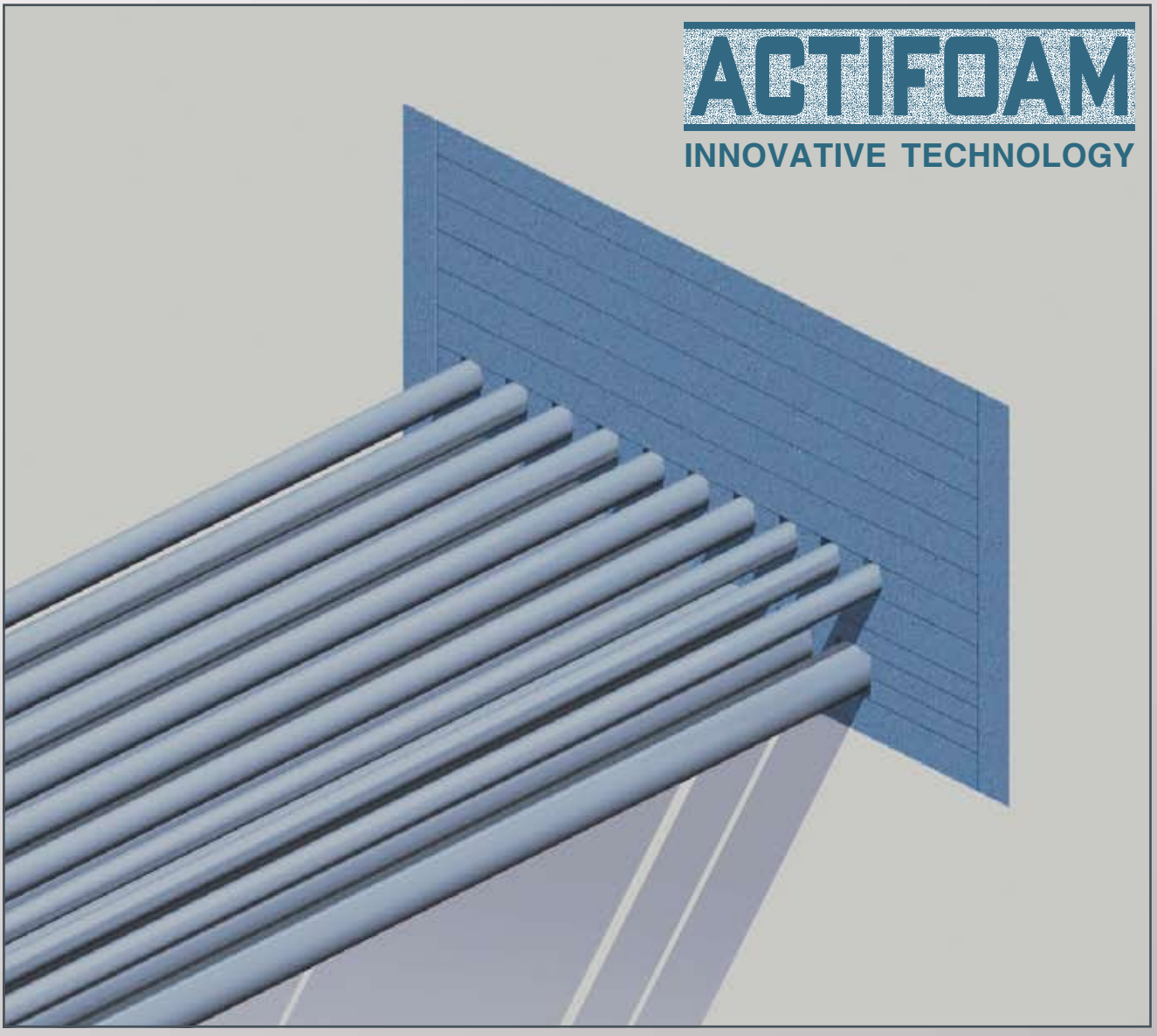
ACTIFOAM® FIRE STOP SEALING SYSTEM FOR CABLES/CABLE WAYS IN BUILDING AND INDUSTRIAL PLANTS

ACTIFOAM

INNOVATIVE TECHNOLOGY



SUCCESSFULLY TESTED ACCORDING TO EN 1366-3:2004; FIRE RESISTANCE EI90/E120 ACCORDING TO EN 13501-2:2003 CERTIFICATE 2007-EFECTIS-R0122

ACTIFOAM

MAXIMUM SIMPLICITY OF USE
OPTIMUM FLEXIBILITY
OUTSTANDING PERFORMANCE

Websites: http://www.actifoam.com, www.beele.com, www.firsto.com, www.nofirno.com, www.rise-systems.com, www.rise-nofirno.com, www.riswat.com and www.slipsil.com

BEELE ENGINEERING BV
CSD INTERNATIONAL BV

BEELE Engineering and CSD International have been working in the field of water and gas tight and fireproof sealing of conduits for pipes and cables for more than 35 years. In the field of passive fire prevention, we have invested substantial amounts of money in the development of systems which are capable withstanding fires for extended periods of time. Passive fire prevention is a very complicated matter due to the fact that cable and pipe penetrations have to be designed to the actual circumstances at site and not for a laboratory test. In case of a catastrophe penetrations are subject not only to flame erosion and very high temperatures, but also to mechanical loads due to collapsing cableways and possibly a jet of fire-fighting water. This means that the performance in actual situations can differ dramatically from that in a regular fire test. In fact, the systems could only be applied as tested to guarantee the required fire safety.

And this means discussions and limitations!

We have ensured that our systems will function under all circumstances, and the classification societies have awarded us signed and stamped installation drawings of our sealing systems. Approved for steel and aluminium partitions. Guaranteed safety in your installation will be the result.

The R&D department of BEELE Engineering is constantly working in the field of rubber and systems techniques to optimize the existing systems and to develop new concepts for cable and pipe conduits on board of vessels and offshore installations. Although installation of the CSD sealing systems is in fact an easy matter, a full training programme can be given in-house by our engineers. Because the advantages and possibilities of passive fire prevention and evacuation signposting can most effectively be discovered in an environment that matches the practical situation as closely as possible, we have constructed an unique research and development centre. As far is known, this R&D centre is the only institute world-wide where visitors can experience for themselves all the aspects of fire prevention and evacuation signposting systems.

Above an impression of the research and development centre with a training and schooling institute for passive fire prevention products and systems and for the improvement of evacuation signposting systems in buildings and on board ships. The centre consists of a presentation theatre seating up to 45 persons, and a mock-up covering about 500 square metres in which various evacuation signposting systems are installed to enable their effectiveness to be determined in the dark.

The behaviour of escaping persons inside the test facility is recorded from a separate technical area (with an associated showroom) by means of infra-red cameras and an audio-video system.

In addition the centre comprises three laboratories with a total surface area of about 300 square metres in which, respectively, large-scale fire tests, mechanical tests, and light emission investigations are performed.

ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

ACTIFOAM®: INNOVATIVE TECHNOLOGY

BEELE Engineering: the inventor of the ACTIFIRE® technology

The ACTIFIRE® technology was developed specifically to allow mechanical loads on the construction caused by fire to be absorbed. This technology is designed to enable the sealant materials used to perform an active and fire-resistant function during a fire. This function is not achieved by volume-expanding (intumescent) materials, whose surface structure swells during fire and thereby provides thermal insulation for the materials behind, but materials that when exposed to high temperatures or fire will produce new fire retardant material (in large volume).

The purpose of ACTIFIRE® technology is to ensure that during a fire the rubbers, thermoplastics and compounds used for the seal will produce such an amount of fire retardant material that major deformations or displacements can easily be followed. As a result the penetration will remain fire-tight. The higher the temperature, the more fire retardant material will be produced. Because of this “active material production”, in the event of a fire an elevated pressure will be formed inside the penetration. The result is that a virtually solid rubber mass forms inside the penetration, with which its fire resistant and sealing capacity is effortlessly maintained.

In addition, “excess” new material produced is forced out of the penetration at the exposed side (together with all the softened plastic materials of the cable sheaths). The expansion caused in this way not only effectively lengthens the penetration but it also compensates for the displacements and substantially extends the withstand time in a fire.

This production of extra fire retardant material during fire is not only necessary in order to absorb the resultant deformations and displacements of the construction and conduits. This extra fire retardant material also fills up the openings which are left by the softening and combustion of cable sheathing and insulation.

The development of the ACTIFIRE® technology has the added benefit that the sealing systems which are manufactured on the basis of this technology are far less vulnerable for inadequate maintenance than existing systems.
Even if a cable is removed from the penetration without sealing the remaining opening, the ACTIFIRE® technology will ensure that this opening is immediately compressed in the event of subsequent fire or elevated temperature.

This means a significant reduction in the fire engineering risk of cable and pipe penetrations.

The ACTIFIRE® technology is based on a combination of only two components (additives), which are capable of giving virtually all base elastomers fire-retardant properties. The new technology also ensures that, when exposed to flames, fire-retardant ACTIFIRE® rubbers, thermoplastics and compounds will not shrink.

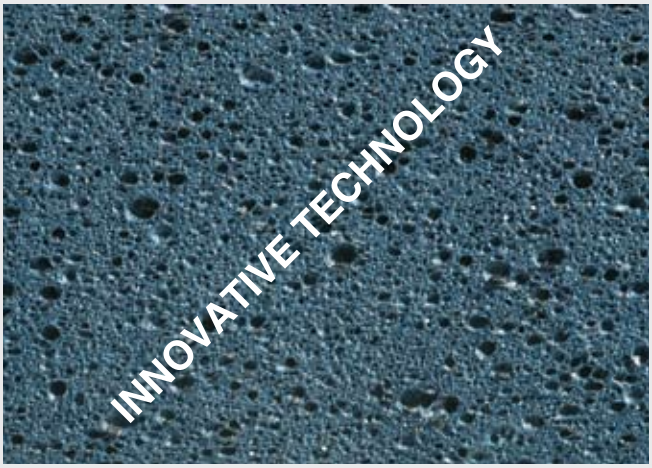
Based on the ACTIFIRE® technology it has proved possible to produce mixtures of rubbers and thermoplastics having an oxygen index far in excess of the minimum value of 30 LOI (Limiting Oxygen Index) which is specified for flame-suppressant materials. Rubber mixtures have even been formulated which exhibit an oxygen index of 85 (an oxygen-rich environment of 85% is required for the rubber to ignite!).

To obtain the flame-suppressant properties, the ACTIFIRE® technology does not make use of halogens, such as chlorine, bromine and fluorine. As a result, a number of rubber formulations (depending on the base elastomer) have been found to comply effortlessly with the values relating to the smoke index and the toxicity of fumes generated by rubber products as set by the Naval Engineering Standard.

The additives to be used for the ACTIFIRE® technology were chosen crucially on the basis of extreme length of lifetime. It is not specified anywhere in the specifications or regulations that fire-resistant sealing systems shall be artificially aged before the systems are tested. And nevertheless, it is known in advance that this kind of systems are characterized by long service lifetimes.

In spite of this omission in the requirements, the new ACTIFIRE® technology is ‘future-proof’. After artificial ageing the flame-suppressant and shrink-resistant properties of various ACTIFIRE® rubbers and compounds, when used at normal temperature, exhibit hardly any difference from those of new material.

The newly developed ACTIFIRE® technology not only makes a fundamental contribution towards optimizing passive fire prevention systems. The technology also makes it possible to extend the application scope of passive fire prevention to many other sectors. Fire safety in general can therefore be raised to a significantly higher level on board ships and in buildings and installations.



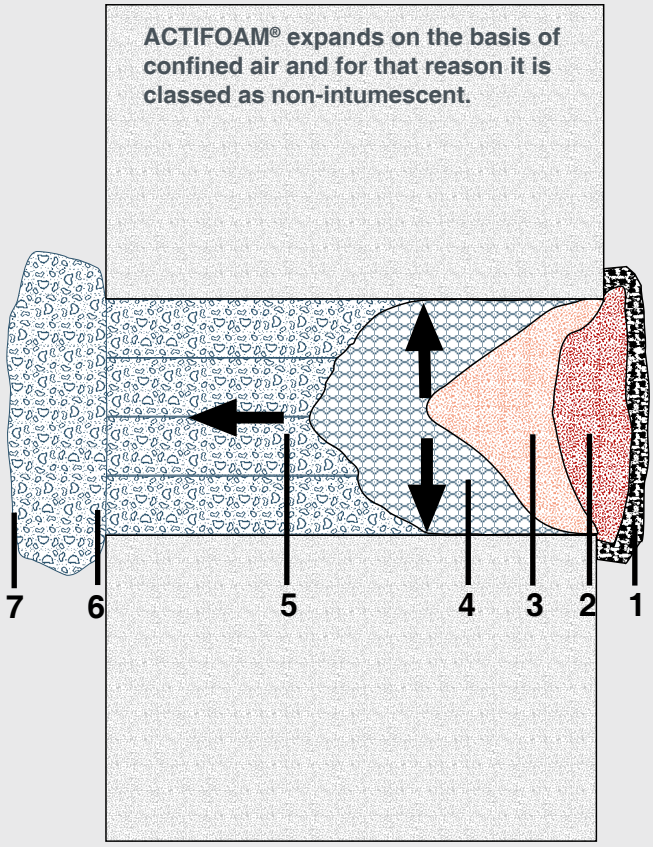
ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

ACTIFOAM®: INNOVATIVE TECHNOLOGY

BEELE Engineering: the inventor of the ACTIFIRE® technology

Based on the experience gained with the ACTIFIRE® technology in the applications of the RISE® sealing system, a development has been started up with the goal of further optimizing the technology. In particular for the installations in the construction sector, the RISE® system – although recognized as superior in terms of fire performance – is perceived as being technologically rather too advanced. For that reason the ACTIFOAM® system has been developed as a derivative of the ACTIFIRE® technology. Installation of the ACTIFOAM® penetrations is extremely simple. These penetrations also possess outstanding fire performance properties. The functionality of the expansion in the ACTIFOAM® penetrations is exactly opposite to that of the ACTIFIRE® technology. Instead of the length of the penetration being extended by the massive formation of new material at the exposed side, with ACTIFOAM® the expansion is achieved by means of volume expansion of confined air in the cell structure. As a result, the extension takes place at the non-exposed side.

The basics of the ACTIFOAM® technology



1) at the exposed side some expansion of the foam first occurs at first, and a crust forms under the effect of the fire. This crust encloses the foam and at the same time acts as a shield against the effect of the fire.
This is the protective fire barrier.

2) the foam behind the crust gradually loses its original structure and changes into a fine granular substance consisting of carbon held together by the softened polymer. In this way a second fire barrier is formed whilst some thermal insulation is maintained.
This is the thermal fire barrier.

3) the layer of foam behind is thermally protected, and only those cells coming into contact with high temperatures will burst open. The remaining foam continues to provide insulation on the basis of its closed cell structure. As a result the process of change in the foam structure will steadily diminish.
This is the retardant barrier.
Depending on the length of time it is exposed to fire, this barrier will move further and further into the penetration.

4) the temperature is now such that no more structural change takes place, and the air in the closed cells can expand without the cells bursting. This results in volume expansion of the foam, and in this way all the openings in the penetration are closed off.
This is the sealant barrier.

5) because the foam is enclosed inside the penetration, due to the volume enlargement of the closed cells the foam will expand towards the non-exposed side.

In effect this means that the length of the penetration is extended and therefore the foam rubber mass is given long-term protection against the continuing effects of fire and heat.

6) the foam is held tightly in the casing. Because of the pressure exerted by the foam mass expanding inside the casing, only some foam applied in the front part of the opening will be forced out of the casing. As a result, the foam emerging from the penetration will swell to a larger size than when it was inside the penetration and provide renewed sealant protection.

7) The surface temperature will remain low and easily comply with the maximum temperature increase of 180°C as required in the standards. Furthermore, the original cell structure is maintained at the non-exposed side. Therefore the foam remains mechanically intact as well.

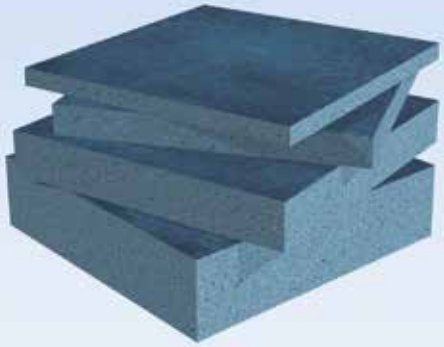
WE CARE

ACTIFOAM

ACTIFOAM® FIRESAFE
MULTI-CABLE & CABLE RUN TRANSIT SEALING SYSTEM

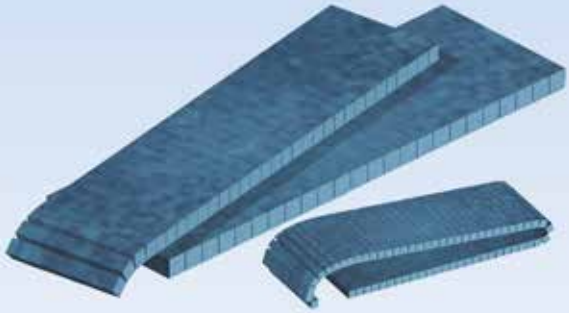
ACTIFOAM® filler sheets

Note: maximum continuous service temperature of the ACTIFOAM® sheets not to exceed 70 °C.
Consult our technical support department in case of higher operating temperatures.



ACTIFOAM® slit filler sheets

Note: maximum continuous service temperature of the ACTIFOAM® sheets not to exceed 70 °C.
Consult our technical support department in case of higher operating temperatures.



ACTIFOAM® is used to fill any cavities or gaps in constructions. In case of fire, the cavity will be totally filled with the expanding rubber, offering a perfect fire seal for a very long duration.
Oxygen index 40% (>30% is flame retardant).
ACTIFOAM® can also be used for other sealing purposes. An advantage is that ACTIFOAM® does not absorb water. Tested at 2.5 bar water pressure during 24 hours.
Due to the closed cell structure, the rubber has good thermal insulation properties. The K value at 10 °C according to NEN-EN 12667 is 12.3 mk/W. The density of the foam rubber at 23 °C is 0.35 g/cm^3 +/- 10% in accordance with ISO 2781. Compression set of the foam rubber is 14% which stands for a good “memory”.
Good weathering, UV and ozone resistance. Temperature range from -15 °C to +70 °C.
The 10 mm thick sheets have 30 pre-cut profiles 10x10 mm, the 15 mm thick sheets 20 (40) profiles 15x15 mm, the 20 mm thick sheets 15 (30) profiles 20x20 mm and the 25 mm thick sheets 12 (24) profiles 25x25 mm. The profiles can easily be torn off.

ACTIFOAM® filler sheets		sheet width	article number
300x150x10		150	83.0110
300x150x15		150	83.0111
300x150x20		150	83.0112
300x150x25		150	83.0113
300x200x10		200	83.0120
300x200x15		200	83.0121
300x200x20		200	83.0122
300x200x25		200	83.0123
300x250x10		250	83.0130
300x250x15		250	83.0131
300x250x20		250	83.0132
300x250x25		250	83.0133
600x150x10		150	83.0210
600x150x15		150	83.0211
600x150x20		150	83.0212
600x150x25		150	83.0213
600x200x10		200	83.0220
600x200x15		200	83.0221
600x200x20		200	83.0222
600x200x25		200	83.0223
600x250x10		250	83.0230
600x250x15		250	83.0231
600x250x20		250	83.0232
600x250x25		250	83.0233
500x500x10		-	83.0005
500x500x15		-	83.0006
500x500x20		-	83.0007
500x500x25		-	83.0008
1000x500x10		-	83.0010
1000x500x15		-	83.0011
1000x500x20		-	83.0012
1000x500x25		-	83.0013

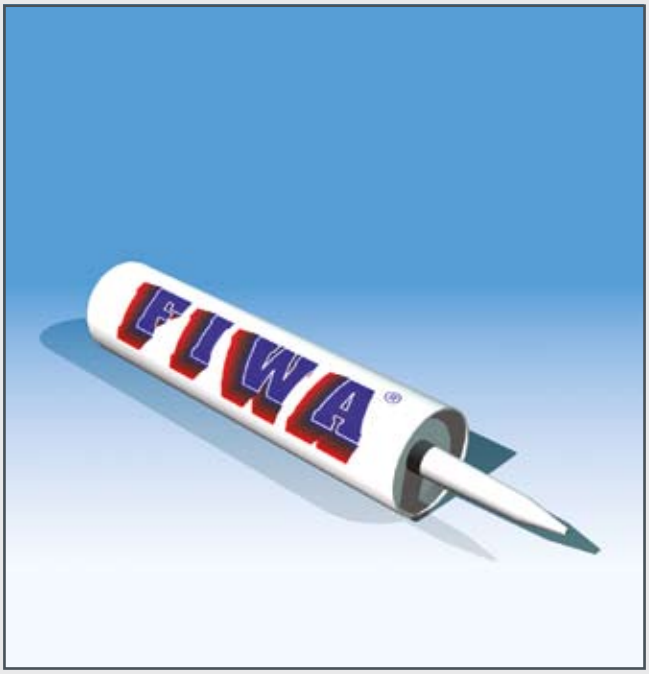
all dimensions in mm

ACTIFOAM® slit separation sheets		sheet width	article number
300x150x10		150	83.1110
300x150x15		150	83.1111
300x150x20		150	83.1112
300x150x25		150	83.1113
300x200x10		200	83.1120
300x200x15		200	83.1121
300x200x20		200	83.1122
300x200x25		200	83.1123
300x250x10		250	83.1130
300x250x15		250	83.1131
300x250x20		250	83.1132
300x250x25		250	83.1133
600x150x15		150	83.1211
600x150x20		150	83.1212
600x150x25		150	83.1213
600x200x15		200	83.1221
600x200x20		200	83.1222
600x200x25		200	83.1223
600x250x15		250	83.1231
600x250x20		250	83.1232
600x250x25		250	83.1233

all dimensions in mm

ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

FIWA® sealant for gas and watertight penetrations



FIWA® is a fire-resistant sealant based on a single component silicone compound.
FIWA® is also water-repellent
High bonding strength
UV and Ozone resistant
In the event of fire or at temperatures in excess of 200 °C the sealant expands to about five to ten times its original volume. During this process a porous mass is formed, which has excellent thermal insulation properties. In contrast to conventional materials that swell under severe heat exposure, the expansion of FIWA® sealant is not caused by intumescence, but by a chemical process (Intumescence means the occurrence of volume enlargement under the effect of heat, caused by the surface structure being inflated by fumes originating from the product). The advantage of this is that the expansion of FIWA® is not accompanied by formation of large amounts of fumes.

optimum combination of viscosity, flow and bonding capacity of FIWA® sealant

PRODUCT INFORMATION

01)	colour	dark grey
02)	specific gravity	1.30 ± 0.03 g/cm^3
03)	curing of top layer	0.5 - 1 hour depending on temperature and air humidity
04)	service temperature	-50 °C up to +160 °C
05)	tensile strength	1.15 MPa
06)	elongation at break	125%
07)	hardness	35 Shore A
08)	elastic deformation	approx. 25%
09)	resistance	UV, Ozone, arctic conditions
10)	ageing	more than 20 years
11)	supplied in	310 ml cartridges
12)	storage	to be stored cool and dry min/max temperature = +5/+30° C
13)	storage life	guaranteed 6 months; when applied later than 6 months after date of manufacturing, curing and adhesive properties have to be checked before application

FIWA is absolutely HALOGEN FREE (tested according to Naval Engineering Standard NES 713: Issue 3). Furthermore FIWA has a low smoke index (NES 711: Issue 2: 1981) and a high oxygen index (ISO 4589-2: 1996), and low flame spread characteristics according to IMO Resolution A.653(16).

Shelf life is 12 months when stored properly. Since we have no control on storage, we can only guarantee for 6 months.

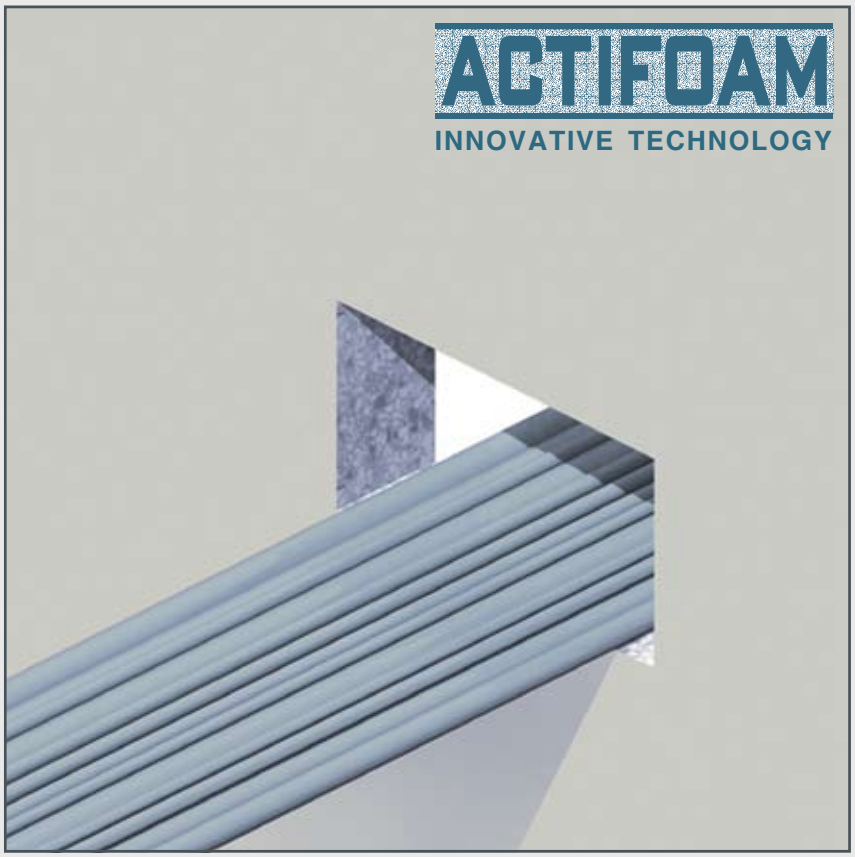
ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

1) If the walls inside the conduit opening exhibit large irregularities, they should be locally smoothed with FIWA® fire safe sealant. Otherwise insufficient smoke tightness will be obtained.

Quality System Approval SMS.W.I.CE.D/2357/A.0 and ISO 9001:2001 Certificate NL7001684 issued by Bureau Veritas

ACTIFOAM

2) The cables can be ducted through the conduit opening in random order.
It is most important that they are not pulled too tight in order not to hamper their separation at a later stage.



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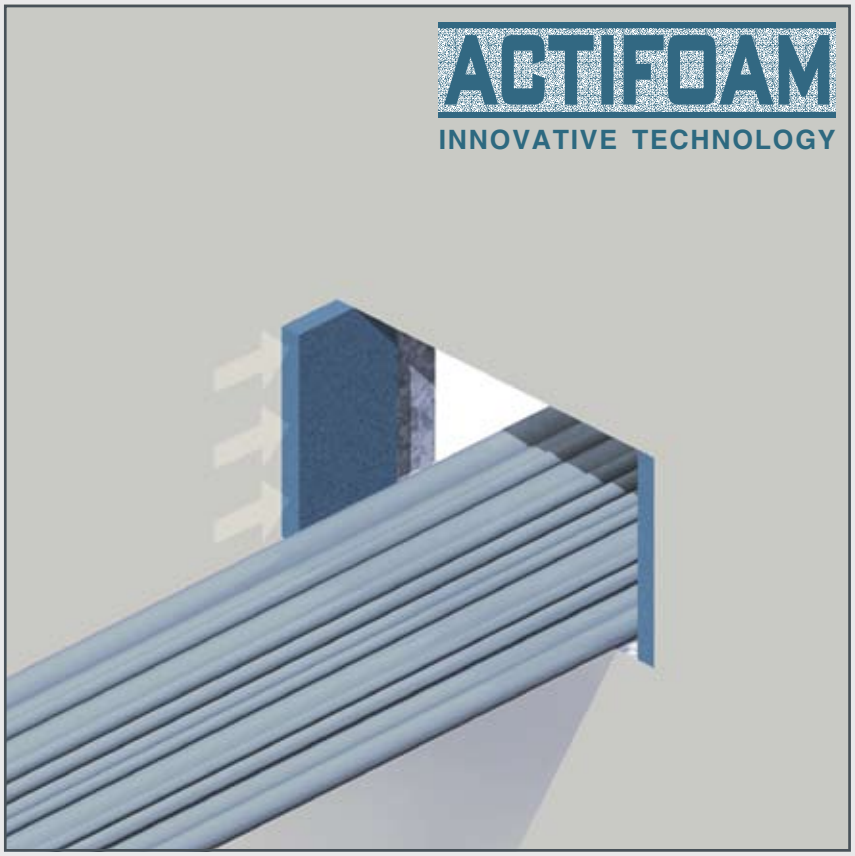
ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

3) ACTIFOAM® rubber sheets are cut into strips fitting to the size of the walls inside the conduit opening. For this purpose ACTIFOAM® sheets with a thickness of 25 mm are used.



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4) The ACTIFOAM® rubber sheets should fit snugly in the conduit opening to ensure a tight fit against the walls. This is important to avoid smoke penetrating between the sheets and the wall.

ACTIFOAM

ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

5) An ACTIFOAM® rubber sheet must also be placed in the conduit opening underneath the layer of cables.
A band is placed around the cable bundle to lift the bundle of cables.

ACTIFOAM

6) A slightly oversized strip of ACTIFOAM® rubber with a thickness of 25 mm is placed inside the conduit opening underneath the cables. The sheet will be compressed by the weight of the cables.

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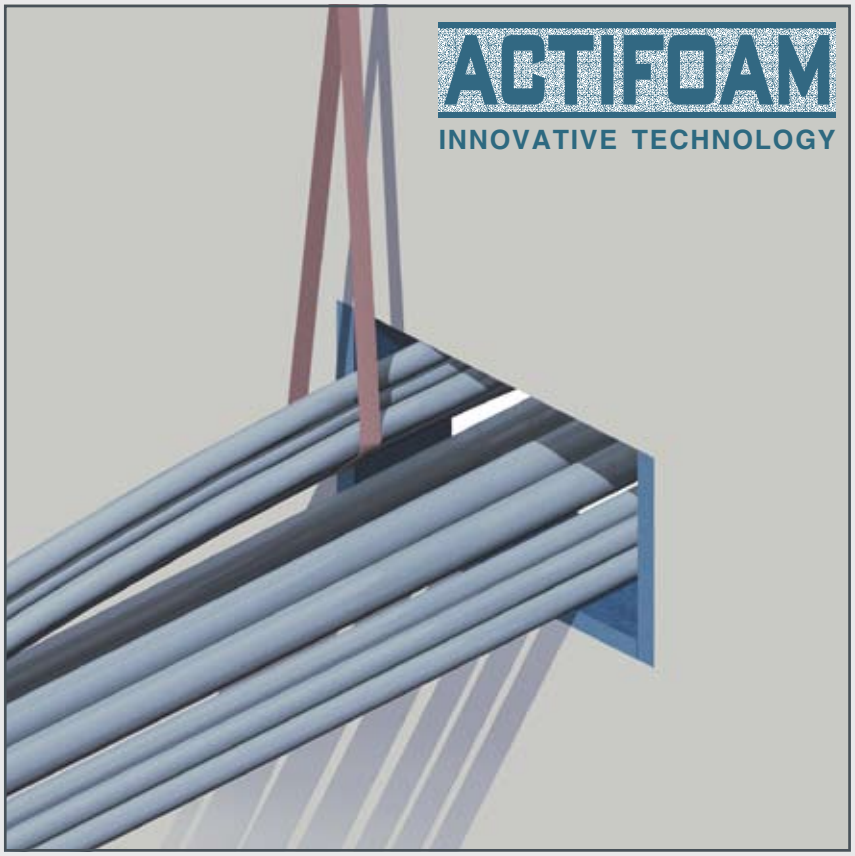
ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

7) One layer of cables is spread out on the ACTIFOAM® rubber sheet at the bottom of the conduit opening. The other cables are lifted to make room for further finishing the first layer.



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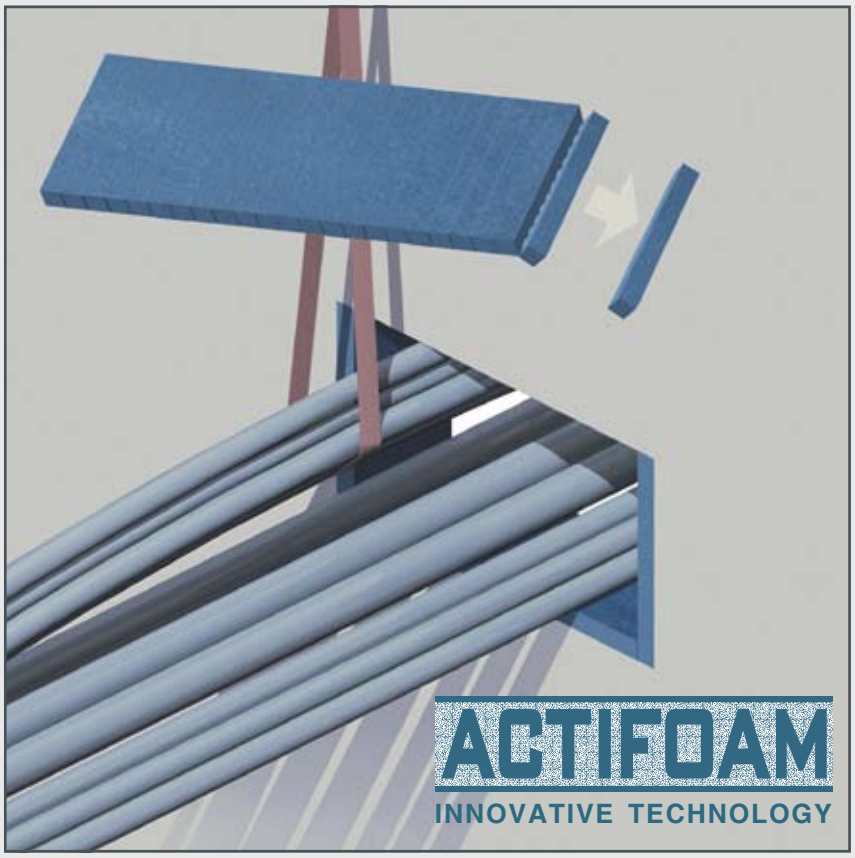
**8) For proper cable separation, square profiles are torn off the pre-slit ACTIFOAM® rubber sheets.
The sizes of the profiles should be equivalent to the cable diameters.**



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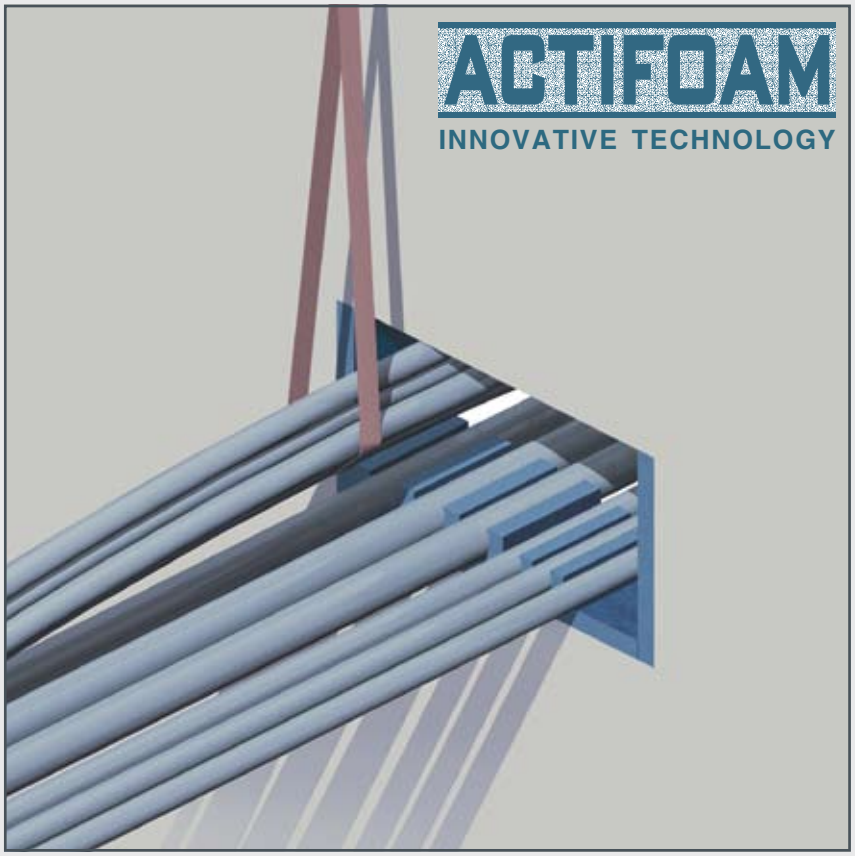
ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

9) Profiles are slit in sizes of 10x10, 15x15, 20x20 and 25x25 mm. This enables an easy fit for corresponding cable sizes. Cables larger than 25 mm should be separated by a minimum of 25 mm.



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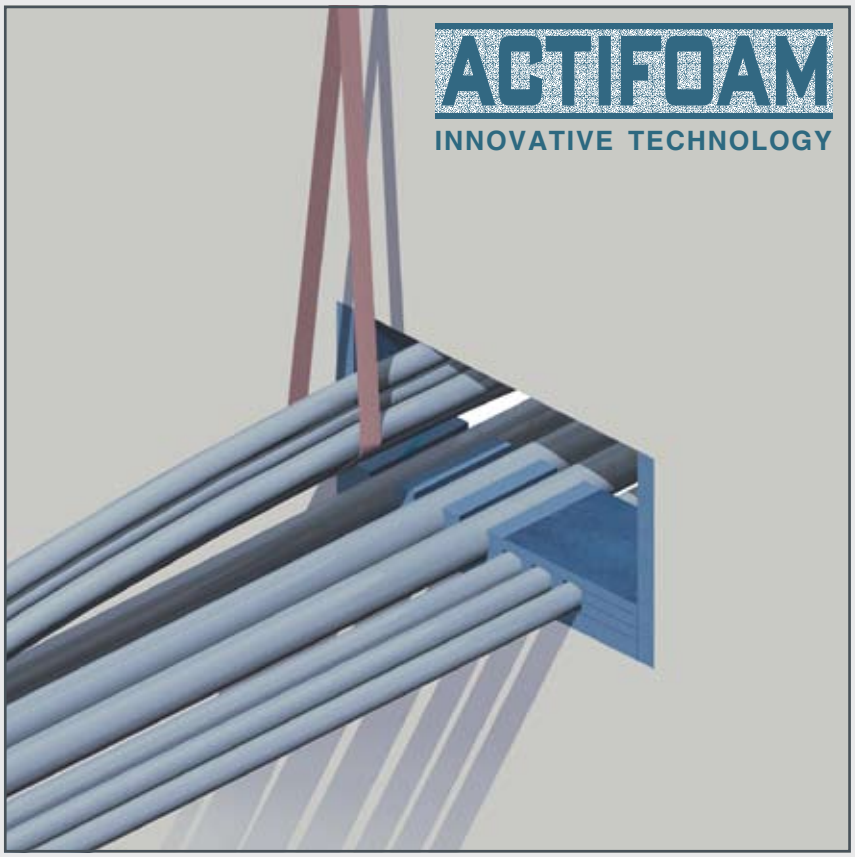
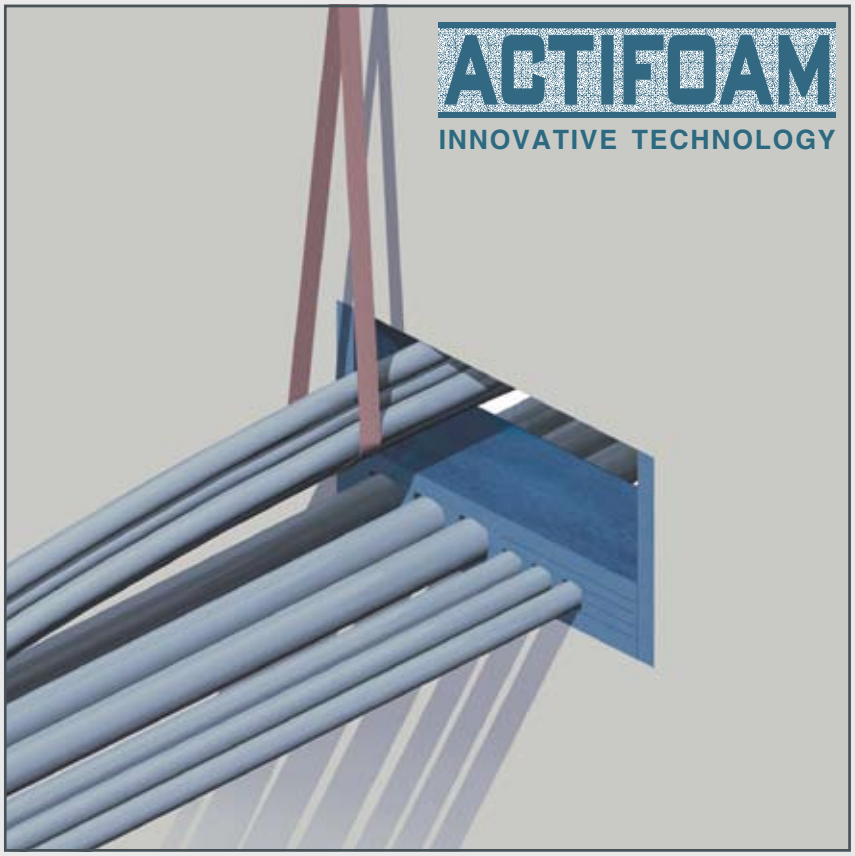
10) Adjacent to the first layer of cables and profiles, one or more extra sheets of ACTIFOAM® rubber is fitted to create a level layer for further filling the conduit opening.



ACTIFOAM

ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

11) An intermediate ACTIFOAM® rubber sheet is inserted in the conduit opening on top of the levelled first layer.
The thickness of the intermediate layer is dependent on the maximum cable diameter.



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12) The next layer of cables is spread out on the ACTIFOAM® intermediate rubber sheet.
As indicated before, the cables should not be pulled too tight to enable this.

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ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

13) In the same way as with the first layer of cables, the cables are separated with the ACTIFOAM® pre-slit profiles and levelled with one or more ACTIFOAM® sheets. Take care for a tight fit.

14) The remaining space is filled with one or more ACTIFOAM® sheets.
All sheets should fit tightly in the conduit opening to obtain a fair degree of smoke tightness.

ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

15) Due to better sliding of greased rubber on rubber, for final finishing an ACTIFOAM® sheet must be inserted between the top layers of ACTIFOAM® sheets.

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**16) Compression of the filling is necessary to obtain stability. For this purpose it is easier to insert a couple of strips instead of sheets.
The strips are greased all around with CSD® lubricant.**

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ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

17) The first strip is inserted into the the opening between the layers by hand. For a wall thickness of 150 mm it is advisable to cut three strips 50 mm wide to enable easier insertion.

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18) A piece of wood is used to push the strips tightly into the opening between the ACTIFOAM® rubber sheets.
The use of strips instead of sheets makes this much easier to do.

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ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

**19) The finished ACTIFOAM® multi-cable penetration.
Officially fire tested according to EN 1366-3:2004 and classified according to EN 13501-2:2003 (NEN 6069) for two hours in an aerated concrete wall 150 mm thick.**

**20) It is not necessary to interrupt the cable tray.
ACTIFOAM® allows, if required, the tray to be passed through the conduit opening.
Around the cable tray ACTIFOAM® sheets are placed.**

ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS

21) In case the penetration has to be not only fire safe but also gas- and water tight, the ACTIFOAM® foam rubber filling can be covered with a layer FIWA® sealant in a thickness of minimum 10 mm.

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22) Certified for 90 minutes thermal insulation. Large diameter cables with heavy copper conductors 4 x 185 mm² transmit substantial heat from the fire side. This influences thermal insulation performance up to E120. By applying longer NOFIRNO® insert sleeves around the cables this classification can be achieved easily.
See the NOFIRNO® board brochure.

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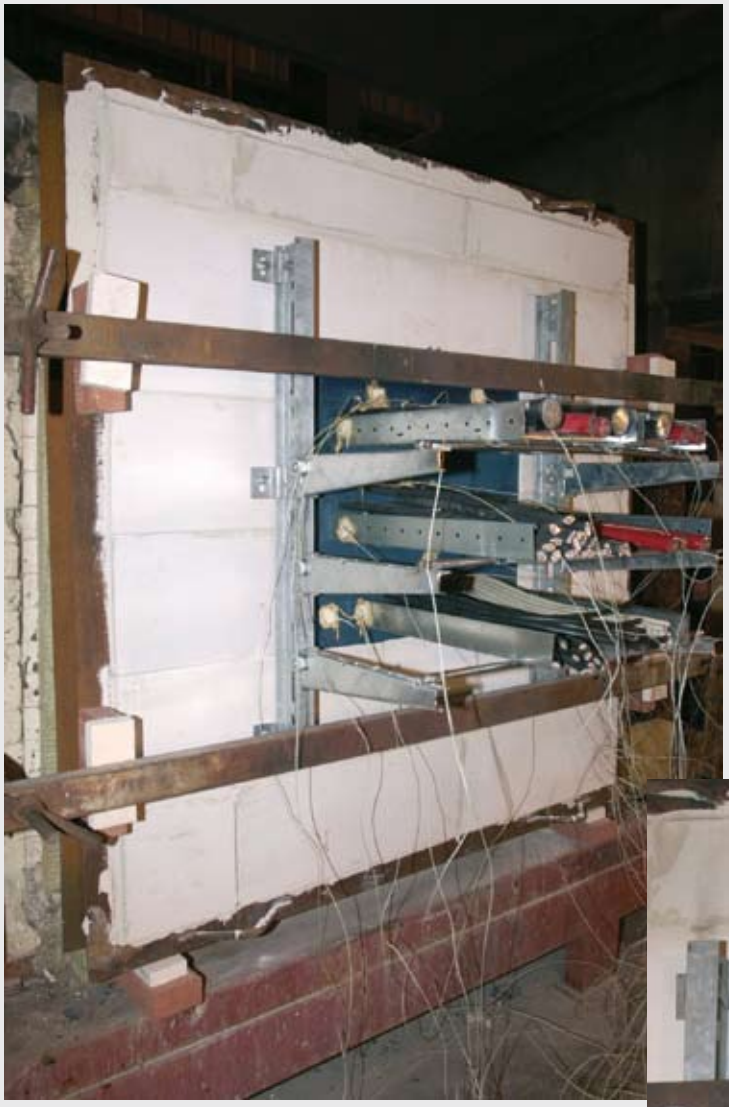
ACTIFOAM® FIRE STOP FOR CABLE AND CABLE RUN PENETRATIONS



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Fire test carried out at the Efectis (TNO) Laboratories, The Netherlands according to the cable specifications in EN 1366-3:2004.
The cable set is well visible on the photograph below.
Some of the cables have minimum separation distance and even a bundled set of cables are incorporated (at the bottom the grey coloured cables).

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The heavy conductor cables are separated minimum. Thermocouples are placed on the cables 25 mm away from the penetration. Despite this all the ACTIFOAM® system managed 90 minutes thermal insulation. By applying NOFIRNO® insert sleeves around these cables an EI fire rating of 120 minutes (thermal insulation) can be achieved.

ACTIFOAM® FIRE STOP FOR BUSBAR PENETRATIONS

1) ACTIFOAM® rubber sheets are cut into strips fitting to the size of the walls inside the conduit opening.
For this purpose ACTIFOAM® sheets with a thickness of 25 mm are used. Fitting sheets are placed underneath the busbar casing.

ACTIFOAM

2) ACTIFOAM® is very uncomplicated to work with. With a knife fitting ACTIFOAM® sheets can be cut out off the sheets at site.

ACTIFOAM

ACTIFOAM® FIRE STOP FOR BUSBAR PENETRATIONS

3) In this way a snugly fitting ACTIFOAM® filling is installed around the busbar casing. ACTIFOAM® sheets are supplied in a thickness of 10, 15, 20 and 25 mm.

ACTIFOAM

4) The ACTIFOAM® filling to be levelled with the upper side of the busbar casing. With some overfilling it will be achieved that the ACTIFOAM® filling will be compressed during further finishing of the penetration. Tightness and mechanical stability are increased in this way.

ACTIFOAM

ACTIFOAM® FIRE STOP FOR BUSBAR PENETRATIONS

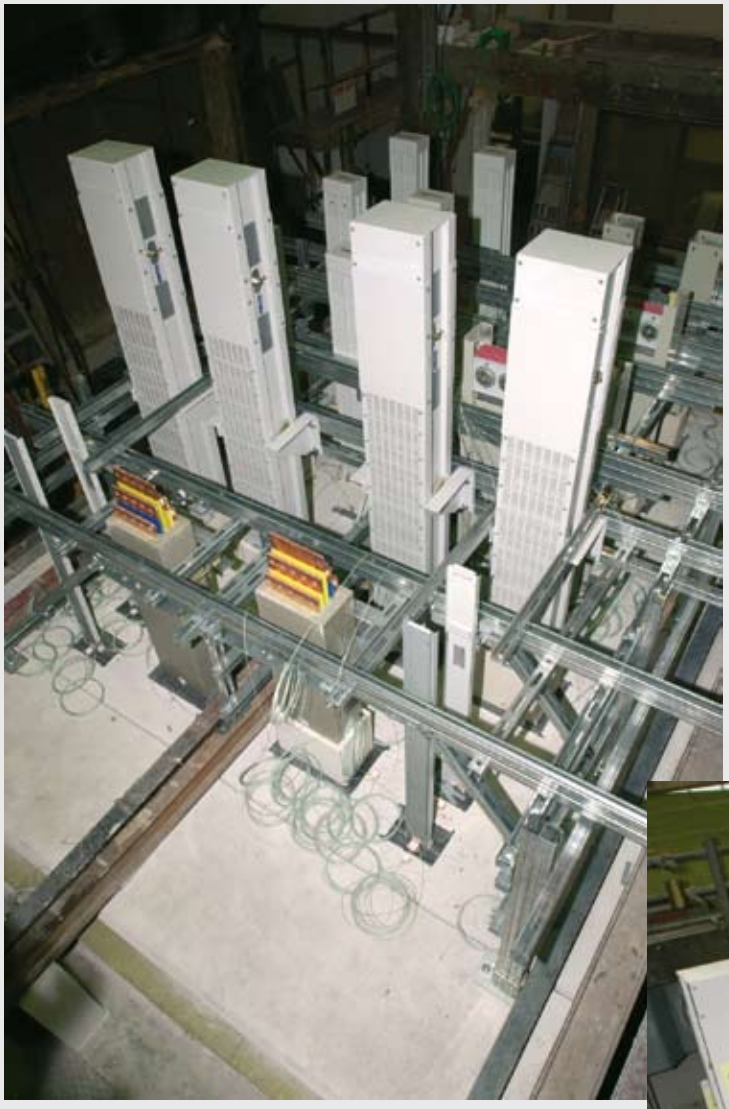
5) The remaining space is filled with one or more ACTIFOAM® sheets. All sheets should fit tightly in the conduit opening to obtain a fair degree of smoke tightness.
See the installation instructions on pages 13 and 14.

ACTIFOAM

6) The finished ACTIFOAM® busbar penetration.
Officially fire tested according to DIN 4102 in a concrete floor 150 mm thick F-120) and an aerated concrete wall 100 mm thick (F-90).

ACTIFOAM

ACTIFOAM® FIRE STOP FOR BUSBAR PENETRATIONS



ACTIFOAM

INNOVATIVE TECHNOLOGY

**The ACTIFOAM® foam rubber showed its perfect thermal insulation and fire stopping properties in an official two hours fire test. The ACTIFOAM® foam rubber has been used also inside the busbar systems.
In this way preventing fire and smoke spread through the inside of the busbar casing.**

OFFICIAL FIRE TEST WITH A VARIETY OF DIFFERENT SIZES OF BUSBAR SYSTEMS IN A 150 MM THICK FLOOR SLAB

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INNOVATIVE TECHNOLOGY

**Despite of the fact that some busbars were equipped with heavy copper conductors, the measured temperature on the surface of the foam rubber did not reach more than ca. 75 °C at the end of the fire test.
This phenomenon is achieved by the minuscule tiny closed cellular structure of the ACTIFOAM® rubber.**

csd sealing systems

CONDUIT SEALING DEVICES OF AN AMAZING SIMPLICITY WITH AN OUTSTANDING PERFORMANCE

ACTIFOAM

BEELE Engineering and CSD International have been involved with fire, water and gas tight sealing for more than 30 years. We have developed and tested products proven to provide the utmost in sealing protection around the world. To receive our complete civil construction and/or marine products catalogues, please contact your distributor or local representative.

distributed by:

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