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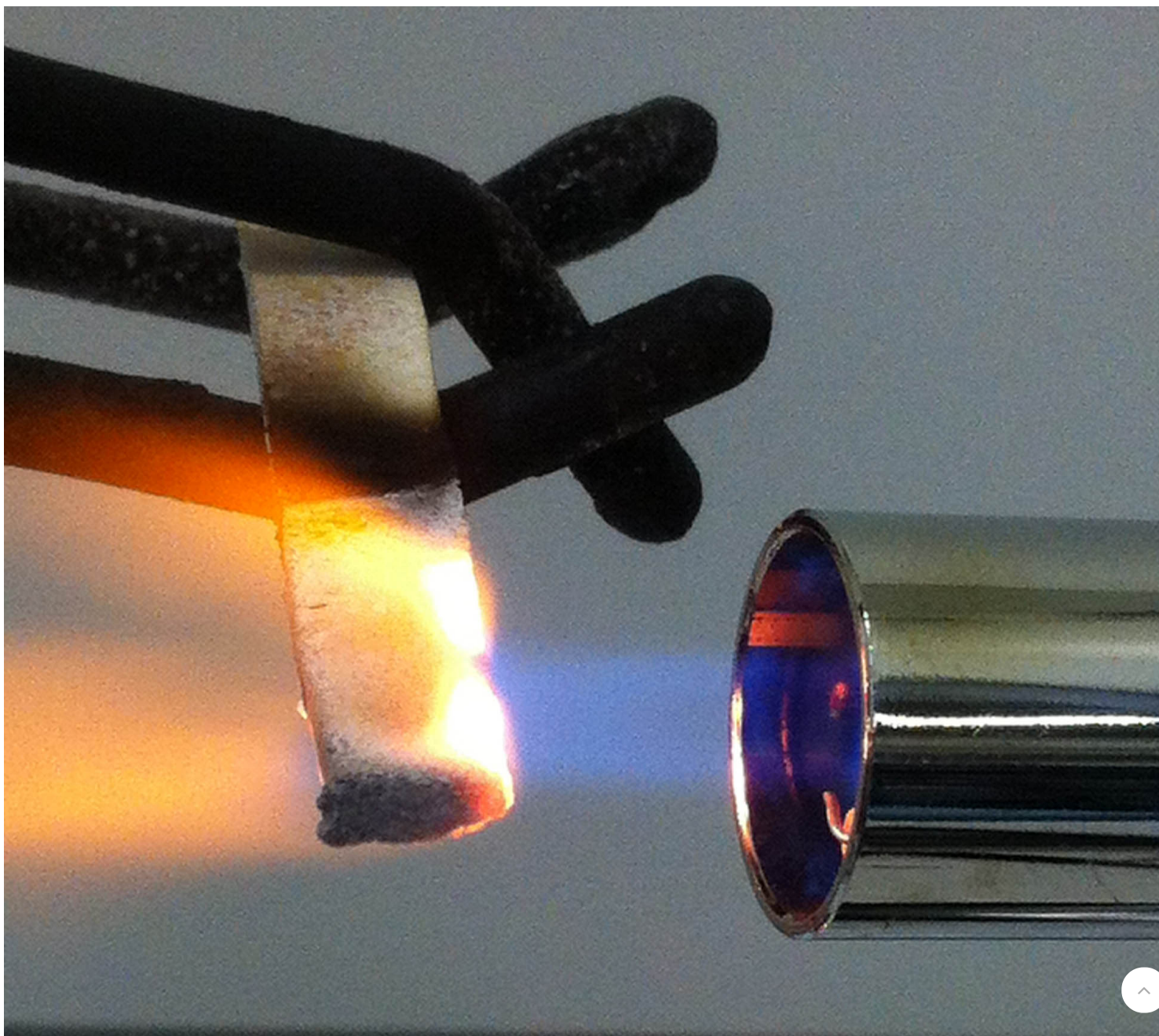
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Fire safety and the use of plastics in construction has dominated the news over the last few days following the tragedy at Grenfell. The stories circulating this morning are firmly pinning the blame on polyethylene (PE cladding) cladding tiles for the rapid spread of the fire up the building. Impact are actual experts in polyethylene (2 of our team have 80 years between them!) and as such know that PE is really not a good idea to have anywhere near a fire, so thought we'd take a look to see why in this case PE tiles had been used.

How the PE cladding was tested

According to the [Guardian](#) the cladding tiles used were Rynobond Architect PE tiles, made by Arconic. You can view the datasheet for the product [here](#). Please note there is apparently a separate insulation layer provided by another company, but we have focused on the outer cladding as it was reportedly made of PE, and that is what we know.



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Reynobond FR with Joint	PASS* CLASS A	PASS* CLASS A
Reynobond with KEVLAR®	PASS* CLASS A	PASS* CLASS A

*Flame spread ≤ 25, smoke developed ≤ 450.

Above is the data sheet on the Arconic website, for two products – the PE based material and the FR based material. The ‘FR’ product is likely to be a steel or similar mineral wool type material, while the PE material is simply extruded PE. Please note we have no information on whether the PE contained flame retardants (which we’d expect it to do).

Attention should be drawn to the ‘safety rating’ in the bottom right. We have enlarged it for you below;

Safety/Class A Rating Per ASTM E84

	Flame Spread	Smoke Developed
Reynobond PE without Joint	PASS* CLASS A	PASS* CLASS A
Reynobond PE with Joint	PASS* CLASS A	PASS* CLASS A
Reynobond FR with Joint	PASS* CLASS A	PASS* CLASS A
Reynobond with KEVLAR®	PASS* CLASS A	PASS* CLASS A

*Flame spread ≤ 25, smoke developed ≤ 450.

As you can see, all 4 materials achieved a ‘CLASS A’ pass.

That’s correct – they all appear to be the same performance.



Just to visualise this, the cladding panel would look similar to below, when in the horizontal plane;

Aluminium skin



PE core

Next, we need to understand how these products are tested. ASTM is the American standard and as such the product has also been tested in other countries using different standards. Below is another datasheet showing fire performance over a number of country specific standards, which all vary slightly from each other.



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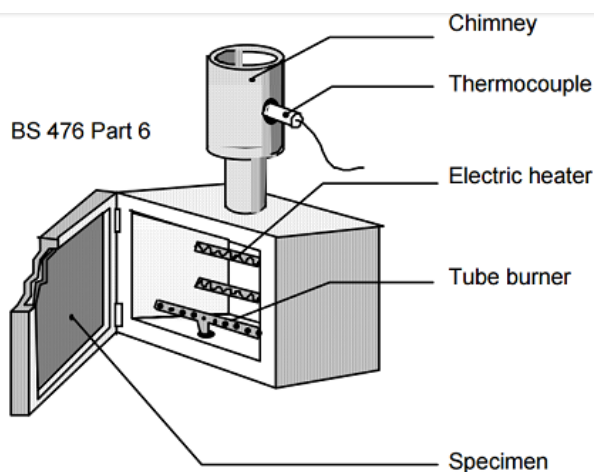
Poland ITB – 1592/W
Atest Higieniczny HK/B/0665/01/2007

Fire certificates for Reynobond® Architecture

Europe	EN 13501-1	FR: B-s1, d0 A2: A2-s1, d0
France	NF P 92-501	PE & FR: M1 Combustible non-inflammable
Germany	DIN 4102	PE: B2 – FR: B1
Switzerland	Directive VKF	PE: 4.2 – FR 5.3
Great Britain	BS476 part 6 & 7	PE & FR: Class 0
Poland	PN-90/B-02867	FR: NRO
USA	ASTM E 84	Meets requirements
Austria	ÖNORM 3800	FR: PASS
Russia	TR	FR: G1

Confusing ain't it? Welcome to the world of standards. They work a bit like political parties, in that everyone has their own idea on the best way to test something. The idea is the testing should simulate what is likely to happen when the product is used for a specific application in the real world.

To be able to understand what all this means, you need to go and look at the standards themselves. Thankfully someone has done this already so we don't have to – thanks Bayer! (<http://stephen-webster.co.uk/wp-content/uploads/2011/02/Fire-testing-overview-of-tests-per-country.pdf>)



The 'cladding tile' is the specimen. It is placed in a holder and subjected to 20 mins of burning from a gas burner, with electric heaters also heating the surface. Go back to our diagram of the cladding tile and see if you can work out why the PE tile passes in the same way the FR one does...

If you haven't picked up the problem yet, don't worry, because the German results are very telling. In Germany, the tiles are tested to DIN 4102, and as you can see this time the PE and the FR tiles have **DIFFERENT** results. PE has been rated as 'B2' whereas FR has been rated as 'B1'. If you have made it this far you really want to know what this means, and once again I can refer to the helpful guide from Bayer for guidance.



Here we have two test setups. On the right we have the test setup for the 'B2' test – on the left the setup for the 'B1' test.

The B2 test is broadly similar to the test carried out under BS476. A flame is applied to the middle of the tile. A product will be classified B2 if it passes the following;

Class B2 building material

Test specifications	
Specimen	Edge application of flame : 5 specimens 90 x 190 mm reference mark 150 mm from lower edge. Surface application of flame : 5 specimens 90 x 230 mm reference marks 40 and 190 mm from lower edge.
Specimen position	Vertical
Ignition source	Small burner, inclined at 45°, flame height 20 mm
Test duration	15 sec.
Conclusions	Passed if the tip of the flame does not reach the reference marks within 20 sec. on any sample for <i>edge application</i> of flame or, if failure is expected with this test, for <i>surface application</i> of flame.
Additional testing	If the filter paper under the sample ignites within 20 sec. after flaming, the material is judged to burn with flaming droplets.

The PE material passed this according to the data presented. This is not surprising as it looks a less rigorous test than the BS476 standard. ^

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If you have watched the clip there really is no need for words. Please bear in mind that we used a virgin PE with no additives to suppress fire (known as flame retardants) and we have no idea what was used in the material used at Grenfell. Therefore in no way should this rough test be used to claim the material was not fit for purpose. The data sheet clearly indicates the performance of the material, and that the PE material does not meet the Class B1 material requirements as shown below.



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The question then is why was a PE cladding tile used?

This is the topic the public inquiry will have to look in to. There is a number of questions which will need to be investigated and answered. It should also be clearly highlighted though that the standard as published has the following scope. Note the last sentence.

1 Scope

This Part of BS 476 specifies a method of test, the result being expressed as a fire propagation index, that provides a comparative measure of the contribution to the growth of fire made by an essentially flat material, composite or assembly. It is primarily intended for the assessment of the performance of internal wall and ceiling linings.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

So was that even the right standard? Probably not if the tiles were (one of) the problems (which we don't yet know). Another possible standard to use would have been BS8414 part 1 which looks at 'combustible cladding materials'. (see https://www.allerdale.gov.uk/downloads/bca_guidance_note_18_use_of_combustible_cladding_materials)

While people should not jump to conclusions too soon, it is clear there is a disconnect between different standards, and a disconnect between how these standards are interpreted by product manufacturers and designers. It is not the first time, and will not be the last, that Impact have dealt with issues such as this during our day to day testing across a wide range of industries.





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