NOFIRNO® GAP SEALING SYSTEM ON OFFSHORE INSTALLATIONS



TESTED TO IMO RESOLUTION A.754(18); FIRE CLASS AO-A6O, HO-HI2O, JET FIRE EC (MED) CERTIFICATE MED-B-4908 ISSUED BY DNV





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BEELE ENGINEERING -SAFETY, RELIABILITY, INVOLVEMENT

Every moment of the day, in every business and every situation, the threat of fire is present. For over three decades, BEELE Engineering has specialized in passive fire safety in the form of systems which prevent the spread of fire, smoke, water and gases via cable and pipe penetrations. With our superior sealing technologies, we have become the undisputed Number One in this particular field.

It is BEELE Engineering's philosophy that R&D exists to respond to market demands. Only then can research and development activities be classed as functional. Only then are innovative solutions generated for problems that have current or near-term relevance. Our policy is one of continuous active response to customers' demands, or to modified or new functional requirements. We listen, we observe and we interpret, and so we arrive at new product developments and bold innovations.

BEELE Engineering has built up an enormous body of specialized expertise and knowledge. Our company is the world market leader in sealing systems for state-of-the-art shipbuilding applications as well as civil and industrial applications. We do not follow trends, we set them.

Development of new products and technologies, as well as pioneering know-how, are present in every fibre of our organization. We are driven by passion for our specialization, and our customer involvement drives us to exceed the boundaries of what is technically feasible.

BEELE Engineering operates world-wide. From our agencies in virtually every industrialized country, our support and services are always somewhere nearby. We are there for you – also for on-site advice or in-house demonstrations, instructions and support at your location.





Our development, test and production facilities are among the most advanced in the world. The factory is equipped with state of the art machines, which are tailor made to the requirements of our company. We work to a high-level ISO system, with unmatched involvement. Continuous investment in design technologies, combined with highest quality polymers, is our guarantee for the safety of lives and equipment. That is why BEELE Engineering is internationally recognized by all relevant certification institutes and classification societies.





NOFIRNO[®] (MULTI-) PIPE TRANSIT SEALING SYSTEM





PRODUCT INFORMATION SEALANT

to be checked before application

01)	colour	red brown
02)	specific gravity	1.40 ± 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 +180 °C
05)	tensile strength	1.5 MPa
06)	elongation at break	200%
07)	hardness	45 Shore A
08)	elastic deformation	approx. 50%
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

NOFIRNO®		sleeve	article
filler sleeve		length	number
18/12 single		140	80.5002
18/12 multi		140	80.5052
18/12 single		160	80.5003
18/12 multi		160	80.5053
18/12 single		210	80.5004
18/12 multi		210	80.5054
27/19 single	all dimensions in mm	140	80.5012
27/19 multi		140	80.5062
27/19 single		160	80.5013
27/19 multi		160	80.5063
27/19 single		210	80.5014
27/19 multi		210	80.5064

Especially for single and multi-pipe penetrations, the multi-filler sleeves offer an advantage when filling the cavity between the conduit sleeve/frame and the ducted pipe. The sets are very flexible and can be wrapped around the ducted pipe. Furthermore, single filler sleeves can be torn off easily. The NOFIRNO® rubber has a good, long lasting memory, enabling a tight fit of the sleeves inside the conduit. This improves the overall mechanical stability of the sealing system during service life.

The NOFIRNO[®] rubber grade has excellent properties and will not be consumed by the fire. The NOFIRNO[®] sealant immediately forms a protective layer and char when exposed to flames, in this way protecting the filling of the penetration seal.

The thermal insulation is very high because of the air volume inside the penetration. The air is tightly enclosed by the sealant layer at both sides even when one side is exposed to the fire. The NOFIRNO[®] system has been subjected to A-0, H-0 and even Jet Fires without being severely affected. Due to the superb behaviour of our various systems, the NOFIRNO[®] sealing system can be easily combined with RISE[®]. The NOFIRNO rubber is absolutely HALOGEN FREE (tested according to Naval Engineering Standard NES 713: Issue 3). Furthermore, the NOFIRNO rubber has a low smoke index (NES 711: Issue 2:

1981) and a high oxygen index (ISO 4589-2: 1996).



NOFIRNO® is a paste-like compound which is simple to use. NOFIRNO® has a balanced viscosity and can be applied overhead. After applying the sealant, it can be smoothed by means of a wet cloth or by hand. Because the sealant adheres very tightly, the cloth and hands should be wetted with water before use to prevent sealant from sticking to them.

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





NOFIRNO®, RIACNOF®, RISE® AND RISE®/ULTRA CABLE/PIPE TRANSIT SEALING SYSTEM



Free material calculation software. Download at our website http://www.beele.com.

After entering the dimensions of the conduit opening and the amount and outer diameters of the ducted cables or pipes, the software calculates the amount of RISE® or RIS-WAT® insert sleeves, the RISE®, RISWAT® or NOFIRNO® filler sleeves, the ACTIFOAM® spare filling sheets, the RISE® or RISE®/ULTRA crushers and the DRIFIL®, FIWA® or NOFIRNO® sealant. It is easy to switch between the several systems and also between A-class, H-class, EMC and watertight penetrations. After entering the dimensions and amount and sizes of cables/pipes, a drawing appears on the screen showing also the remaining free space in the conduit opening. Furthermore, the filling rate of the cable penetrations is shown. Warnings appear for deviations of the certified configurations and for overfilling the transits or exceeding filling rates.

For a created project, all calculated transits can be stored in a database. Order/calculation forms can be shown on screen for project totals and single transits. The material lists can be printed and/or exported to MS Word.

The material list of a transit shows the options which can be entered to make a calculation of the materials needed:

1) transit dimensions.

2) the depth of a transit is automatically selected based on the entered data at class (A, B, H-class or watertight) but can be changed. In this case, a warning appears that this is a deviation of the certification.

- 3) selection of the sealing system (cable, pipe).
- 4) the quantity of duplicate transits in the project.

5) the filling rate is calculated on the basis of the entered cable amounts and dimensions

6) percentage of spare for later extensions

7) where appropriate, a selection can be made for EMC rated penetrations

8) type of sealant can be selected (FIWA[®] or NOFIRNO[®] for fire rated transits and DRIFIL[®], FIWA[®] or NOFIRNO[®] for watertight transits)

The material list displays the selected system, cable (or pipe) specifications, and the sealing material requirements. All transits in a project can be selected to create a similar list for all materials for the whole project.

Program-version of Transit-calculator: 3.9.2 (10 Dec 2009) Always use the most recent version when creating a new material-list!

Material list for transit 'PDsteel'



3





1) Based on the width and length of the gap to be sealed, partitions have to be put in place to ensure that the adhesive surface is in accordance with the maximum certified surface of 1800 cm².





2) NOFIRNO[®] filler sleeves are inserted in the gap to be sealed. A combination of multi-filler sleeves (set of 10 sleeves) and single filler sleeves type 18/12 and 27/19 can be used.









NOFIRNO[®] FLOOR GAP SEALING SYSTEM

3) The ratio 27/19 to 18/12 should be about 2:1. For H/class and Jet Fire rated constructions the length of the sleeves is 210 mm. For ease of filling, the filler sleeves are also supplied in multi-sets of 10 pieces. The ratio 27/19 to 18/12 should be about 2:1.





4) Push the filler sleeves into the conduit in such a way as to leave about
20 mm free space at the top and the bottom.
The whole set of filler sleeves should fit tightly into the conduit to provide sufficient mechanical stability.









5) A 20 mm thick layer of NOFIRNO[®] sealant is applied at each side of the conduit. Clean and dry the conduit opening as well as the pipe thoroughly, and remove any dirt, rust or oil residues before applying the sealant.



NOFIRNO

6) An overfill of NOFIRNO[®] sealant has to be applied, because some sealant will be pushed between and into the empty filler sleeves during further finishing. This will contribute to obtain higher tightness ratings.









7) To smooth the surface of the NOFIRNO[®] sealant layer, a cloth is sprayed with water. This prevents the sealant from sticking to the cloth. Note: do not use soap water!





8) The cloth is then used to press down the sealant layer.

People with sensitive skin should use gloves when working with NOFIRNO[®]. Please refer to the Safety Data Sheet for more information.









9) The surface can be smoothed by hand. Just wet the hands thoroughly with soap and water. No dirty hands when working with NOFIRNO[®] and a very neat surface is the result.



NOFIRNO

10) For H-class penetrations (which are insulated), the conduit sleeve needs to be insulated only at the insulated side of the bulkhead or at the lower side of the deck.









11) The optimized viscosity and the superb adhesion properties of the NOFIRNO[®] sealant make applying the sealant overhead at the bottom of the sealing system an easy matter. NOFIRNO[®] sealant does not sag and will not drip off. Furthermore, the viscosity allows to form a sloped surface of the the top layer to ensure that water will drip off in case of leakages in the installation.







NOFIRNO[®] (MULTI-) PIPE TRANSIT SEALING SYSTEM

JET FIRE TEST ACCORDING TO ISO 22899-1:2007 AND ISO/CD 22899-2

Article 6.5 of ISO/CD 22899-2 mentions:

There are concerns regarding the application and performance of passive fire protection materials and products when subjected to extreme fire events. Limited information is available how passive fire protection materials and products (developed for buildings only to withstand relatively slow build up fire tests such as ISO 834) perform if subjected to a fire exposure significantly more severe.

A fire protection material or system intended to withstand a conventional building fire for a specified period may not perform adequately in an extreme event scenario. Products that have demonstrated the ability to withstand a jet fire can be used to protect buildings more sensitive to extreme fires.

Article 9.1 of ISO/CD 22899-2 mentions:

Whilst hydrocarbon furnace tests are designed to represent a particular type of fire, they do not reproduce the actual fire conditions. Parameters such as: the balance between radiative and convective heat transfer, pressure fluctuations due to turbulence, erosive forces from high gas velocities, thermal shock and differential heating are not reproduced.

Jet fire tests simulate the most onerous conditions of a hydrocarbon fueled fire on an offshore oil rig, or a missile strike on a military warship.











NOFIRNO[®] (MULTI-) PIPE TRANSIT SEALING SYSTEM



APPROVED GAS TIGHT UP TO I BAR CAN BE USED IN ARCTIC CONDITIONS AND FOR STEAM LINES HIGH LEVEL OF SOUND DAMPING/EMC ATTENUATION SHOCK AND VIBRATION PROOF NO MECHANICAL STRESSES TRANSFERRED TO THE DIVISION **UP TO 50 YEARS SERVICE LIFE** CAPABLE OF ABSORBING TEMPERATURE CHANGES WEATHERING, UV AND OZONE RESISTANT PROVIDES CATHODIC PROTECTION ALLOWS LONGITUDINAL/RADIAL MOVEMENT FOR METALLIC, GRP AND PLASTIC PIPES APPROVED FOR MULTI-ALL-MIX PIPE/CABLE PENETRATIONS EXTREMELY SIMPLE TO INSTALL INSULATION ONLY AT THE INSULATED SIDE OF THE DIVISION NO INSULATION REQUIRED FOR A-O AND H-O DIVISIONS SYSTEM PREVENTS CORROSION INSIDE THE TRANSIT APPROVED FOR STEEL AND ALUMINIUM PARTITIONS MAINTENANCE FRIENDLY





NOFIRNO® (MULTI-) PIPE TRANSIT SEALING SYSTEM



Several options are available with the NOFIRNO[®] sealing system. The most simple and cost effective solution is a fitting multi-filler sleeve applied in a conduit sleeve with an ID creating a tight fit. NOFIRNO[®] sealant with a thickness of minimum 20 mm to be applied at both sides.



For oversized conduits and/or off centre ducted pipes, a combination of NOFIRNO[®] single and multi-filler sleeves can be used. NOFIRNO[®] sealant with a thickness of minimum 20 mm to be applied at both sides. Conduit depth minimum 180 mm.



The NOFIRNO[®] sealing system is certified for A-0 and H-0 class without the use of any insulation. In these cases, the only difference is that the conduit depth is 250 mm instead of 180 mm. NOFIRNO[®] sealant with a thickness of minimum 20 mm to be applied at both sides. System is also gas and watertight.



The NOFIRNO[®] sealing system is also approved for multi-pipe penetrations of steel, copper and GRP pipes to a transit size of 1000x300 mm with a depth of 180 mm only. Minimum separation of the pipes to be regarded. NOFIRNO[®] sealant with a thickness of minimum 20 mm to be applied at both sides.





BEELE - RESEARCH & DEVELOPMENT PRODUCTS FOR SPECIAL APPLICATIONS

NOFIRNO[®]

NEW TECHNOLOGY

- Approved for harshest fire ratings for pipe penetrations (A, H and Jet Fire class).
- Allows substantial movement of the ducted pipe within the conduit.
- High pressure ratings designed for gas and/or watertight penetrations.
- Prevents corrosion inside the penetration.
- Longest service life and best Total Cost of Ownership on the market.
- NOFIRNO[®] rubber sleeves and sealant will remain stable and not be consumed by fire.
- Breakthrough MULTI-ALL-MIX SYSTEM[®]
- Approved for any combination of cable and/or metallic, GRP or plastic pipes!

NOFIRNO[®]

NEW TECHNOLOGY

- Gaskets and rubber sheets for applications in which the transits, coamings or conduit sleeves are bolted to the partition.
- Successfully tested for A-class RISE[®], RIACNOF[®] and NOFIRNO[®] sealing systems for multi-cable and pipe transits bolted to the partitions.
- NOFIRNO[®] rubber will remain stable and not be consumed by fire.
- NOFIRNO[®] rubber has excellent resistance against UV, Ozone and weathering.
- Wide temperature range: -50 °C up to +180 °C.
- Proven harshest fire exposure
- Special sizes of gaskets upon request.
- Products made of NOFIRNO® rubber upon request.

ACTIFOAM[®]/ULTRA NEWEST TECHNOLOGY

- Sealing of gaps and openings in constructions against the ingress of moisture and to avoid flame spread.
- ACTIFOAM[®] has high thermal insulation values due to the close cellular structure.
- RISE®/ULTRA adhesive properties under fire load.
- Breakthrough ACTIFOAM[®] sheets can be layered with RISE/ULTRA sheets.
- The sandwich construction acts as a "bridge bearing" enabling the carrying of very high loads.
- Highest fire ratings achievable due to the unique combination of the two rubber grades.
- Successfully subjected to two hour hydrocarbon fire.









BEELE ENGINEERING: A COMPANY DEDICATED TO SAFETY FOR OVER 35 YEARS



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