With or without insulation, and which insulation? With or without Fire Retardant products?



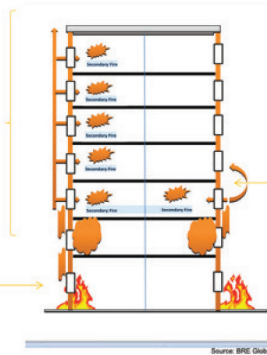
WHILE GLASS ALLOWS FIRE TO ENTER/EXIT, CLADDING ALLOWS/PREVENTS SPREAD

Rapid Fire Spread

Fire spreads upwards due to a combustible cladding, thereby contributing to the fire

Fire breaks in & out through glass

Flames break out
Smoke/ Fumes builds up



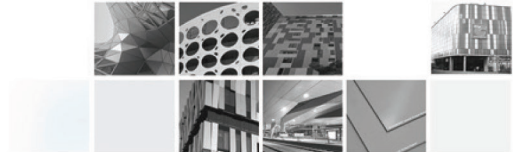
Source: BRE Global

Restricted Fire Spread

Fire spread is restricted due a FIRE RETARDANT or NON-COMBUSTIBLE cladding material and SYSTEM

No Droplets falling down to avoid further spread and hazard to people

No Smoke/ Toxic Fumes



AN FR ACM IS AS GOOD AS THE COMPOSITION OF ITS CORE

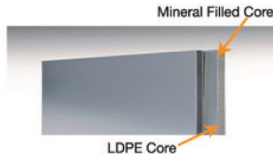
- An Aluminium Composite Material which has sufficient inherent capability to retard/ arrest fire propagation and does not emit smoke/ toxic fumes
- The fire retardancy stems from the composition of the core material used in the ACM
 - Traditional ACM core is largely made of low density polyethylene (LDPE), a petrol based product and fully combustible
 - FR ACM core has to largely or completely be a non-combustible mineral
 - The aluminium skins are inherently non-combustible
- The key is the composition and mix of Mineral in the core



LDPE

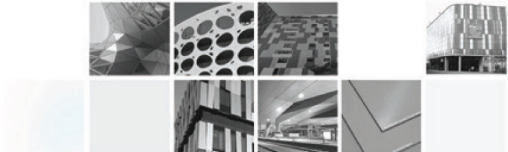


Minerals



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ESSENTIALLY ALL MID - AND HIGH-RISE BUILDINGS SHOULD USE A FR ACM

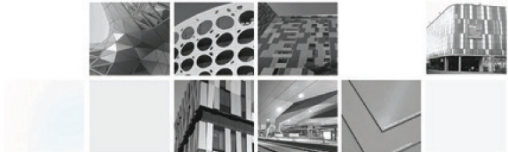
- To avoid any risk to human beings or disruption to business/ domestic life in a building in case of a Fire breakout either due to excessive smoke/ toxic fumes emanating from the ACM or due to propagation of fire.
- To adhere to the stringent regulations (in certain countries) around Fire Prevention in architectural products without having to compromise on the design element or the aesthetics of any structure.
- Along with a valid substructure, insulation and fixing system
- Because Fire Engines ladders can only reach up to certain height

BUT:

Very importantly, its not just the height that will determine the use of a FR panel but also the type and purpose of the building: e.g. schools, malls, hospitals can be considered typically low rise, but definitely worthy of a FR cladding

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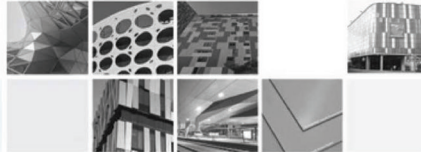
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WE MANAGE WHAT WE MEASURE...

...therefore it is key to know

- What performance we want
 - How to measure it
 - Which test to use to convince ourselves of the performance
-
- What defines performance for a fire retardant cladding solution?
 - Extent of lateral & vertical fire spread
 - Extent of smoke emissions
 - Extent of droplets emissions
 - Self-extinction of the fire on the panel
 - Applicable to all elements of the system used



THESE ARE THE MOST COMMON QUALIFICATIONS REQUESTED

Tests

ASTM E84
BS 476

Product Tests
(Reaction to Fire)

EN 13501

Wall Assembly Test
(Heat Transmission)

ASTM E119
NPFA 285
BS 84141

System Tests
(Resistance to Fire)



Source: BRE Global

... But choosing the right product starts with choosing the right test methodology



ASTM E-84

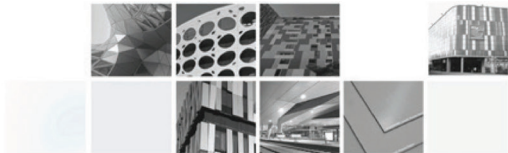


- Runs for 10 min
- Measures the distance of the flame spread and smoke emission
- Compares distance to a standard
- Results classified as:

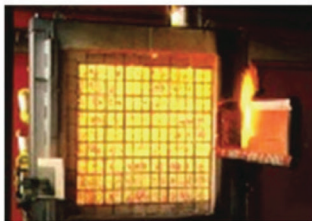
ASTM E-84	Panel	System		Flame test scale	Smoke test scale
Flame spread	☹	☹	Class A	0-25	0-450
Smoke development	☹	☹	Class B	25-75	0-450
Droplets	☹	☹	Class C	75-200	0-450
Self-extinguishing	☹	☹			

Verdict:

Not: suitable, even a PE panel can pass this test!



BS 476: PARTS 6 & 7



Part 7 test

- Runs for 1.5-10 mins
- Measures the speed and the distance of the flamae spread
- Results classified as:

Flame Propagation Index:

Class 1: 0-25 (mm)

Class 2: 26-45 (mm)

Class 3: 46-75 (mm)

BS 476 pt. 6&7

	Panel	System
Flame spread	☺	☹
Smoke development	☹	☹
Droplets	☹	☹
Self-extinguishing	☹	☹

- A panel obtains an overall BS Class 0 rating if

-it is Class 1, AND

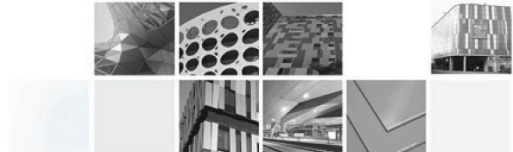
Verdict:

Not suitable, even a PE panel can pass this test!

-It has a subindex of no more than 6 when tested according to BS 476: Part 6

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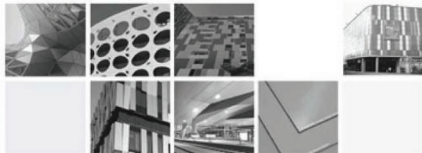
EN 13501-1



- Measures spread of flame and contribution to fire as well the generation of smoke and the production of burning droplets.
- Results are Classified as:

EN 13501-1	Panel	System	Material Designation	Classification
Flame spread	☹	☹		
Smoke development	☹	☹	Non Combustible	A1, A2- s1, d0
Droplets	☹	☹		
Self-extinguishing	☹	☹	Combusts with difficulty	B, C - s1 d0

Verdict:
Best suited when done
alongside an apt
System.



ASTM E-119

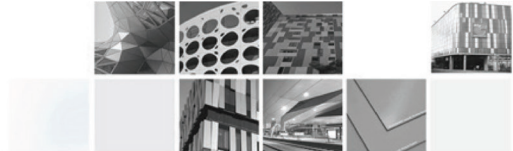


- Tests how long until an entire WALL ASSEMBLY fails to hold back temperature and hot gases
- Mostly used for structural, load-bearing walls and partitions, but NOT their joints!
- Measures the time until a wall assembly can hold back transmission of temperatures exceeding $\Delta+139^{\circ}\text{C}$
- Does NOT measure flame spread or fire propagation!
- Does NOT measure smoke development or toxic gases!
- Results classified as hours/minutes it takes until the delta of $+139^{\circ}\text{C}$ is reached

ASTM E-119	Panel	System
Flame spread	⊗	⊗
Smoke development	⊗	⊗
Droplets	⊗	⊗
Self-extinguishing	⊗	⊗

Verdict:

Not suitable, this for a different purpose and even a PE panel as part of the wall assembly can pass this test!



NFPA 285



- The test method is intended to evaluate the inclusion of combustible components within wall assemblies/panels that are required to be of noncombustible construction. It is intended to simulate the multistory flammability fire performance of entire exterior wall assemblies.

- In this 30 minute test the Results are Classified as Pass or Fail:

NFPA 285	Panel	System	Criteria	Result
Flame spread	☺	☺	If Flames do not reach 10Ft vertically and 5Ft laterally. No Visible flaming in the secondary story of the test room	PASS
Smoke development	☹	☹		
Droplets	☹	☹		
Self-extinguishing	☺	☺		

Verdict:
One of the best tests!



BS 8414-1



- This test assesses the behaviour of a non load bearing external cladding system. The test measures fire spread and classifies based on 3 distinct ways: External Fire Spread, Internal Fire Spreads and Mechanical performances.
- Results are Classified as Pass or Fail based on:

BS 8414-1

Flame spread

Panel System



Smoke development



Droplets



Self-extinguishing



Criteria

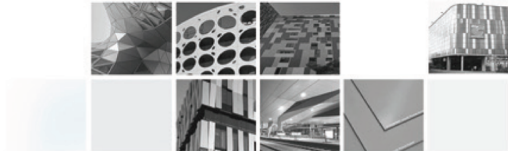
Temp < 6000C within
15 min of start time
(5m above
combustion
chamber)

Result

PASS

Verdict:

One of the best tests!



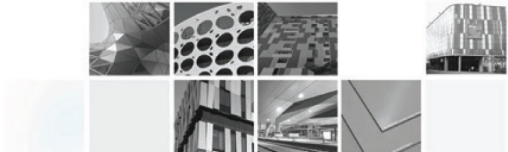
A COMBINATION OF A USEFUL PANEL AND SYSTEM TEST SHOULD BE USED

No single test covers all relevant aspects of performance of a FR ACM solution

Test	Flame	Smoke	Droplets	Extinguishing	System	Suitable?
ASTM E-84						NO
BS 476: pt 6&7						NO
ASTM E-119						NO
EN 13501						In combination with a system test
NFPA 285						YES
BS 8414						YES

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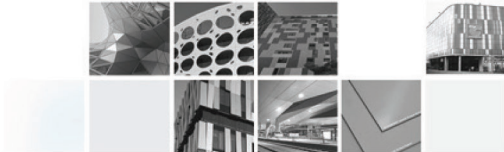


ONLY THIRD PARTY CERTIFICATES SHOULD BE TRUSTED, NOT TEST REPORTS

- Even if the right tests are performed, in most cases the test is based on samples provided by the applicant, i.e. the panel manufacturer
- In order to be sure that the samples are randomly selected and represent the true capability of the manufacturer and his products, a trusted third party organisation should
 - Inspect the factory in a regular cycle
 - Select random product during this inspection
 - Perform testing on the randomly selected product
- Otherwise, as an owner or specifier you cannot be sure that:
 - The test report is indicative of the actual product produced in the factory
 - The product is compliant with the claims/results of the test
 - The company is not "engineering" the results for one-time tests

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TYPES OF CERTIFICATIONS

Class 1A	The entire quality system is assessed. Product is type tested and surveillance testing/ inspection of sample(s) selected randomly from manufacturer's factory and/or open market is carried out periodically.
Class 2	Product samples provided by manufacturers are tested.





PROCEDURES FOR DIFFERENT CERTIFICATIONS

Procedures	Class 1A	Class 2
Submission of application, product catalogues and test reports	✓	✓
Submission of Production QA	✓	
Submission of batch inspection request	✓	
Submission of samples to the lab by the manufacturer		✓
Submission of request for Listing	✓	
Certification Lab evaluates documentation	✓	✓
Certification Lab conducts batch inspection/tests	✓	
Certification Lab conducts factory inspection	✓	
Certification Lab issues Certificate of Conformity (COC)	✓	✓
Certification Lab lists products and application in the directory	✓	

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CLASS 2

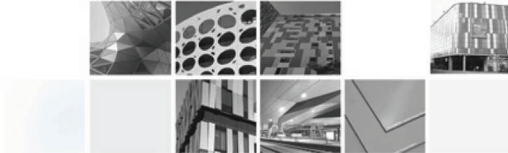


1A



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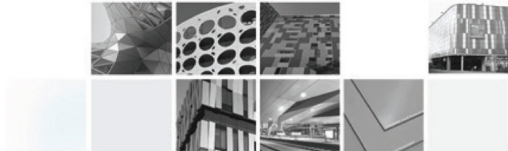


CERTIFICATION OF CONFORMITY FOR ALUCOBOND®

Products	Tests	Class 1A- COC	Class 2- COC
ALUCOBOND®	ASTM E-84	✓	
	EN 13501-1	✓	
ALUCOBOND® plus	ASTM E-84	✓	
	BS 476 Part 6 & 7		✓
	EN 13501-1	✓	
	NFPA-285	✓	✓
ALUCOBOND® A2	ASTM E-84	✓	
	EN 13501-1	✓	
ALUCORE®	BS 476 Part 6 & 7		✓
	EN 13501-1	✓	
	BS 476 Part 4		✓

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TRUE FR ACM

- Should have the right mix in its mineral filled core
 - >-70% minerals to qualify as a true FR
 - >-90% minerals to qualify under A2
- Should weigh nothing less than 7.6 kg/m² for a 4mm panel with 0.5mm aluminum coils on both sides.
- Only the above will pass the relevant fire tests (NFPA285 & BS8414) If coupled with proper insulation and fixing system
- Should be recyclable
- With all its functionality should provide design freedom and beauty which it is intended for



RECYCLABLE

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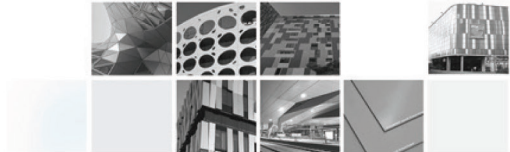
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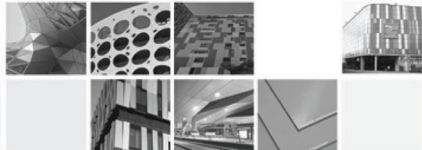
TRUE FR ACM WILL NOT

- Endanger people through toxic gases and smoke
- Spread the fire to the next floor and sideways
- Endanger people or help the fire expand due to droplets
- Contribute energy to the fire, but actually be self-extinguishing



Images courtesy The Daily Mail





MYTHS AND REALITIES AROUND THE 'REAL' FR ACM PANELS

Myths

White colored core means its a Mineral filled core-FR Panel

There is no difference between the weight of a PE panel and a FR panel

If a panel can withstand 'X' hours of fire test, its a good FR panel.

Test Certificates alone qualifies any ACM as FR panel/ manufacturer

Only passing the product tests is OK to be qualified to be an FR panel

Realities

In reality only if the core comprises of 70% or more minerals it can be classified as a FR panel. White colored core can be achieved by using white color pigments

The weight of an FR panel will always be more than that of the PE panel due to its composition. An ideal FR Panel should be $> \sim 7.6 \text{ kg/m}^2$

Incorrect. This is not the correct method to define an FR Panel. There are more comprehensive tests to determine a good FR Panel.

Not until an ACM manufacturer get a Class 1A certification can it be comprehensively qualified FR ACM product/ manufacturer.

There are enough cases of manufacturers providing different products for testing as against what they really manufacture/supply.

Partially true, but when compared to a real life situation its important that especially for high rise buildings the tests are done for the entire system rather than just the product alone



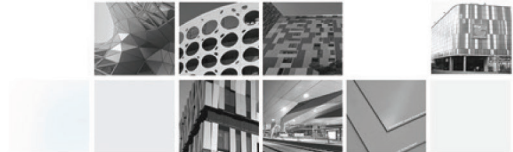
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ALUCOBOND® PLUS OR A2 ARE YOUR IDEAL FR ACM PANELS

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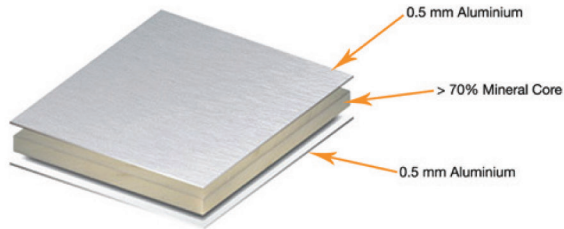
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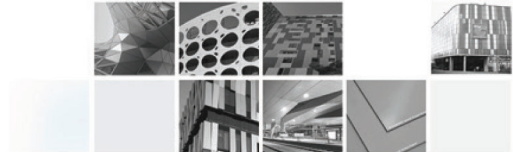
ALUCOBOND® PLUS

- Composite panel consisting of two Aluminium cover sheets and a non combustible mineral-filled core.
- The right composition and mix of minerals used is the best in class hence rendering a high quality FR panel.
- Specialty product for building code compliance on multi-story construction and applications where fire retardant materials are needed



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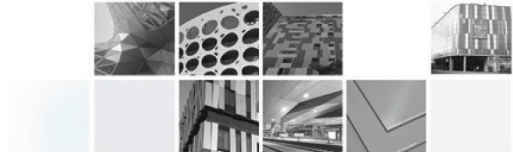


WHY ALUCOBOND® PLUS?

- Not only does it qualify the International Fire Standards it also provides the freedom around design/ aesthetics
- One can have most of the ALUCOBOND® surface finishes hence providing freedom of design aesthetics.
- As an ideal FR ACM panel, It doesn't spread the fire laterally or vertically, or have any toxic fumes causing any harm to people in the building.
- Not only does it not have any harmful droplets but also retards the fire from propagation.

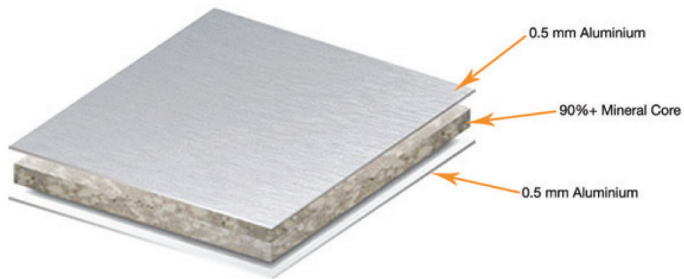
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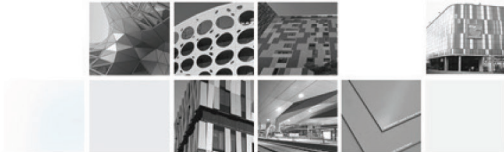
ALUCOBOND® A2

ALUCOBOND® A2 is the only non-combustible aluminium composite panel used in architecture world-wide. Due to its 90%+ mineral-filled core ALUCOBOND® A2 meets the highest requirements of the fire regulations and possibly the best FR ACM that there is in the world!!



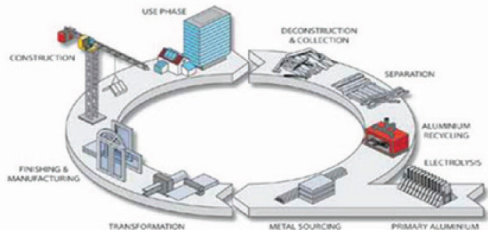
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SUSTAINABILITY

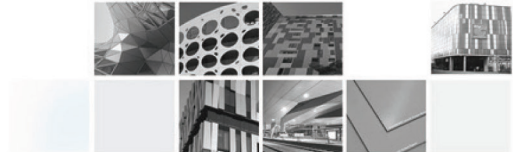
- Co₂ emission in ALUCOBOND® production has been reduced by almost 50% in comparison to what it was 10 years ago.
- During the life cycle of ALUCOBOND® composite panels, no substances containing CFC are set free at any time. The core material does not contain any nitrogen, chlorine or sulphur.
- ALUCOBOND® is fully recyclable, i.e. both the core material and the aluminium sheets are recycled and can be used in the production of new material.
- Having a very long lifecycle (~30 years) and having the recyclability of the same after that makes it very much a Green product.
- ALUCOBOND® has been investing time and resources around developing products which can help design and build Green buildings which helps gain important LEED points.



Source: EAA library

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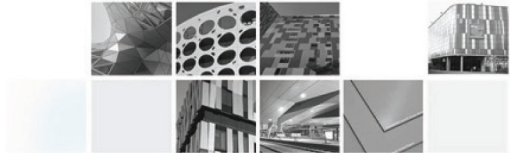


PROJECT REFERENCES



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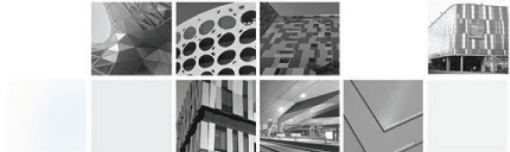


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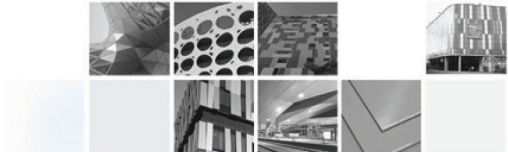


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TAKE AWAY- ALUCOBOND® FIRE RETARDANT PRODUCTS

- Fire Retardant core with best in class specifications
- Meets all International Standards of Fire code classifications
- Available in wide range of colors, finishes, widths and thicknesses
- Provides freedom of design at the same as matching the FR properties (Functionality meets Aesthetics)
- Global manufacturing set up to enhance customer service
- Support on apt Fixing Systems for application
- Offers Value Added Services like Optimization, Made to Measure panels, Ready to Install panels for an consistent and top class final outcome
- Environment friendly product
- Backed by the pioneers of ACM in the world – ALUCOBOND®

ALUCOBOND®

THANK YOU!!