

ADVISORY NOTE 0.5

Using Polyurethane Foams in Firestopping Applications

General Properties of PU Foams

PU foams are normally dispensed from pressurised cans through application guns or long nozzles as a sticky liquid which quickly expands to many times its original volume to form rigid foam. PU foams are not structural materials and hence should not be used in areas subject to foot traffic where such traffic is likely to pass over the seal and transfer load to the seal material.

Fire Performance

► Reaction to Fire

Many PU foams claim to be 'Fire Rated' often citing e.g. a Classification such as B1, B2 or B3 (which is based on the German DIN4102-1 test and classification system) or C-s1,d0 (based on the BS EN 13501-1 classification system). These classifications are based on 'reaction to fire' testing and are concerned with the ignitability, surface spread of flame and heat release characteristics of the material during the initial, pre-flashover phases of fire development.

Reaction to fire classifications such as the above do not support the use of the material where fire resistance is required to maintain compartmentation, such as in linear gap or service penetration seals.

► Fire Resistance

Fire resistance, in the context of fire testing, is the ability of a wall or floor to maintain fire separation so that fire does not spread from one compartment to another in a fully developed, post flashover fire. PU foams which are to be used in linear gap or service penetration applications must have their fire performance determined by testing to the appropriate fire resistance test standards.

In the UK the appropriate standards are BS EN 1366-4 in the case of linear gaps, BS EN 1366-3 for service penetration seals and BS EN 1634-1 for fire doors, which includes the seal between the door frame and supporting wall construction.

Once tested to the required Standard(s) it is important that the scope of application of the test results is assessed by a competent person or organisation in accordance with current industry agreed guidance and that the products are not used outside of the scope of such guidance without further support from expert opinion.

For example, PU foams tested as linear gap seals cannot be used to seal pipe or cable penetrations (see photo overleaf) unless they have been tested and can be evidenced as suitable for use sealing pipe or cable penetrations.



Above: Examples of Firestopping seals that are unlikely to be supported by test and certification.

Performance evidence should be sought via a UKAS Accredited third party product certification scheme. In the absence of this, European or UK Technical Assessments or UK/ European Classification documents should be requested. (ASFP Advisory note 34 contains more information about the different types of performance evidence)

Guidance in use

PU foams are combustible and hence the rate at which combustion occurs under standard heating conditions will be dependent upon such factors as the available oxygen and the presence of conductors capable of transferring heat into the seal. With respect to the amount of available oxygen, the aspect ratio (gap/opening width/seal depth) will be a key factor in determining fire performance. The narrower and deeper the gap, the longer it will take to burn through.

In the case of heat transfer, the presence of penetrating metallic pipes or cables with large metallic conductors will have a hugely detrimental effect on fire performance of materials tested solely as a linear joint (in accordance with BS EN 1366-4).

For applications where PU foams are used to seal metal pipes and cables performance evidence should be seen to be within the scope of the classified and tested application, (in accordance with BS EN 1366-3).

UK Buildings Regulation Guidance suggests that openings for small plastic pipes of 40mm o/d or less need only be fire stopped around the pipe without the need for the use of a pipe closure device or a metallic sleeve. ASFP thinks this guidance is fundamentally flawed, (see Advisory note 2 for more details). In circumstances where the small pipe dispensation is being used in England and Wales (ADB Vol 1 clause 9.4), it is important that the seal around the pipe is non-combustible so as to limit the size of any resultant opening in the fire separating construction and consequently the use of PU foam is not suitable.

Plastic pipes may also be sealed by the use of intumescent wrap systems designed to expand under fire conditions crushing the softened pipe and sealing the opening. Such systems require external restraint in order that the intumescent expansion is directed inwards. Hence, if PU foam is to be used to seal an opening around such a device, evidence must be available which demonstrates the required fire performance under test to BS EN 1366-3.

Finally, care should be taken where the bonding properties of the foam under fire conditions may be critical to the performance of another element, for example, if the foam were to be used to bond the frame of a fire-resistant door into a structural opening without the use of additional mechanical fixings. In such a case the erosion of the foam as it burns is likely to significantly weaken the stability of the frame to the point where it has a detrimental effect on the fire performance of the door assembly. Hence, as with intumescent pipe wrap, proof of performance in the intended application must be available before use.

One area where PU foams may be acceptable to use without suitable test evidence is in replacing a Polyethylene foam backing rod, which is then used to allow a full depth bead of mastic to be installed in a fire resisting seal around a pipe or cable bundle. All other details of the seal (mastic depth and diameter) must be in accordance with the original classified and tested detail.

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