



AMERICAN BUREAU OF SHIPPING

| | | | |
|------------------|----------------------|--------------------|-------------|
| Customer Name | BEELE ENGINEERING BV | Purchase Order No. | |
| Attending Office | Rotterdam | Report Number | RO2497866-A |
| First Visit Date | 02-Dec-2013 | Last Visit Date | 02-Dec-2013 |

Statement of Fact Of: PRESSURE TEST OF NOFIRNO SEALING SYSTEM Quantity: One(1)
Manufacturer: BEELE ENGINEERING BV

Survey Location: AALTEN, NETHERLANDS

The scope of work was as agreed.

The survey of the items identified has been carried out in accordance with the applicable Process Instruction.

Test report WT 1312-121

NOFIRNO sealing system with 60mm filler sleeves 18/12 and 27/19 and 20mm sealent at the pressure exposed side assembled in flanged conduit sleeve 160x5 mm with a length of 100mm type 18/12 and 27/19 filler sleeves in a ratio ca. 1:2.

NOFIRNO sealent applied thickness 20mm.

Water tightness test has been carried out. Pressure has been applied from sealent side. It was performed with pressure increments of 0.5 bar up to 2.5 bar, holding pressure for 30 minutes at each pressure increase, and found tight.

Manufacturer's test report has been attached.

Surveyor(s) to The American Bureau of Shipping Attending Surveyors

Sabasov Karlo

Electronically Signed on 03-Dec-2013

Reviewed By

Zalewski, Mariusz P

Electronically Signed on 09-Dec-2013, Rotterdam Port

NOTE: This Report does not constitute validation of any ABS Rule requirement relating to the captioned equipment or documentation, as no evaluation of acceptance or rejection is made by the signatory. This Report is issued solely for the use of the Bureau, its committees, its clients or other authorized entities. Parties are advised to review the Rules for the scope and conditions of classification and to review the survey records for a fuller description of any restrictions or limitation on the vessel's service or surveys. The validity, applicability and interpretation of this Report is governed by the Rules and standards of American Bureau of Shipping who shall remain the sole judge thereof. Nothing contained in this Report or in any notation made in contemplation of this Report shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator or other entity of any warranty express or implied.



AMERICAN BUREAU OF SHIPPING

| | | | |
|------------------|----------------------|--------------------|-------------|
| Customer Name | BEELE ENGINEERING BV | Purchase Order No. | |
| Attending Office | Rotterdam | Report Number | RO2497866-B |
| First Visit Date | 02-Dec-2013 | Last Visit Date | 02-Dec-2013 |

Statement of Fact Of: PRESSURE TEST OF NOFIRNO SEALING SYSTEM
Quantity: One(1)
Manufacturer: BEELE ENGINEERING BV

Survey Location: AALTEN, NETHERLANDS

The scope of work was as agreed.

The survey of the items identified has been carried out in accordance with the applicable Process Instruction.

Test report WT 1312-122

NOFIRNO sealing system with 60mm filler sleeves 18/12 and 27/19 and 20mm sealant at the unexposed side assembled in flanged conduit sleeve 160x5 mm with a length of 100mm type 18/12 and 27/19 filler sleeves in a ratio ca. 1:2.

NOFIRNO sealant applied thickness 20mm.

Water tightness test has been carried out. Pressure has been applied from sleeve side. It was performed with pressure increments of 0.5 bar up to 2.0 bar, holding pressure for 30 minutes at each pressure increase, and found tight.

Manufacturer's test report has been attached.

Surveyor(s) to The American Bureau of Shipping Attending Surveyors

Sabasov Karlo

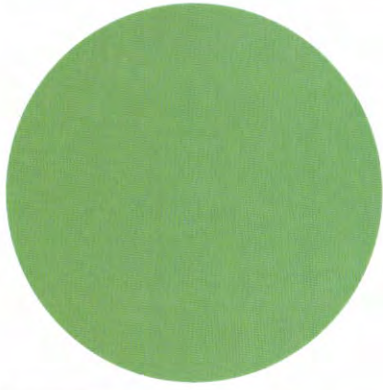
Electronically Signed on 03-Dec-2013

Reviewed By

Zalewski, Mariusz P

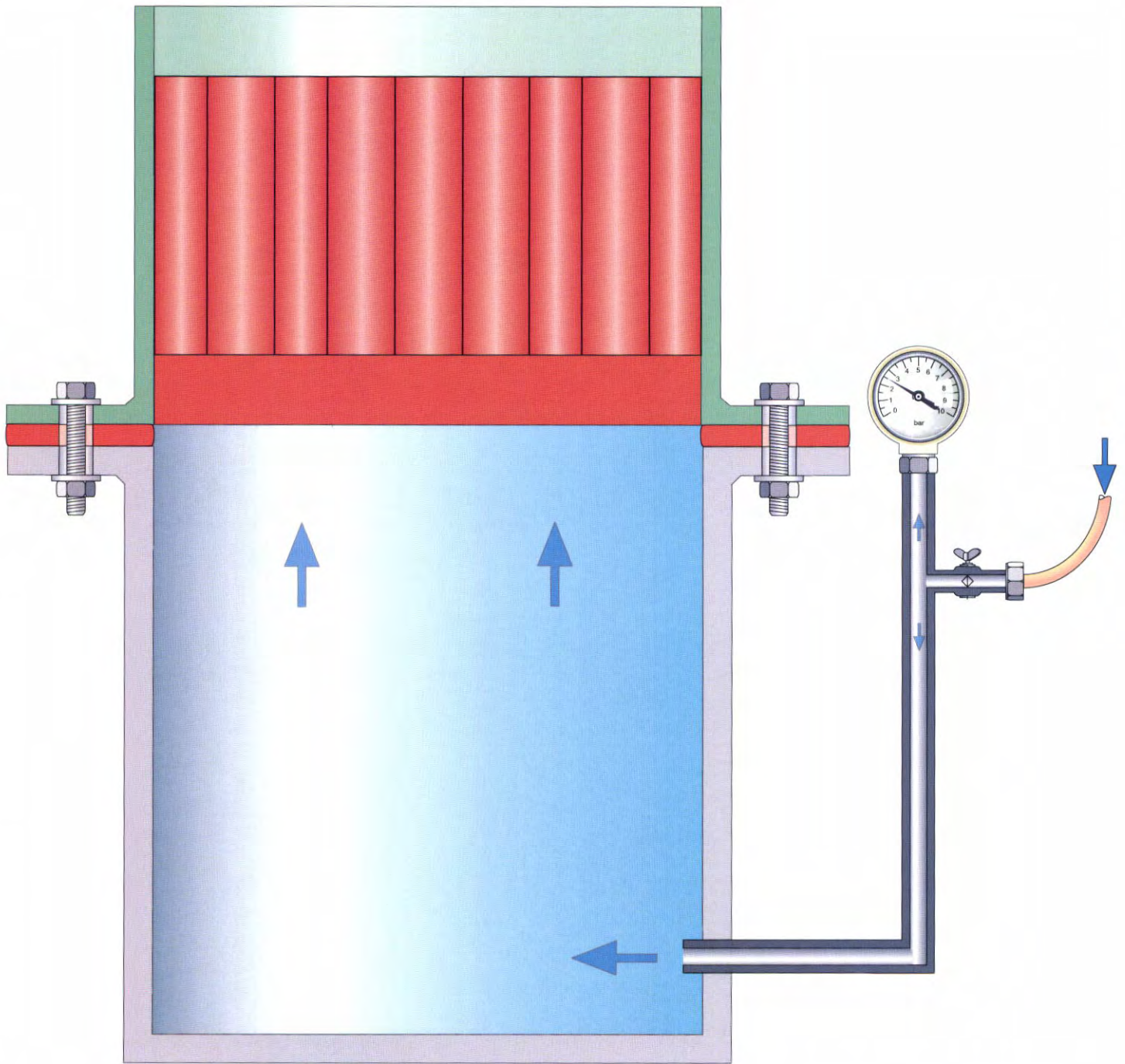
Electronically Signed on 09-Dec-2013, Rotterdam Port

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BEELE

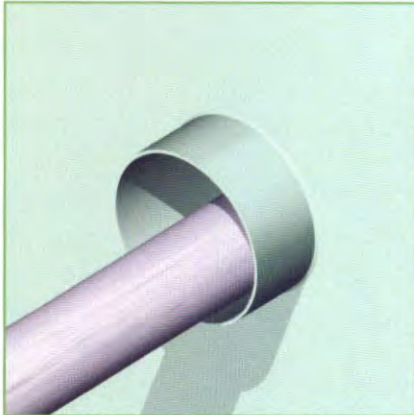
ENGINEERING



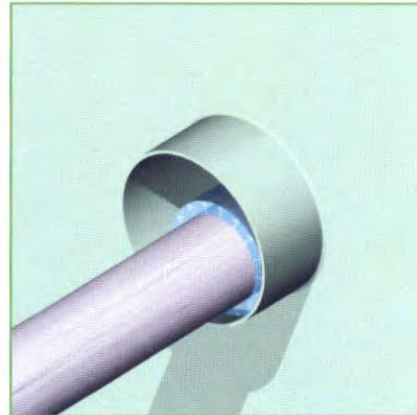
TEST REPORT WT 1312-121



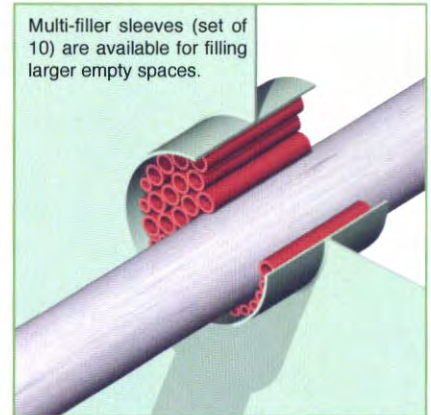
NOFIRNO® (MULTI-) PIPE TRANSIT SEALING SYSTEM - FIRESAFE/GAS & WATERTIGHT



1) The metallic pipe can be passed through the conduit sleeve in any position, provided there is enough space between the sleeve and the ducted pipe (see next at 2).

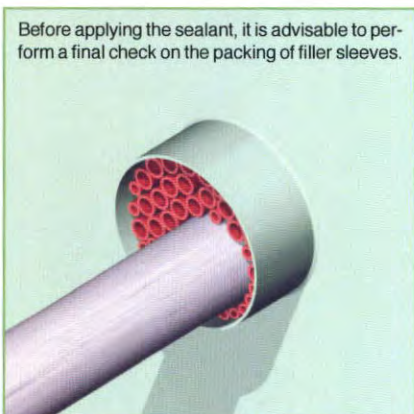


2) Make sure that the minimum space between the pipe and the wall of the conduit sleeve is in accordance with the minimum allowed distance as certified.



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

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. Alternative only filler sleeves type 22/15.



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

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



Use our professional sealant guns. Hand fatigue is prevented and optimum flow of the sealant is obtained.

Note: sealant cannot be applied on hot surfaces. Maximum temperature is 60 °C. After full curing max. operating temperature is 180 °C.

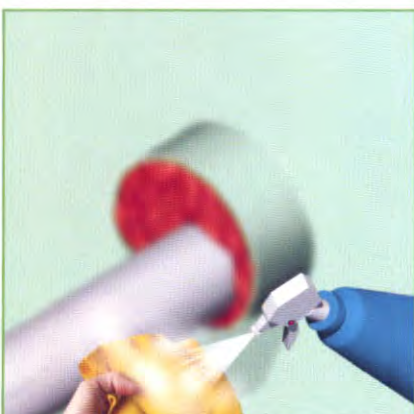
5) A 20 mm thick layer of NOFIRNO® sealant is applied at each side of the conduit. Clean and dry the conduit opening as well as the pipe thoroughly, and remove any dirt, rust or oil residues before applying the sealant.



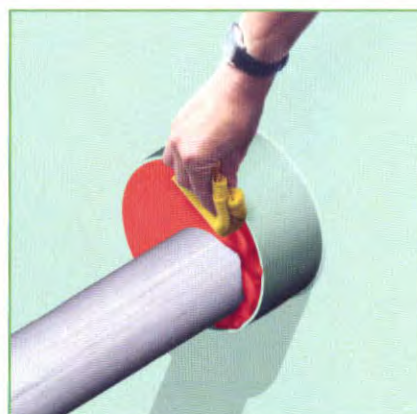
People with sensitive skin should use gloves when working with NOFIRNO®. Please refer to the Safety Data Sheet for more information.

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

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.



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.



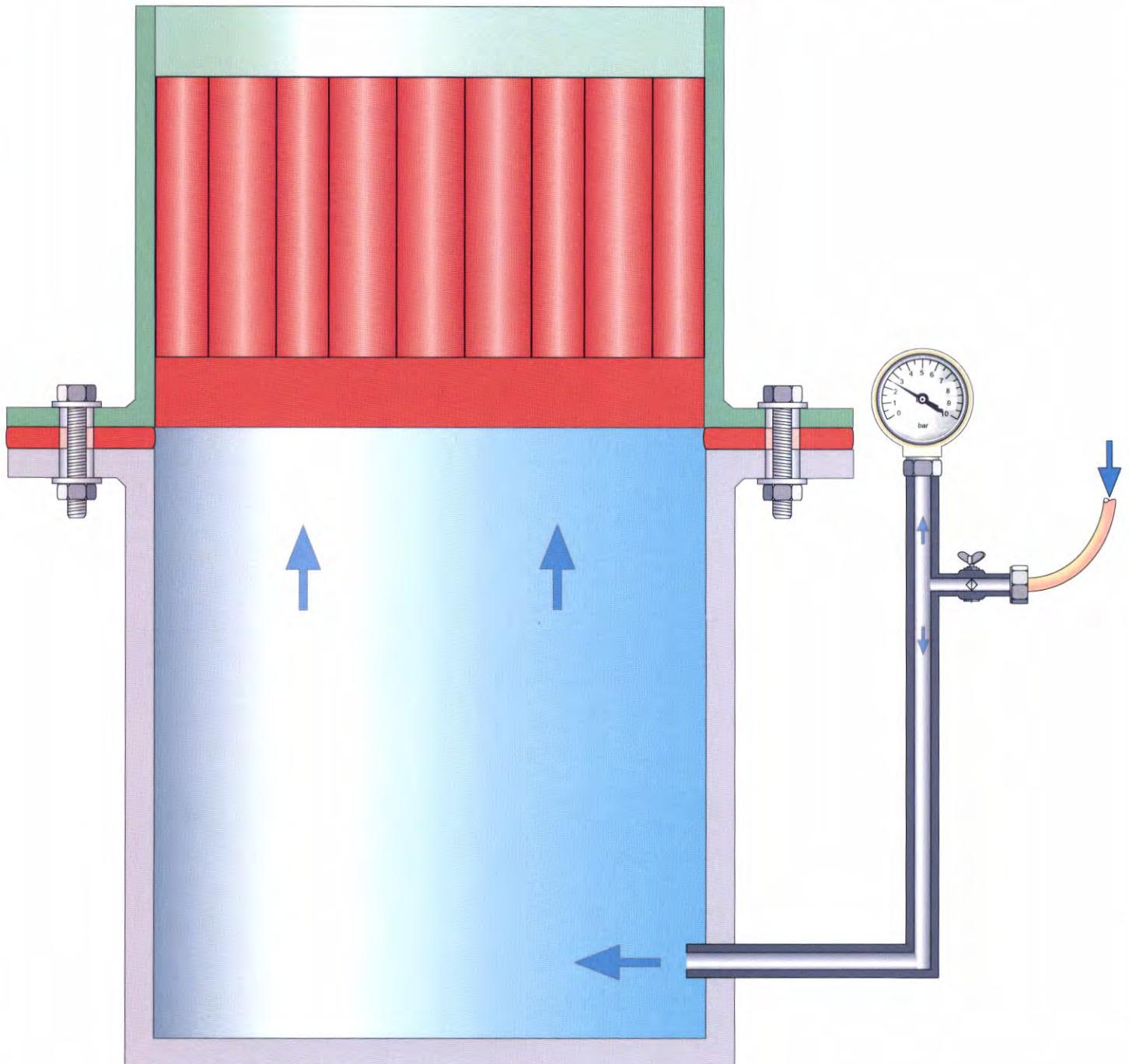
People with sensitive skin should use gloves when working with NOFIRNO®.

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.



TEST PROTOCOL FOR HYDROSTATIC TESTING OF THE NOFIRNO SEALING SYSTEM



The NOFIRNO sealing system is fire tested and certified according to IMO Resolution A.754(18). The NOFIRNO system is generally installed in conduits with a minimum length of 180 mm and with NOFIRNO sealant applied at both sides of the penetration. For watertight applications the set-up is similar and the system is certified for a design pressure of 3 bar. In case of watertight requirements the conduit length can be shorter as has been proven with pressure tests on cable penetrations. The mechanical load in kg on the exposed surface is derived from $1 \text{ bar} = 1 \text{ kg/cm}^2$, and therefore the size of the transit and the filling rate with pipes/cables is a determining factor. The adhesive surface of the sealant is in this respect also of importance. NOFIRNO cable transits have been tested up to 4 bar with only NOFIRNO sealant at the exposed side. Reference is made to test reports WT0901-008 and 009. The objective of the test is to determine the max. pressure ratings on blind transits 150 mm diameter with 60 mm sleeves and 20 mm sealant only at one side applied. The standard protocol is to start with pressure of 0.5 bar to be hold for 30 minutes, followed by raising the pressure in intervals of 0.5 bar each to be hold for 30 minutes. The pressure is raised till a leakage occurs. In case a pressure of 2.5 bar is achieved, the pressure is maintained for minimum of 4 hours.



TEST PROTOCOL FOR HYDROSTATIC TESTING OF THE NOFIRNO SEALING SYSTEM



Test Report No. WT 1312-121
Date 02-12-2013

Date of installation 15-11-2013
Installation instructions standard

Installation by T. Brzoskowski
Witnessed by J.A.C. van Gaalen
product specialist R&D

PRODUCT SPECIFICATION

Type of sealing system NOFIRNO sealing system with 60 mm filler sleeves 18/12 and 27/19 and 20 mm sealant at the exposed side.
Conduit Flanged conduit sleeve 160 x 5 mm with a length of 100 mm
NOFIRNO sleeves type 18/12 and 27/19 in a ratio ca. 1 : 2 with a length of 60 mm
Sealant NOFIRNO sealant in thickness of 20 mm
Ducted pipe/cable none

| pressure | start | end | observations/actions |
|----------|-------|------|----------------------|
| 0.5 | 0:00 | 0:30 | no leakages |
| 1 | 0:30 | 1:00 | no leakages |
| 1.5 | 1:00 | 1:30 | no leakages |
| 2 | 1:30 | 2:00 | no leakages |
| 2.5 | 2:00 | 2:30 | no leakages |
| 3 | | | |
| 3.5 | | | |
| 4 | | | |
| | | | |

CONCLUSION

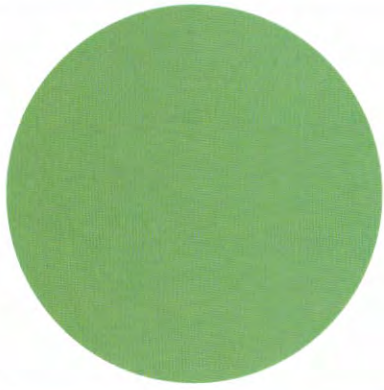
The NOFIRNO sealing system, as specified above, has been successfully subjected to a hydrostatic pressure rating up to 2.5 bar without showing any leakage.

FOR TESTING/WITNESSING
December 2, 2013

For testing:
Tomasz Brzoskowski
BEELE Engineering bv

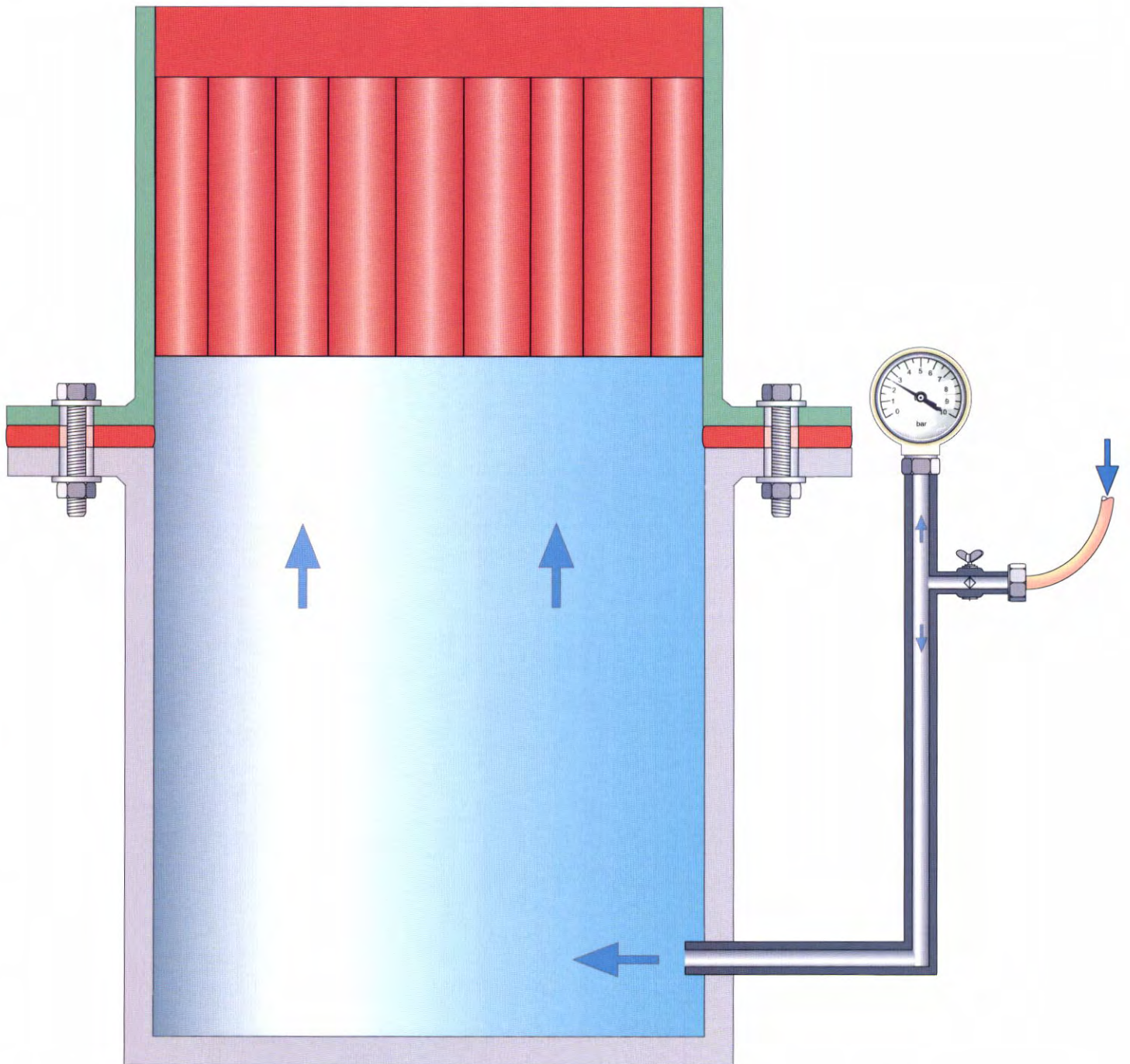
For witnessing:
K. Sabasov (senior surveyor)
ABS - Rotterdam





BEELE

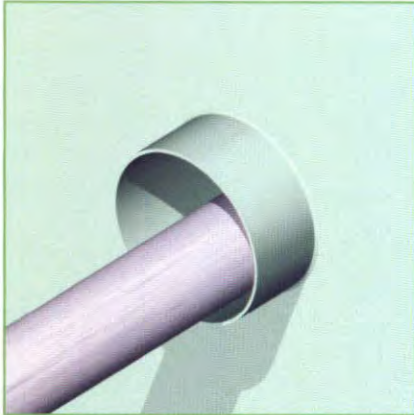
ENGINEERING



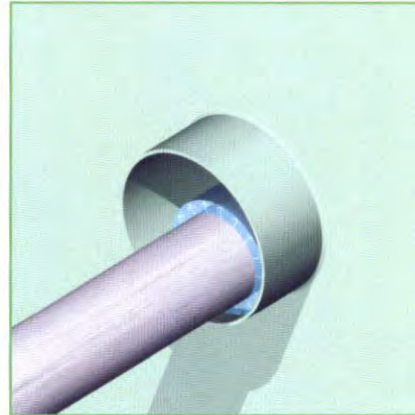
TEST REPORT WT 1312-122



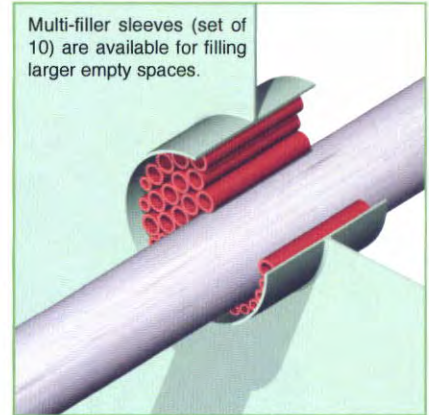
NOFIRNO® (MULTI-) PIPE TRANSIT SEALING SYSTEM - FIRESAFE/GAS & WATERTIGHT



1) The metallic pipe can be passed through the conduit sleeve in any position, provided there is enough space between the sleeve and the ducted pipe (see next at 2).

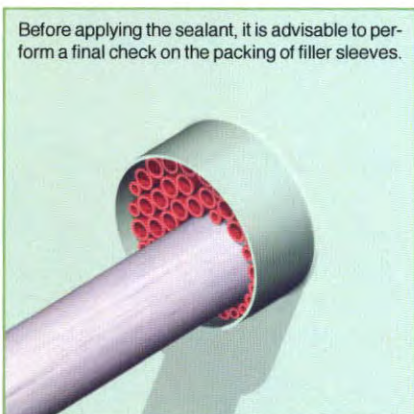


2) Make sure that the minimum space between the pipe and the wall of the conduit sleeve is in accordance with the minimum allowed distance as certified.



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

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. Alternative only filler sleeves type 22/15.



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

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



Use our professional sealant guns. Hand fatigue is prevented and optimum flow of the sealant is obtained.

Note: sealant cannot be applied on hot surfaces. Maximum temperature is 60 °C. After full curing max. operating temperature is 180 °C.

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.



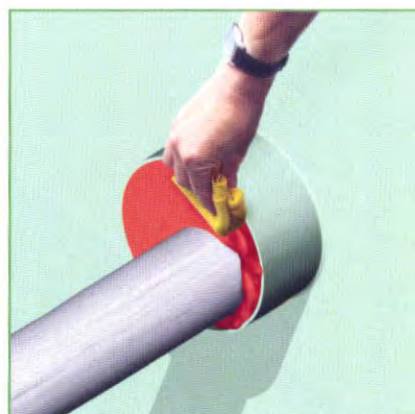
People with sensitive skin should use gloves when working with NOFIRNO®. Please refer to the Safety Data Sheet for more information.

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

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.



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!



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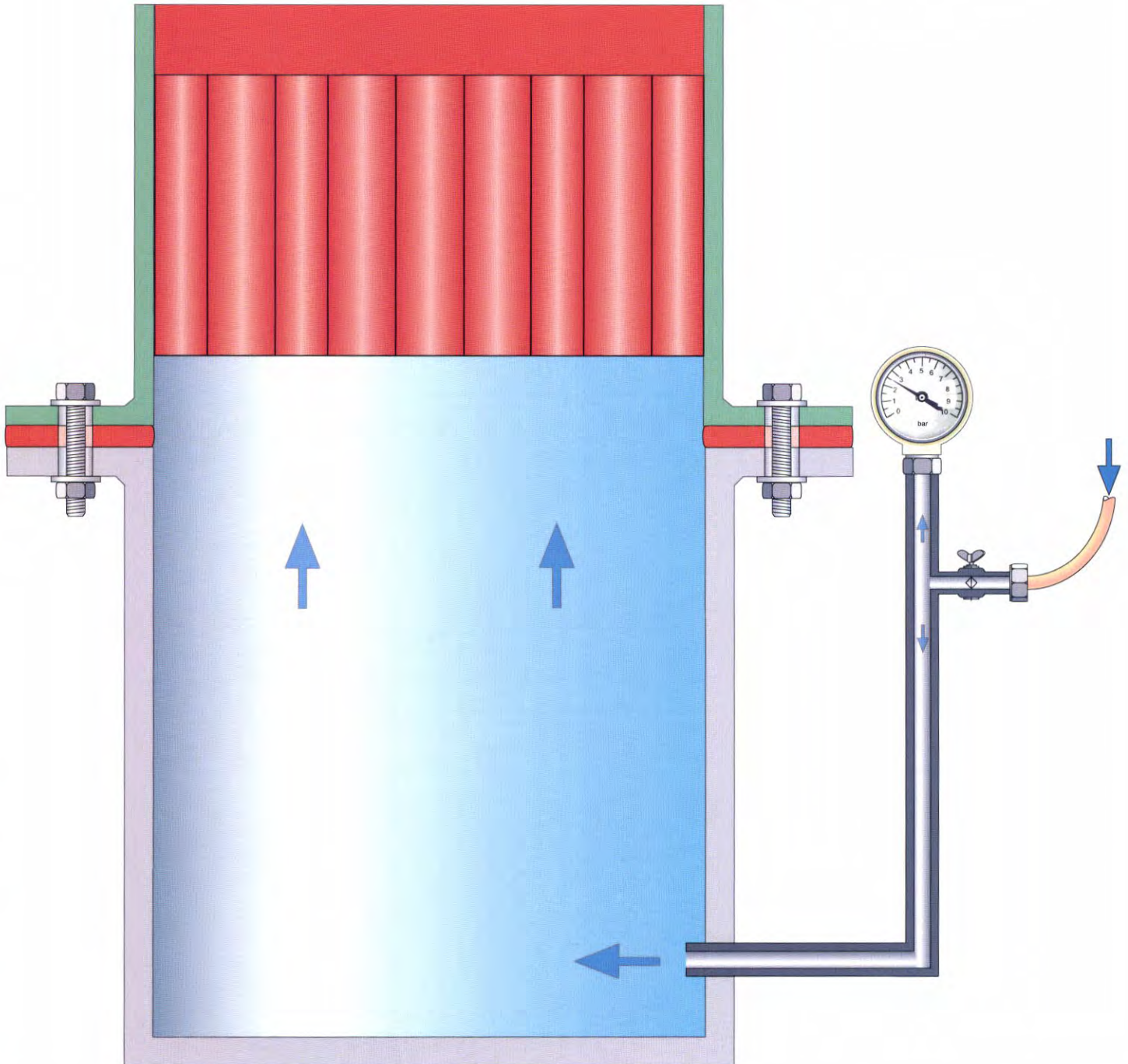


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9) The surface can be smoothed by hand. Just wet the hands thoroughly with soap and water. No dirty hands when working with NOFIRNO® and a very neat surface is the result.

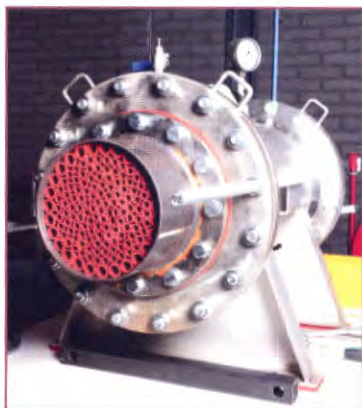
TEST PROTOCOL FOR HYDROSTATIC TESTING OF THE NOFIRNO SEALING SYSTEM



The NOFIRNO sealing system is fire tested and certified according to IMO Resolution A.754(18). The NOFIRNO system is generally installed in conduits with a minimum length of 180 mm and with NOFIRNO sealant applied at both sides of the penetration. For watertight applications the set-up is similar and the system is certified for a design pressure of 3 bar. In case of watertight requirements the conduit length can be shorter as has been proven with pressure tests on cable penetrations. The mechanical load in kg on the exposed surface is derived from $1 \text{ bar} = 1 \text{ kg/cm}^2$, and therefore the size of the transit and the filling rate with pipes/cables is a determining factor. The adhesive surface of the sealant is in this respect also of importance. NOFIRNO cable transits have been tested up to 4 bar with only NOFIRNO sealant at the exposed side. Reference is made to test reports WT0901-008 and 009. The objective of the test is to determine the max. pressure ratings on blind transits 150 mm diameter with 60 mm sleeves and 20 mm sealant only at one side applied. The standard protocol is to start with pressure of 0.5 bar to be hold for 30 minutes, followed by raising the pressure in intervals of 0.5 bar each to be hold for 30 minutes. The pressure is raised till a leakage occurs. In case a pressure of 2.5 bar is achieved, the pressure is maintained for minimum of 4 hours.



TEST PROTOCOL FOR HYDROSTATIC TESTING OF THE NOFIRNO SEALING SYSTEM



Test Report No. WT 1312-122
Date 02-12-2013

Date of installation 15-11-2013
Installation instructions standard

Installation by T. Brzoskowski
Witnessed by J.A.C. van Gaalen
product specialist R&D

PRODUCT SPECIFICATION


| | |
|------------------------|---|
| Type of sealing system | NOFIRNO sealing system with 60 mm filler sleeves 18/12 and 27/19 and 20 mm sealant at the unexposed side. |
| Conduit | Flanged conduit sleeve 160 x 5 mm with a length of 100 mm |
| NOFIRNO sleeves | type 18/12 and 27/19 in a ratio ca. 1 : 2 with a length of 60 mm |
| Sealant | NOFIRNO sealant in thickness of 20 mm |
| Ducted pipe/cable | none |

| pressure | start | end | observations/actions |
|----------|-------|------|----------------------|
| 0.5 | 0:00 | 0:30 | no leakages |
| 1 | 0:30 | 1:00 | no leakages |
| 1.5 | 1:00 | 1:30 | no leakages |
| 2 | 1:30 | 2:00 | no leakages |
| 2.5 | 2:00 | 2:30 | not tested |
| 3 | | | |
| 3.5 | | | |
| 4 | | | |
| | | | |

CONCLUSION

The NOFIRNO sealing system, as specified above, has been successfully subjected to a hydrostatic pressure rating up to 2.0 bar without showing any leakage.

FOR TESTING/WITNESSING
December 2, 2013


For testing:
Tomasz Brzoskowski
BEELE Engineering bv


For witnessing:
K. Sabasov (senior surveyor)
ABS - Rotterdam