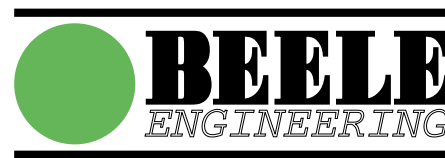


INSTALLATION INSTRUCTIONS NOFIRNO® SEALING SYSTEM FOR MULTI-CABLE TRANSITS



TESTED TO IMO RESOLUTION A.754(I8);
FIRE CLASS AO-A60 and HO-HI20
EC (MED) CERTIFICATE
09156/CO ISSUED BY BUREAU VERITAS



PLEASE ALSO REFER TO THE STAMPED INSTALLATION DRAWINGS ATTACHED TO OUR MED AND TYPE APPROVAL CERTIFICATES

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NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

RISE® cable sleeves



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

cable sleeves are supplied split lengthwise

NOFIRNO® filler sleeves



Operating temperatures:
-50 °C up to +180 °C

filler sleeves are supplied non-split

NOFIRNO® multi-filler sleeves



filler sleeves are supplied in multi-sets of 10 sleeves

RISE® cable sleeve	cable diameter	sleeve length	article number
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12/6	5 - 7	140	80.0051
14/8	7 - 9	140	80.0052
16/10	9 - 11	140	80.0053
18/12	11 - 13	140	80.0054
20/14	13 - 15	140	80.0055
22/16	15 - 17	140	80.0056
27/19	17 - 21	140	80.0057
31/23	21 - 25	140	80.0058
35/27	25 - 29	140	80.0059
39/31	29 - 33	140	80.0060
46/36	33 - 39	140	80.0061
52/42	39 - 45	140	80.0062
58/48	45 - 51	140	80.0063
64/54	51 - 57	140	80.0064
70/60	57 - 63	140	80.0065

all dimensions in mm

12/6	5 - 7	160	80.0100
14/8	7 - 9	160	80.0101
16/10	9 - 11	160	80.0102
18/12	11 - 13	160	80.0103
20/14	13 - 15	160	80.0104
22/16	15 - 17	160	80.0105
27/19	17 - 21	160	80.0106
31/23	21 - 25	160	80.0107
35/27	25 - 29	160	80.0108
39/31	29 - 33	160	80.0109
46/36	33 - 39	160	80.0110
52/42	39 - 45	160	80.0111
58/48	45 - 51	160	80.0112
64/54	51 - 57	160	80.0113
70/60	57 - 63	160	80.0114

all dimensions in mm

12/6	5 - 7	210	80.0200
14/8	7 - 9	210	80.0201
16/10	9 - 11	210	80.0202
18/12	11 - 13	210	80.0203
20/14	13 - 15	210	80.0204
22/16	15 - 17	210	80.0205
27/19	17 - 21	210	80.0206
31/23	21 - 25	210	80.0207
35/27	25 - 29	210	80.0208
39/31	29 - 33	210	80.0209
46/36	33 - 39	210	80.0210
52/42	39 - 45	210	80.0211
58/48	45 - 51	210	80.0212
64/54	51 - 57	210	80.0213
70/60	57 - 63	210	80.0214

all dimensions in mm

NOFIRNO® filler sleeve	sleeve length	article number
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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	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

all dimensions in mm

NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

PRODUCT INFORMATION SEALANT

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 to be checked before application



article number 50.0102

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.

PRODUCT INFORMATION PUTTY

01) colour	black
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	0.80 MPa
06) elongation at break	40%
07) hardness	35 Shore A
08) elastic deformation	approx. 25%
09) electrical resistance	< 100 Ω
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



article number 80.0910

CONDUCTON® putty is an electrically conductive sealing putty based on a single component silicone compound.

CONDUCTON® has been developed for the RISE/EMC multi-cable and pipe transits.

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



article number 80.0932

CONDUCTON® flexible rubber has been developed for the RISE®/EMC multi-cable transits and is used to fill the cavity around the ducted cables in the conduit sleeve, instead of making use of the putty. This rubber can be molded by hand and offers the highest attenuation.

CONDUCTON® flexible rubber is absolutely HALOGEN FREE and has a toxicity index of 0,00 (tested according to Naval Engineering Standard NES 713: Issue 3).

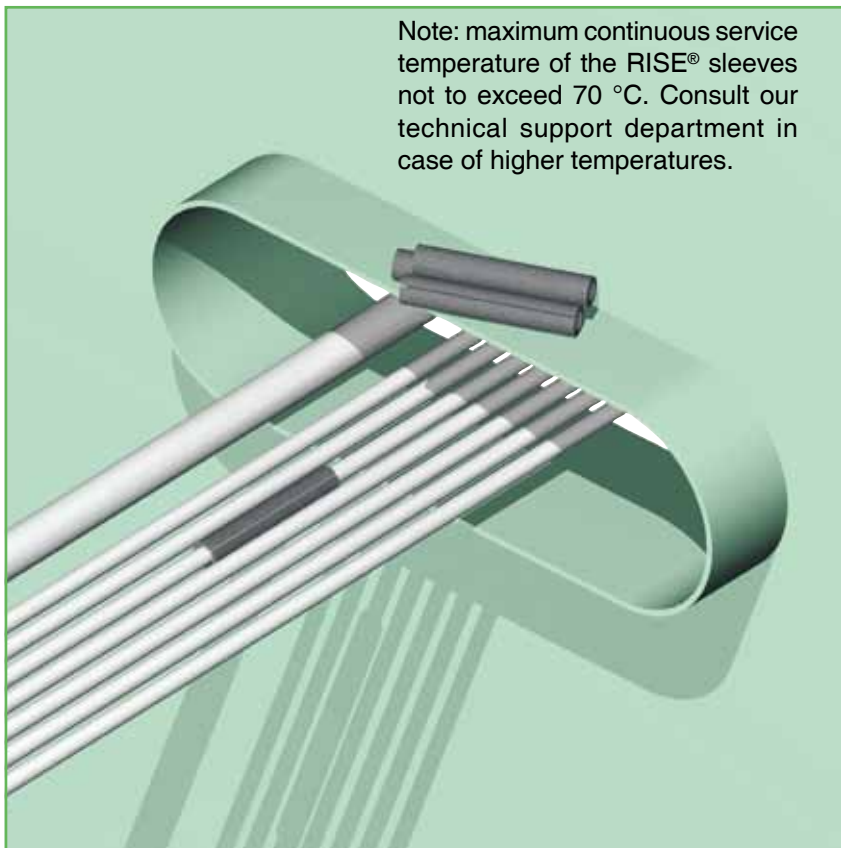
Furthermore CONDUCTON® has a low smoke index (NES 711: Issue 2: 1981), an oxygen index of 38,2% (ISO 4589-2: 1996), and a temperature index of 294 °C (ISO 4589-3: 1996).

CONDUCTON® flexible rubber fulfils the criteria for use on board of UK Navy vessels for EMP/EMI penetrations.

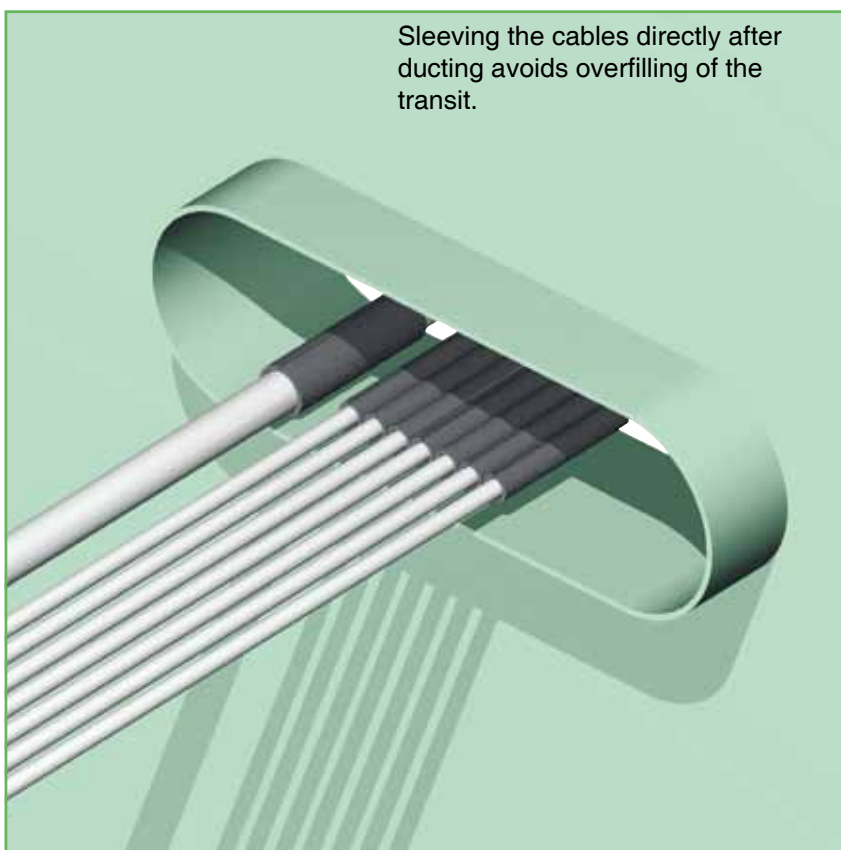


NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

1) The cables can be ducted through the conduit sleeve/frame in random order. It is most important that they are not pulled too tight so as not to hamper their separation when RISE® insert sleeves are inserted.



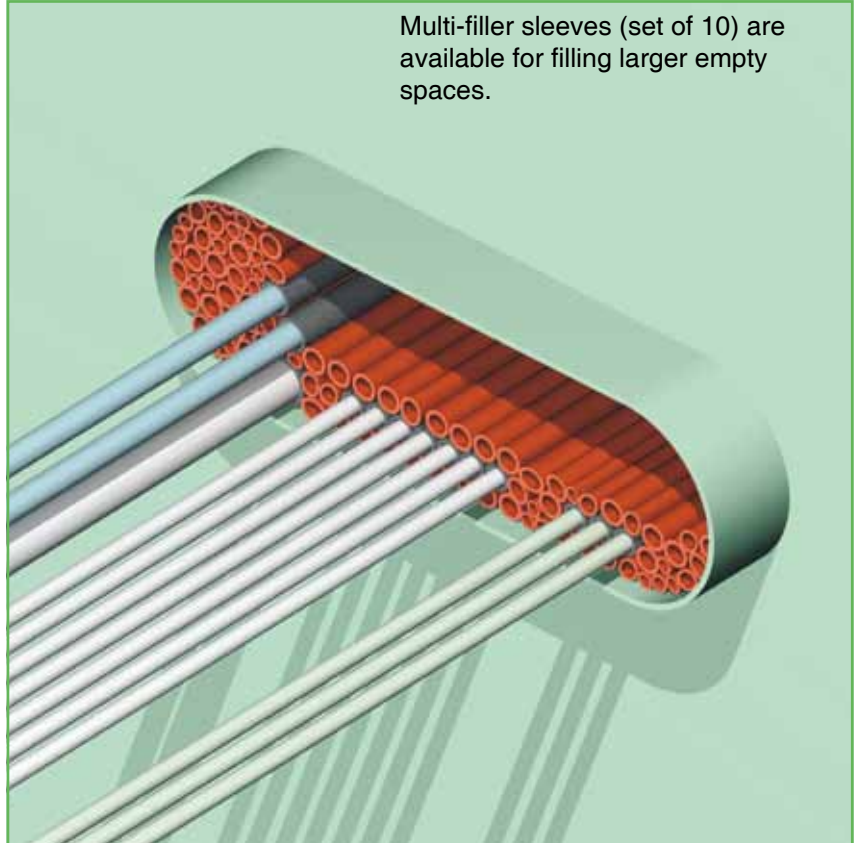
2) After the cables have been ducted, RISE® insert sleeves are applied around each cable. The insert sleeves are split lengthwise and can therefore be placed around the cables in front of the conduit.



NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

3) The remaining free space in the conduit is filled with NOFIRNO® filler sleeves type 27/19 and 18/12. For ease of filling, the NOFIRNO® filler sleeves are supplied non-split. The ratio 27/19 to 18/12 should be about 2:1.

Multi-filler sleeves (set of 10) are available for filling larger empty spaces.



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

Before applying the sealant, it is advisable to perform a final check on the packing of insert and filler sleeves.



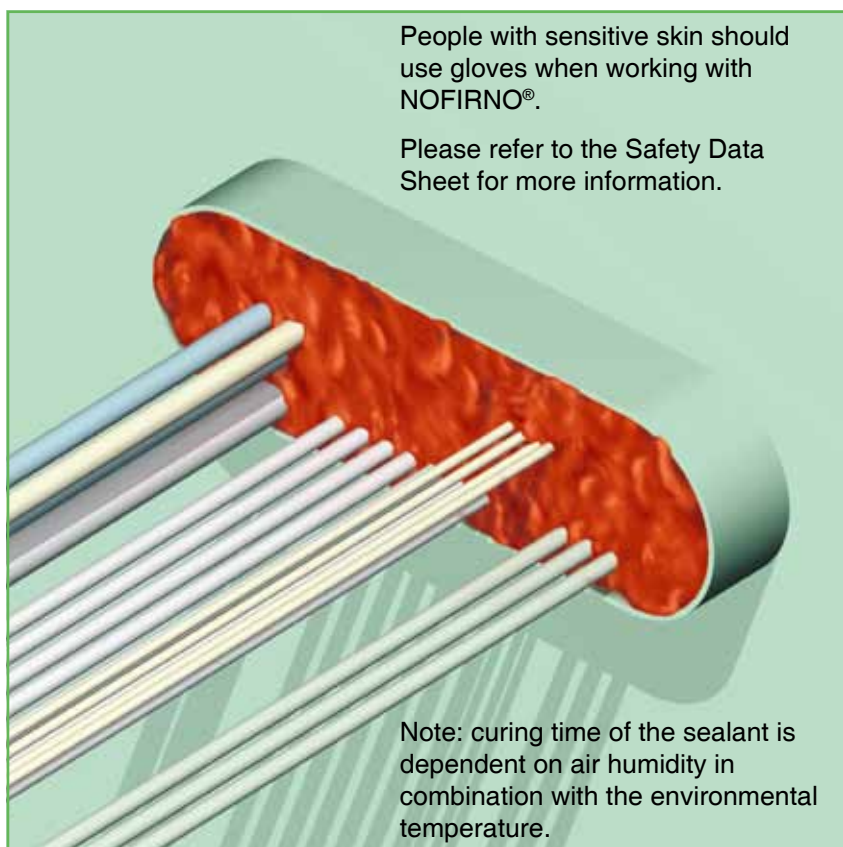


NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

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



6) The conduit should be overfilled with NOFIRNO® sealant, because some sealant will be pushed between and into the empty filler sleeves during further finishing. This will contribute to obtain higher tightness ratings.

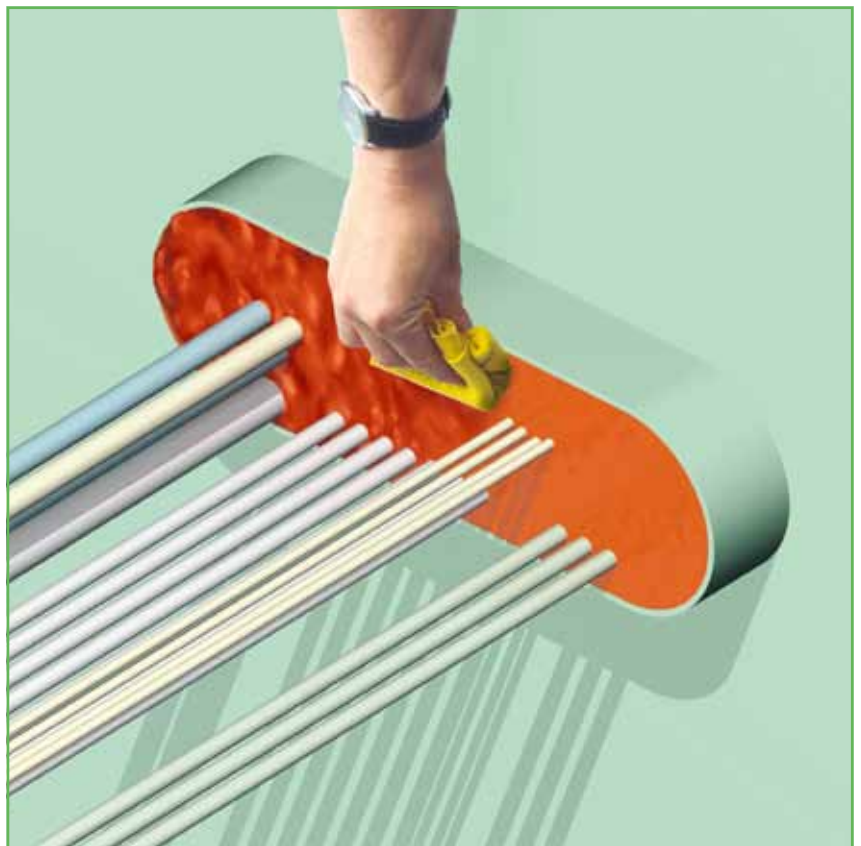


NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

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!



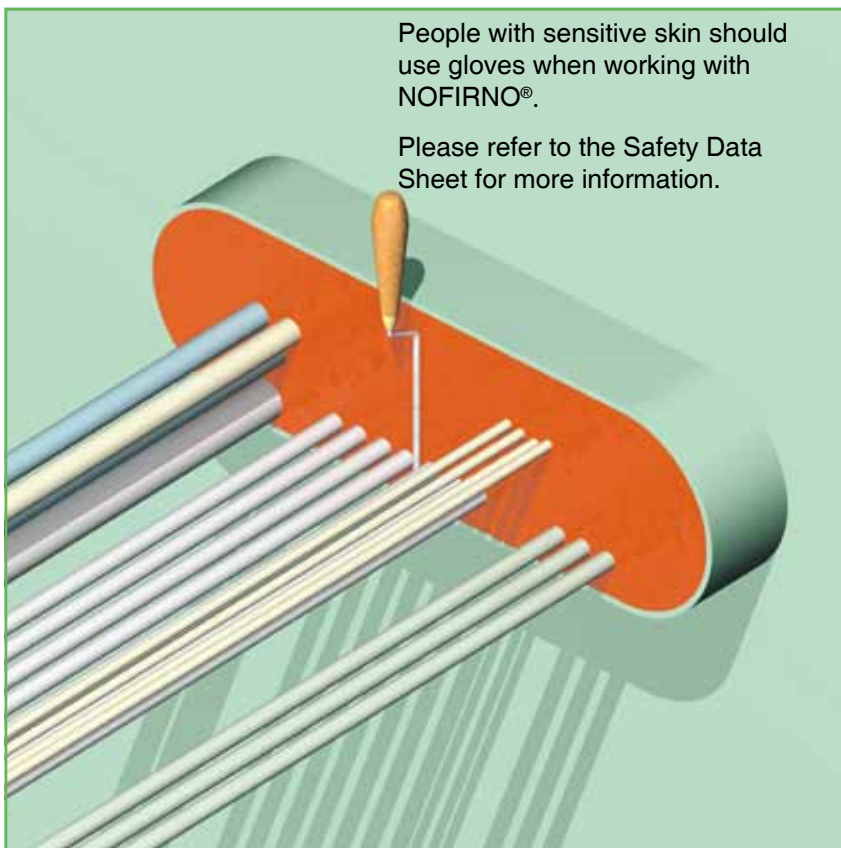
8) The cloth is then used to press down the sealant layer. People with sensitive skin should use gloves when working with NOFIRNO®. Please refer to the Safety Data Sheet for more information.





NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

9) The NOFIRNO® sealant between the cables is pressed down and smoothed by hand or with a spatula or putty knife. This is essential to obtain optimum gas and water tightness.



10) 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® MULTI-CABLE TRANSIT SEALING SYSTEM

11) After smoothing is finished, a last check should be performed to ensure sufficient sealant has been applied in between the cables (especially for transits with larger amounts of cables).

This is most important for water and gas tight penetrations.

To obtain optimum adhesion during the curing process of the sealant, the cables should be tightly fixed immediately after finishing the transit.



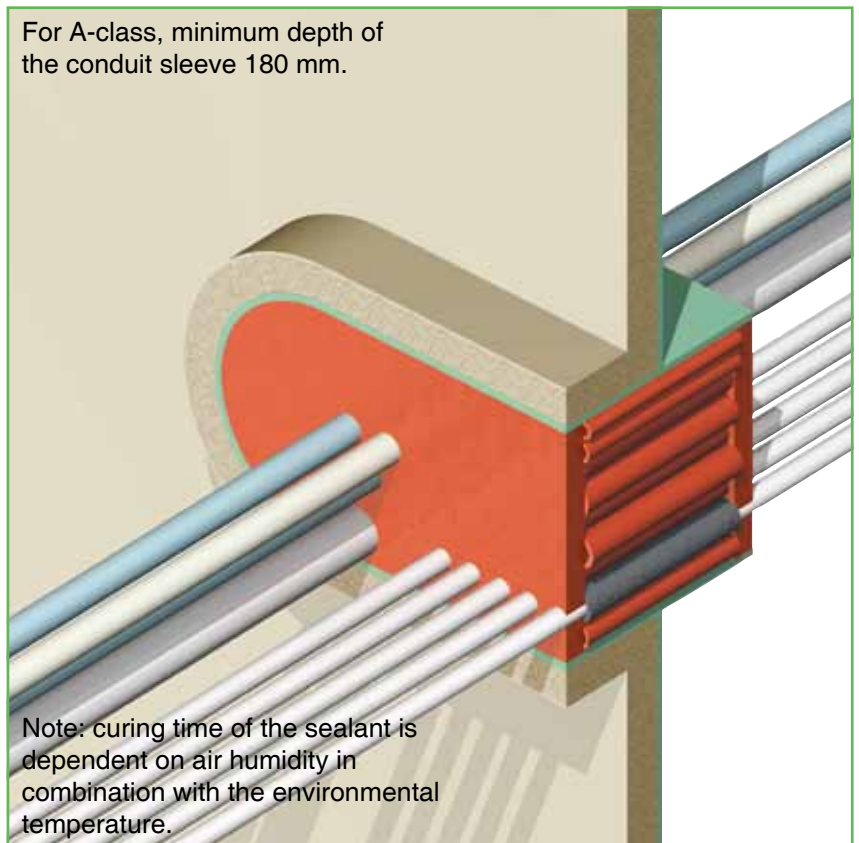
The bright, contrasting colour of the sealant contributes to ease of inspection.



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

No extra insulation needed in front of the penetration and/or in between the cables.

For A-class, minimum depth of the conduit sleeve 180 mm.



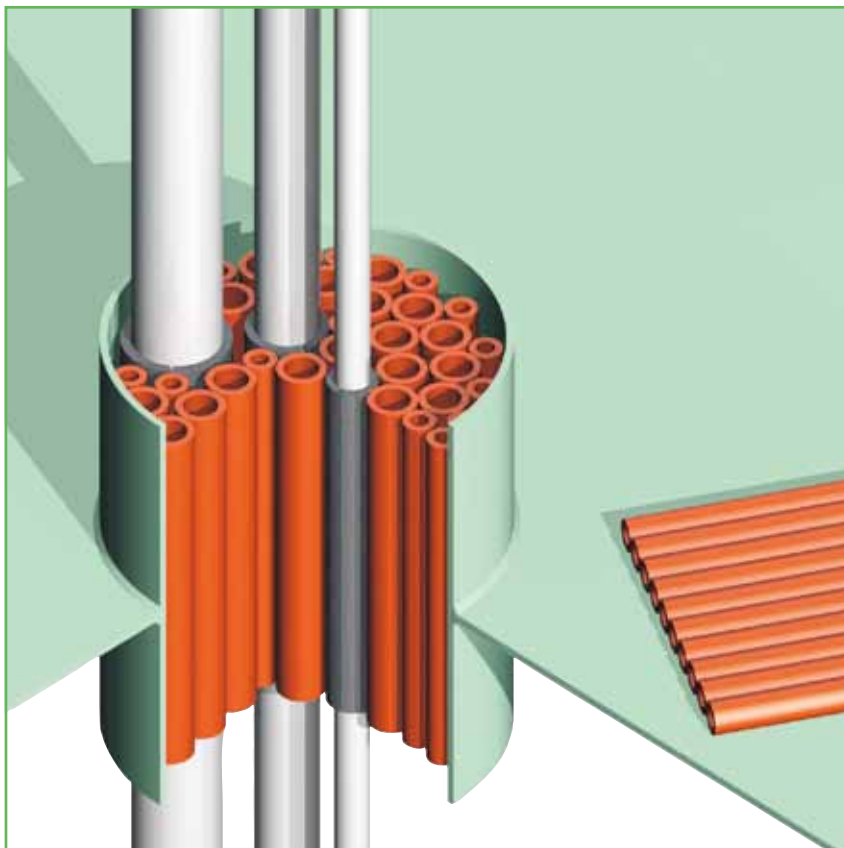
Note: curing time of the sealant is dependent on air humidity in combination with the environmental temperature.



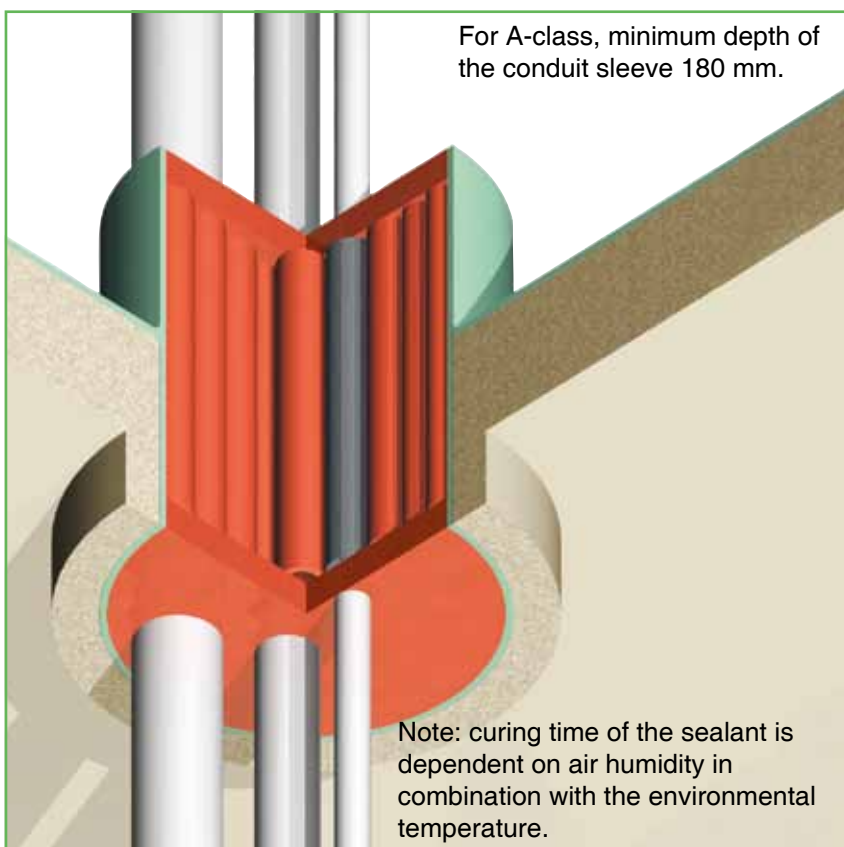


NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

13) To prevent the filler sleeves from falling out of the conduit sleeve/frame, they are squeezed together to form a compact bundle. They are available in bundles of ten pieces.

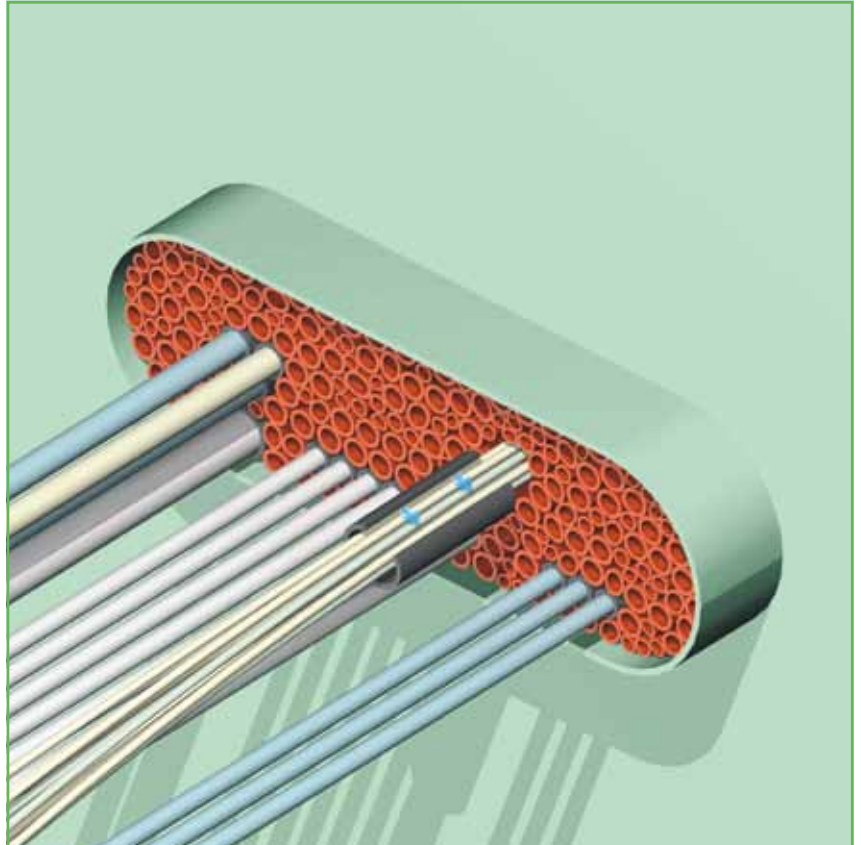


14) The optimized viscosity and the superb adhesion properties of the NOFIRNO® sealant make applying the sealant overhead an easy matter. NOFIRNO® sealant does not sag and will not drip off.



NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

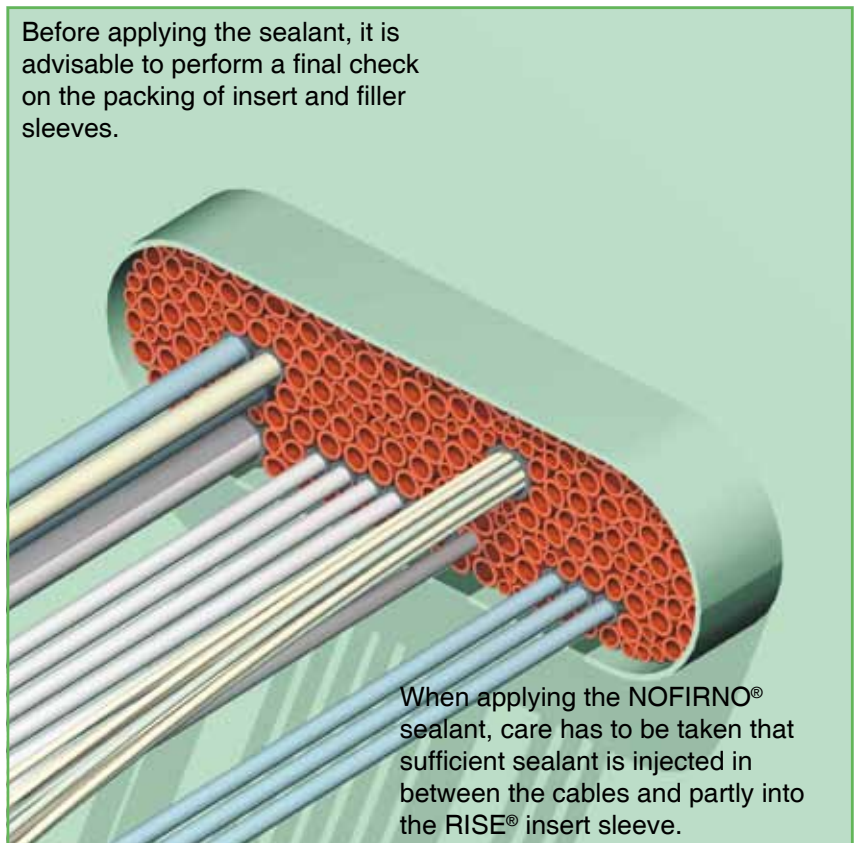
15) The NOFIRNO® cable penetrations are certified for ducting bundles of cables. Pull a set of bundled cables through the conduit and place a RISE® insert sleeve around the cable.



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

The conduit to be finished as described on pages 5-8.

Before applying the sealant, it is advisable to perform a final check on the packing of insert and filler sleeves.



When applying the NOFIRNO® sealant, care has to be taken that sufficient sealant is injected in between the cables and partly into the RISE® insert sleeve.





NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

1) Adding extra cables is an easy job. Cut away the sealant layer at both sides of the penetration with a knife or a hollow punch in a tapering shape. This creates a good foundation for the sealant mass to be applied later.



2) Remove one or more NOFIRNO® filler sleeves to create a fitting opening for the cable to be ducted.



NOFIRNO® MULTI-CABLE TRANSIT SEALING SYSTEM

3) Pull the new cable through the created opening.
Place a RISE® sleeve around the ducted cable.
Push the insert sleeve into the conduit.
Fill open spaces with NOFIRNO® filler sleeves.



4) Refill the opening in the sealant layer at both sides of the penetration with sufficient NOFIRNO® sealant.

The NOFIRNO® sealant is pressed down firmly and smoothed with a damped cloth.

Note: do not use soap water!



People with sensitive skin should use gloves when working with NOFIRNO®.

Please refer to the Safety Data Sheet for more information.

Note: curing time of the sealant is dependent on air humidity in combination with the environmental temperature.

