



Testing. Advising. Assuring.

TO WHOM IT MAY CONCERN

INFLUENCE OF SUBSTRATES ON FIRE PERFORMANCE

The fire performance of any product is strongly dependent on the substrate upon which it is used. Test and classification reports should therefore always refer to the substrate when providing a classification since for any one material it is possible to achieve different classifications depending on the substrate.

One example would be a wallpaper product. The table below shows the possible classifications which can be derived on the same wallpaper when used with different substrates.

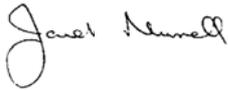
Substrate	European Class
Fibre Cement	B-s1,d0
Calcium Silicate	B-s1,d0 or C-s1,d0
Plasterboard	C-s1,d0
Mineral Fibre Insulation	E or F
Chipboard (Particleboard)	D-s1,d0
Air	E or F

The flammability or fire response of any product depends on the time it takes for the product when heated to reach its fire point, that is the temperature at its surface at which the product will ignite. Substrates behind the product are important because they act as heat sinks to varying degrees. The heat sink effect is essentially a mechanism by which heat is drawn away from the surface of the product the speed at which this occurs increases the time taken for the product to reach its fire point. The factor which influences this is the thermal conductivity of the substrate determined by the equation $k/\rho c$, where ρ is the density. There is therefore a direct relationship between density and the rate at which heat is drawn away from the surface of the product, thus the more dense the substrate the better the fire class. This is the reason why the classification of a product on a non combustible mineral fibre substrate is so low. The density is so low that the fibres act as an insulant and the heat largely remains in the product.

When an airgap is behind a product, the air itself is the substrate. Air is an excellent insulator (hence the use of air between 2 panes of glass for double glazing or within thermos flasks). Air therefore serves to insulate the product and the heat is retained in the product which will reach its fire point quickly. In simple terms a match applied to a piece of paper will cause it to burn, a match applied to the same piece of paper which is stuck to a piece of glass will burn your fingers before anything happens to the paper.

I hope this provides sufficient explanation on the effects of substrates on classification of products

Yours sincerely

A handwritten signature in black ink that reads "Janet Murrell". The signature is written in a cursive style with a large initial 'J'.

Dr Janet Murrell PhD, MRSC, C.Chem. MIFS
For and on behalf of Exova Warringtonfire

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