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Covenant
K107973/01

Issued *2021-04-01*

Replaces -

COVENANT

NOFIRNO/Cer sealing system for jet fire resistant pipe penetrations

STATEMENT BY KIWA
With this Covenant, issued in accordance with the Kiwa Regulations for Product Certification, Kiwa declares that legitimate confidence exists that the products supplied by

Beele Engineering B.V.

as specified in this product certificate and marked with the Kiwa®-mark in the manner as indicated in this product certificate may, on delivery, be relied upon to comply with Kiwa Covenant manual K15013 dated 01-01-2016.

Ron Scheepers
Kiwa

Publication of this certificate is allowed.
Advice: consult www.kiwa.nl in order to ensure that this certificate is still valid.

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1 Scope of the Covenant

Jet fire resistant pipe penetrations sealed with the NOFIRNO/Cer sealing system for application in divisions made of steel.

The sealed pipe penetrations comply with the jet fire resistance classes as stated in this Covenant for the described fields of application and constructions, if exposed to ISO 22899-1[1] jet fire conditions or High Heat Flux (HHF)[2] jet fire conditions.

The jet fire resistance performance of the constructions is assessed against the integrity and insulation criteria of IMO Resolution MSC.307 (88)[3] and classified according to ISO/TR 22899-2[4].
For the indication of the classification related to the type of fire according to ISO/TR 22899-2, the letters JF represent Jet Fires (whereas HC and CF represent hydrocarbon pool fires and cellulosic fire respectively)[5].
NB: In daily practice and communication the letters J, H and A are mostly used, instead of JF, HC and CF.

Extended application of the sealing system with respect to the range of dimensions of pipes, type of pipes, dimensions of conduit sleeves is assessed, based on evidence of test results from ISO 22899-1 jet fire tests and from hydrocarbon fire resistance tests following the principles of IMO Resolution MSC.307(88), heat transfer and heat flux analysis and calculations with respect to different jet fire conditions, hydrocarbon fire conditions, pipe and conduit dimensions, insulation performance of the sealing system and of the applied insulation (type, dimensions) on division, conduits and pipes. For the assessment principles used it is referred to the mentioned documents[6] [7].

[1] ISO 22899-1:2007 *"Determination of the resistance to jet fires of passive fire protection materials — Part 1: General requirements"*

[2] Modified ISO 22899-1 test with higher heat flux (350 kW/m^2)

[3] International Maritime Organization - IMO Resolution MSC.307(88) – International Code for Application of Fire Test Procedures, 2010 (FTP Code 2010)

[4] ISO/TR 22899-2:2013 "*Determination of the resistance to jet fires of passive fire protection materials — Part 2: Guidance on classification and implementation methods"*

[5] ISO 13702:2015 "*Petroleum and natural gas industries — Control and mitigation of fires and explosions on offshore production installations — Requirements and guidelines*"

[6] ISO/TR 12470-2:2017 "*Fire resistance tests – Guidance on the application and extension of results from tests conducted on fire containment assemblies and products – Part 2: Non-load bearing elements*"

[7] Ian Bradley, A Review of the Applicability of the Jet Fire Resistance Test Method to Severe Release Scenarios, HSE Research Report R1120, 2017

2 Description of the product

2.1 NOFIRNO/Cer sealing system

The NOFIRNO/Cer sealing system is intended for penetrations through HC and JF Class divisions made of steel.
The sealing system consists of a combination of NOFIRNO/Cer filler sleeves and NOFIRNO/Cer sealant.
The aperture(s) inside the conduit sleeve(s) or conduit frame(s) between the penetrating pipe(s) and the inner surface of the conduit sleeve(s) is/are filled with NOFIRNO/Cer filler sleeves (40 mm shorter than the length of the conduit sleeve(s), leaving a space of 20 mm on each side). The remaining space in the conduit opening(s) on each side of the bulkhead or deck is sealed with a layer of 20 mm NOFIRNO/Cer sealant.

The filler sleeves are available in six diameter sizes and in five lengths.

2.2 Insulation of steel division, conduit sleeves and pipes

2.2.1 FYLLOFYS non-combustible thermal insulation

FYLLOFYS is available as 25 and 50 mm thick mineral board panels for insulation of steel sections with a flat surface and as 50 mm thick shell parts for the application of insulation around metal pipes, in lengths from 100 mm to 600 mm. For large pipes with outer diameter greater than 406 mm, tapered FYLLOFYS strips are installed around the perimeter of the pipe. All FYLLOFYS parts are finished with FISSIC coating for internal bonding of individual parts and bonding to substrates, for providing protection of the outer surface, as well as for resistance to water absorption. FYLLOFYS panels are mounted to flat steel parts by staple fixing and screw fixing. Stainless steel jubilee strips are used to fit the shell parts around the pipe. The front of the FYLLOFYS shell parts is finished with NOFIRNO/Cer sealant to prevent moisture ingress and rust formation on the pipe beneath the insulation.
FYLLOFYS is classified as non-combustible material for reaction to fire Class ‘A2 s1 d0’ according to EN 13501-1.
FISSIC coating is classified for reaction to fire Class ‘B-s1,d0’ according to EN 13501-1.

2.2.2 Chartek 7 insulation material

Chartek 7 is an epoxy based insulation material for insulation of steel. Chartek 7 is trowel applied on the steel substrates. This material is not manufactured and not supplied by Beele Engineering.

3 Field of application

3.1 General

Fire resistant sealing of pipe penetrations through JF Class divisions.
JF Class divisions may be steel bulkheads onboard ships/vessels, steel walls and divisions on off- or onshore installations and platforms that have to be resistant to jet fires.
The type of pipes included in this certificate are:

- Steel: carbon steel grades for pipes
- SS: stainless steel grades for pipes
- CuNi: copper nickel alloys for pipes

The fields of application for the penetrations using the sealing systems included in this certificate are specified herein.
The detailed drawings are presented in Annex C.

The Jet fire classification of pipe penetrations according to ISO/TR 22899-2 expresses the minimum time of resistance to jet fires in minutes with respect to both integrity and insulation to the stated maximum temperature rise at the unexposed side of the division.
Expression:
"JF / pipe penetration seal / 180 °C / xxx min" : Jet Fire rating for pipe penetration seal for integrity and insulation; maximum 180 °C temperature rise not reached after minimum xxx minutes.

ISO/TR 22899-2 does not define the expressions for the jet fire rating for uninsulated configurations with respect to the integrity only. For uninsulated configurations there are no requirements for the insulation performance with respect to the maximum temperature rise at the unexposed side of the division.
In line with the expression for insulated configurations is used:
"JF / pipe penetration seal / 0 / xxx" : Jet Fire rating for uninsulated pipe penetration seal for integrity; integrity criteria still met after minimum xxx minutes.
ISO/TR 22899-2 does not define the expressions for jet fire ratings for high heat flux 350 kW/m^2 jet fire conditions (HHF).
In this Covenant the expression "JF_{HHF}" is used for the classification of the resistance to HHF jet fires.
In the ratings mentioned in this Covenant the term "pipe penetration seal" will be left out, as it is clear that the Covenant is limited to this field of application.

In daily practise and communication, mostly the Jet fire classification expressions are simplified. These simplified jet fire ratings will be mentioned as well.
Expressions:
"J15" until "J240" for integrity and insulation during 15 until 240 minutes.
"J0" for integrity of uninsulated configurations; the time is undefined. For J0 rated configurations the duration of performance is not clear. Therefore in this Covenant the expressions "J0-15" until "J0-240" are used to provide more performance information.

3.2 Jet fire classification of pipe penetration seals within this Covenant

3.2.1 Overview of the jet fire classification

A general overview of the jet fire classification of pipe penetration seals with the NOFIRNO/Cer sealing system is presented in table 1 and 2.

Table 1. Overview of the jet fire classification of uninsulated pipe penetration seals with the NOFIRNO/Cer sealing system

Pipe penetrations Steel coamings: min. length 250 mm / OD: 88,9 – 1879 mm Steel/SS/CuNi pipes: OD 6 – 1600 mm No insulation of steel divisions, coamings and pipes		
Jet fire rating *		Integrity only
ISO 22899-1 jet fire	HHF 350 kW/m^2 jet fire **	
JF / 0 / 240 min (J0-240)	JF_{HHF} / 0 / 60 min (J_{HHF} 0-60)	No insulation

Table 2. Overview of the jet fire classification of insulated pipe penetration seals with the NOFIRNO/Cer sealing system

Pipe penetrations Steel coamings: min. length 250 mm / OD: 88,9 – 1879 mm Steel/SS/CuNi pipes: OD 6 – 1600 mm Insulation of steel divisions, coamings and pipes		
Jet fire rating *		Integrity and insulation (max ΔT = 180 °C)
ISO 22899-1 jet fire	HHF 350 kW/m^2 jet fire **	
JF / 180 °C / 30 min (J30)	JF_{HHF} / 180 °C / 30 min (J_{HHF} 30)	25 mm FYLLOFYS or 20 mm Chartek 7
JF / 180 °C / 120 min (J120)	JF_{HHF} / 180 °C / 60 min (J_{HHF} 60)	50 mm FYLLOFYS or 20 mm Chartek 7

* The rating given is the highest rating for the configuration. All classes lower than the class given are also applicable, e.g. for J0-240 either J0-15, J0-30, J0-60, J0-120 as appropriate, or for J120 either J15, J30, J60 as appropriate

** JF_{HHF} ratings for high heat flux 350 kW/m^2 jet fire conditions are also valid for ISO 22899-1 jet fire conditions

3.2.2 Detailed descriptions of the jet fire classified pipe penetrations

Beele Engineering drawings (see Annex C):
- NFN167E, NFN168E, NFN169E, NFN170E, NFN171E, NFN172E, NFN173E, NFN174E

J_{HHF} 0-60 or J0-240 Class Steel / SS / CuNi pipe penetrations through bulkheads made of steel - NOFIRNO/Cer sealing system - Drawing NFN167E (04-11-2020)

• Penetration range:
circular conduit sleeves minimum NPS 3" / DN 80 / OD 88,9 mm / ID 82,5 mm, maximum NPS 84" / DN 2100 / OD 2133,6 mm / ID 2095,5 mm
• Conduit sleeves length minimum 250 mm, conduit sleeves welded in the bulkhead
• Conduit frame position symmetrical in the bulkhead, or in case of fire possible from only one side non-symmetrical with the longest length on the non-fire side of the bulkhead
• No insulation is needed on the bulkhead, conduit sleeve and pipes
• Type of pipes and dimensions:
Steel/SS/CuNi pipes - Minimum NPS 1/16" / OD 6 mm - Maximum NPS 64" / DN 1600 / OD 1625,6 mm / ID 1606,1 mm

J_{HHF} 30 or J_{HHF} 60 or J120 Class Steel / SS / CuNi pipe penetrations through bulkheads made of steel - NOFIRNO/Cer sealing system - Drawing NFN168E (04-11-2020)

• Penetration range:
circular conduit sleeves minimum NPS 3" / DN 80 / OD 88,9 mm / ID 82,5 mm, maximum NPS 84" / DN 2100 / OD 2133,6 mm / ID 2095,5 mm
• Conduit sleeves length minimum 250 mm, conduit sleeves welded in the bulkhead
• Conduit frame position symmetrical in the bulkhead, or in case of fire possible from only one side non-symmetrical with the longest length on the non-fire side of the bulkhead
• Insulation on the bulkhead, conduit sleeve and pipes:
- for J_{HHF} 30: 25 mm FYLLOFYS or 20 mm Chartek 7
- for J_{HHF} 60 or for J120: 50 mm FYLLOFYS or 20 mm Chartek 7
the lengths of the pipe insulation (depending on the pipe size) are indicated in the drawing
• Type of pipes and dimensions:
Steel/SS/CuNi pipes - Minimum NPS 1/16" / OD 6 mm - Maximum NPS 64" / DN 1600 / OD 1625,6 mm / ID 1606,1 mm

J_{HHF} 0-60 or J0-240 Class Steel / SS / CuNi pipe penetrations through decks made of steel - NOFIRNO/Cer sealing system - Drawing NFN169E (04-11-2020)

• Penetration range:
circular conduit sleeves minimum NPS 3" / DN 80 / OD 88,9 mm / ID 82,5 mm, maximum NPS 84" / DN 2100 / OD 2133,6 mm / ID 2095,5 mm
• Conduit sleeves length minimum 250 mm, conduit sleeves welded in the deck
• Conduit frame position totally below deck up to totally above deck
• No insulation is needed on the deck, conduit sleeve and pipes
• Type of pipes and dimensions:
Steel/SS/CuNi pipes - Minimum NPS 1/16" / OD 6 mm - Maximum NPS 64" / DN 1600 / OD 1625,6 mm / ID 1606,1 mm

J_{HHF} 30 or J_{HHF} 60 or J120 Class Steel / SS / CuNi pipe penetrations through decks made of steel - NOFIRNO/Cer sealing system - Drawing NFN170E (04-11-2020)

• Penetration range:
circular conduit sleeves minimum NPS 3" / DN 80 / OD 88,9 mm / ID 82,5 mm, maximum NPS 84" / DN 2100 / OD 2133,6 mm / ID 2095,5 mm
• Conduit sleeves length minimum 250 mm, conduit sleeves welded in the deck
• Conduit frame position totally below deck up to totally above deck
• Insulation on the deck, conduit sleeve and pipes:
- for J_{HHF} 30: 25 mm FYLLOFYS or 20 mm Chartek 7
- for J_{HHF} 60 or for J120: 50 mm FYLLOFYS or 20 mm Chartek 7
the lengths of the pipe insulation (depending on the pipe size) are indicated in the drawing
• Type of pipes and dimensions:

Steel/SS/CuNi pipes - Minimum NPS 1/16” / OD 6 mm - Maximum NPS 64" / DN 1600 / OD 1625,6 mm / ID 1606,1 mm

J0-240 Class Multi Steel / SS / CuNi pipe penetrations through bulkheads made of steel - NOFIRNO/Cer sealing system - Drawing NFN171E (04-11-2020)

- Penetration range:
  conduit frames, wall thickness minimum 8 mm, maximum outer dimensions 600 x 300 mm
- Conduit frames length minimum 250 mm, conduit frames welded in the bulkhead
- Conduit frame position symmetrical in the bulkhead, or in case of fire possible from only one side non-symmetrical with the longest length on the non-fire side of the bulkhead
- No insulation is needed on the bulkhead, conduit frame and pipes
- Type of pipes and dimensions:
  Steel/SS/CuNi pipes - Minimum NPS 1/16” / OD 6 mm - Maximum NPS 8" / DN 200 / OD 219,1 mm / ID 203 mm

J_{HHF} 30 or J_{HHF} 60 or J120 Class Multi Steel / SS / CuNi pipe penetrations through bulkheads made of steel - NOFIRNO/Cer sealing system - Drawing NFN172E (04-11-2020)

- Penetration range:
  conduit frames, wall thickness minimum 8 mm, maximum outer dimensions 600 x 300 mm
- Conduit frames length minimum 250 mm, conduit frames welded in the bulkhead
- Conduit frame position symmetrical in the bulkhead, or in case of fire possible from only one side non-symmetrical with the longest length on the non-fire side of the bulkhead
- Insulation on the bulkhead, conduit sleeve and pipes:
  - for J_{HHF} 30: 25 mm FYLLOFYS or 20 mm Chartek 7
  - for J_{HHF} 60 or for J120: 50 mm FYLLOFYS or 20 mm Chartek 7
    the lengths of the pipe insulation (depending on the pipe size) are indicated in the drawing
- Type of pipes and dimensions:
  Steel/SS/CuNi pipes - Minimum NPS 1/16” / OD 6 mm - Maximum NPS 8" / DN 200 / OD 219,1 mm / ID 203 mm

J0-240 Class Multi Steel / SS / CuNi pipe penetrations through decks made of steel - NOFIRNO/Cer sealing system - Drawings NFN173E (04-11-2020)

- Penetration range:
  conduit frames, wall thickness minimum 8 mm, maximum outer dimensions 600 x 300 mm
- Conduit frames length minimum 250 mm, conduit frames welded in the deck
- Conduit frame position totally below deck up to totally above deck
- No insulation is needed on the deck, conduit frame and pipes
- Type of pipes and dimensions:
  Steel/SS/CuNi pipes - Minimum NPS 1/16” / OD 6 mm - Maximum NPS 8" / DN 200 / OD 219,1 mm / ID 203 mm

J_{HHF} 30 or J_{HHF} 60 or J120 Class Multi Steel / SS / CuNi pipe penetrations through decks made of steel - NOFIRNO/Cer sealing system - Drawings NFN174E (04-11-2020)

- Penetration range:
  conduit frames, wall thickness minimum 8 mm, maximum outer dimensions 600 x 300 mm
- Conduit frames length minimum 250 mm, conduit frames welded in the deck
- Conduit frame position totally below deck up to totally above deck
- Insulation on the deck, conduit sleeve and pipes:
  - for J_{HHF} 30: 25 mm FYLLOFYS or 20 mm Chartek 7
  - for J_{HHF} 60 or for J120: 50 mm FYLLOFYS or 20 mm Chartek 7
    the lengths of the pipe insulation (depending on the pipe size) are indicated in the drawing
- Type of pipes and dimensions:
  Steel/SS/CuNi pipes - Minimum NPS 1/16” / OD 6 mm - Maximum NPS 8" / DN 200 / OD 219,1 mm / ID 203 mm

Notes:
OD: Outer Diameter / Outer Dimensions
ID: Inner diameter / Inner Dimensions
NPS: Nominal Pipe Size
DN: Nominal Diameter

4 Initial product assessment

4.1 Jet fire resistance

The jet fire resistance of the pipe penetrations has been assessed by

- jet fire tests according to ISO 22899-1 using the provisions for pipe penetrations according to ISO/TR 22899-2;
- fire tests according to IMO Resolution MSC.307(88) – International Code for Application of Fire Test Procedures, 2010 (FTP Code 2010) – Part 3, applying the Norwegian Petroleum Directorate (NPD) hydrocarbon curve (H Class) in accredited laboratories as well as in-house tests under witness;
- extended application studies based on test evidence and thermo-physical heat transfer calculations.

Reports:

- RISE report 12000-60-T1, NOFIRNO/Cer sealing system – Pipe and cable penetrations, Jet fire test according to ISO 22899-1;
- RISE report 12000-60-T2, NOFIRNO/Cer sealing system – Pipe and cable penetrations, Jet fire test according to ISO 22899-1;
- RISE report 12000-60-T3, NOFIRNO/Cer sealing system – Pipe penetrations and FYLLOFOAM sealing system blind transit penetration, Jet fire test according to ISO 22899-1;
- RISE Memo 06.06.2020, Statement on the integral of heat fluxes during the test period in 3 jet fires, project 12000-60;
- 2019-Efectis-R002086, Determination of the fire resistance of pipe penetrations exposed to NPD fire conditions, NOFIRNO/Cer sealing system;
- IFC report 21507-01, Field of application of the jet fire resistance of NOFIRNO/Cer penetration seals for steel and Cu/Ni pipes;
- IFC Technical note TN/21531/01, NOFIRNO and NOFIRN/Cer sealing systems.

5 Quality system requirements

5.1 General

This chapter contains the requirements that have to be fulfilled by the manufacturer's quality system.

5.2 Manager of the quality system

Within the manufacturer's organizational structure an employee must be appointed who is in charge of managing the quality system.

5.3 Internal quality control/quality plan

As part of the quality system the manufacturer must implement an internal quality control schedule (IQC-scheme).
In this IQC-scheme the following must be demonstrably recorded:

- which aspects are inspected by the manufacturer;
- according to which methods these inspections are carried out;
- how often these inspections are carried out;
- how the inspection results are registered and stored.

The ICQ-schedule must be detailed in such a way that it provides Kiwa sufficient confidence that requirements will be continuously fulfilled.

5.4 Procedures and work instructions

The manufacturer must be able to submit:

- procedures for:
  - the handling of non-conforming products;
  - corrective actions in case non-conformities are found;
  - the handling of complaints regarding the products and / or services supplied;
- the work instructions and inspection sheets in use.
- instructions for packaging and closing off of products during storage and transport.

5.5 External inspection

The manufacturer's quality system shall be assessed by Kiwa with regard to at least the aspects mentioned in the Kiwa-Regulations for Product Certification.
The Kiwa Committee Covenant will determine the inspection frequency. At the time of validation of this Covenant this frequency has been fixed at 2 inspection visits per year.

5.6 Quality control of products

The following routine tests shall be carried out according to the test methods mentioned in this covenant or otherwise mentioned.

5.6.1 NOFIRNO/Cer rubber compound

a. hardness – ISO 48-4
b. tensile properties – ISO 37
c. density – ISO 2781
d. limited oxygen index –ISO 4589-2
e. compression set – ISO 815-1

The product control tests shall be carried out on cured test sheets.

5.6.2 NOFIRNO/Cer rubber products

a. dimensions – internal method
b. surface imperfections, appearance and colour – internal method
c. hardness – ISO 48-4
d. density – ISO 2781
d. only for plugs and gaskets: hydrostatic tightness test – internal method

The product control tests shall be carried out on lots of finished products.

5.6.3 NOFIRNO/Cer sealant

Non cured material:
a. film structure – internal method
b. viscosity – internal method
c. curing - internal method

Cured material:
a. appearance and colour – internal method
b. hardness – ISO 48-4
c. density – ISO 2781
d. tensile properties – ISO 37
e. limited oxygen index –ISO 4589-2

The product control tests shall be carried out on lots of finished products (filled cartridges).

5.6.4 FYLLOFYS insulation

Mineral board plates, pipe shells
a. surface imperfections, appearance and colour – internal method
b. dimensions before and after drying– internal method

5.6.5 FISSIC coating

a. density of wet coating – internal method
b. solids content – ISO 3251
c. limited oxygen index – ISO 4589-2
d. TGA ash residue - ISO 247-2

Marking

The following marks and indications must be provided on each product packaging in a clear, legible and indelible way:
- the name of manufacturer or the deposited trademark;
- the batch number;
- only for sealants: the expiry date.

Additionally, the following mark and indication may be provided on each product packaging:
- Kiwa Covenant mark “Pipe penetrations in fire divisions” and Kiwa Covenant number.

6 Recommendations for customers

Check at the time of deliver whether:
- the supplier has delivered in accordance with the agreement;
- the mark and the marking method are correct:
- the products show no visible defects as a result of transport etc.

If you should reject a product on the basis of the above, please contact:
Beele Engineering B.V.

And, if necessary,
Kiwa Nederland B.V.

Consult the suppliers processing guidelines for the proper storage and transport methods.
Consult the supplier’s installation manuals.

Annex A. Components and material compositions used for the sealing systems

A.1 NOFIRNO/Cer filler sleeves

These components are made of NOFIRNO/Cer rubber. The colour of the compound is green. The rubber compound is manufactured and converted into products by Beele Engineering.

A.2 NOFIRNO/Cer sealant

The material of the sealant is a room temperature curing sealant. The colour of the compound is green. Other colours are admitted on the condition that only the pigment is exchanged in the composition. The sealant compound is manufactured by Beele Engineering and packed in 310 ml plastic cartridges.

Annex B. Material and product properties

B.1. Physical-mechanical material properties

NOFIRNO/Cer rubber filler sleeves

Hardness (ISO 48-4)	70 – 78 Shore A
Density (ISO 2781)	1,55 – 1,65 Mg/m^3
Tensile strength (ISO 37)	min 2,0 MPa
Elongation at break (ISO 37)	min 100 %
Limited oxygen index (ISO 4589-2)	min 40 %
Volume change in water (ISO 1817) after 7 days at 70 °C	max +8 / -1 %

NOFIRNO/Cer sealant (cured)

Hardness (ISO 48-4)	35 – 55 Shore A
Density (ISO 2781)	1,42 – 1,52 Mg/m^3
Elongation at break (ISO 37)	min 50 %
Limited oxygen index (ISO 4589-2)	min 37 %
Volume change in water (ISO 1817) after 7 days at 70 °C	max +8 / -1 %

FYLLOFYS

Non-combustible thermal insulation material (hydrous phyllosilicate)

Density (EN 1094-4):	500 +/- 50 kg/m^3
Application limit:	1100 °C
Cold compressive strength (EN 1094-5):	1,5 N/mm^2
Thermal expansion (lineair):	0,6% (750 °C)
Permanent linear change:	<1% (1000 °C)
Thermal conductivity (ASTM C1113):	0,15 W/mK (200 °C)
	0,17 W/mK (400 °C)
	0,19 W/mK (600 °C)
Organic content:	1,8 +/- 0,3 % w/w

FISSIC finish coating

Density of wet coating	1580 ± 15 g/l
Solids content (ISO 3251)	78 - 82 % w/w
TGA ash residue (ISO 247-2)	45 - 47 % w/w
Limited oxygen index (ISO 4589-2)	100 %

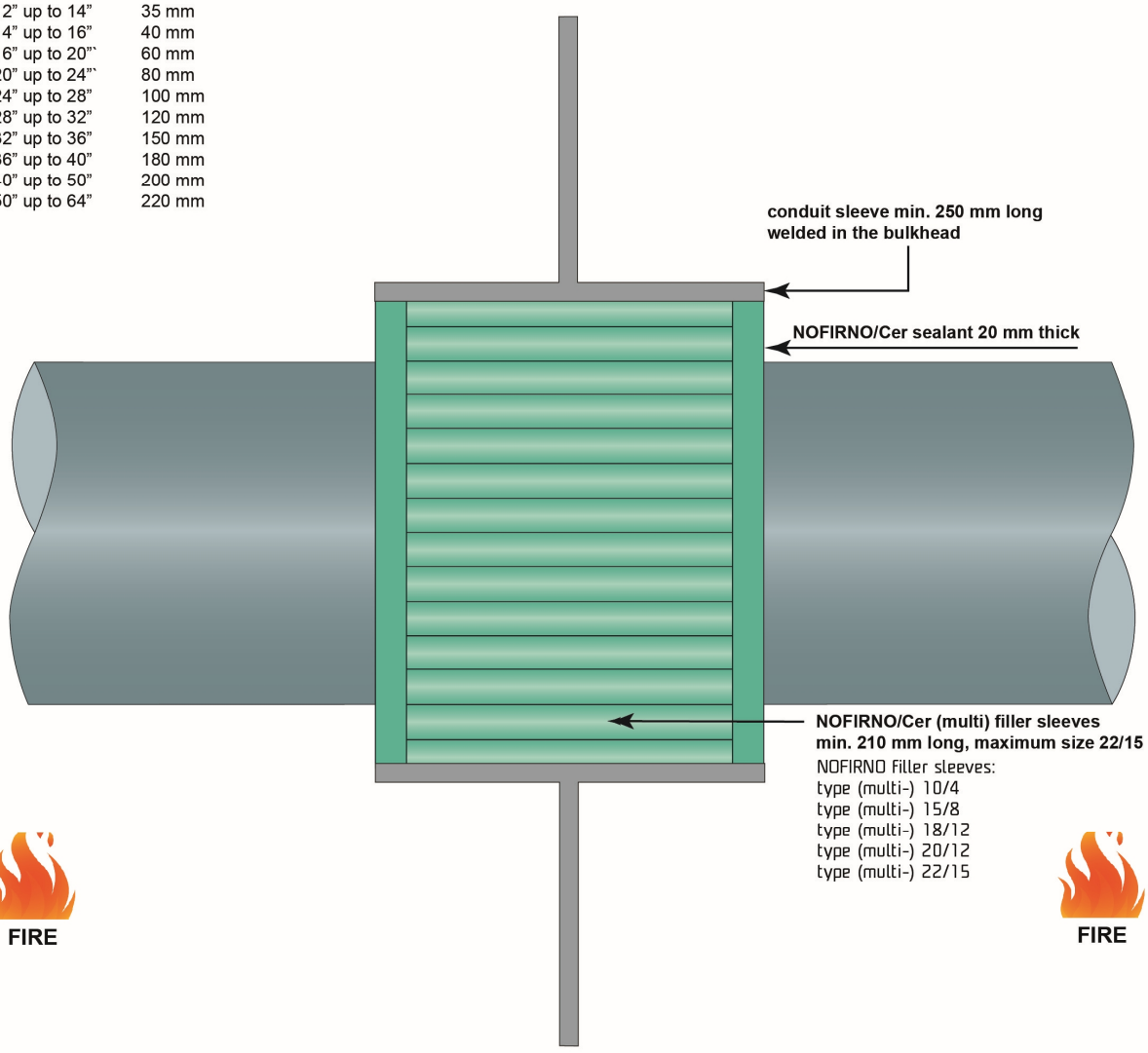
Annex C. Drawings of applicable pipe penetrations

direction of exposure:
fire from either side

NOFIRNO/Cer SEALING SYSTEM
for steel/ss/CuNi pipes
up to 1600 mm - 64" NPS

Minimum clearance between conduit sleeve and ducted pipe:

OD pipe	
up to 3"	15 mm
≥3" up to 8"	20 mm
≥8" up to 12"	30 mm
≥12" up to 14"	35 mm
≥14" up to 16"	40 mm
≥16" up to 20"`	60 mm
≥20" up to 24"`	80 mm
≥24" up to 28"	100 mm
≥28" up to 32"	120 mm
≥32" up to 36"	150 mm
≥36" up to 40"	180 mm
≥40" up to 50"	200 mm
≥50" up to 64"	220 mm



conduit frame positioned:
- symmetrical
or in case of fire from only one side
- non-symmetrical with longest length on non-fire side

BEELE SAFETY SEALING SYSTEMS	Description: NOFIRNO/Cer sealing system for J240 class bulkheads/decks			
	Mat.: NOFIRNO/Cer rubber sleeves/sealant			
	Ref.: JAB	Date:	04-11-2020	Scale:
No part of this document may be reproduced by photocopy, print, microfilm or any means without the written permission of BEELE Engineering bv of The Netherlands		Rev. 1		NFN 167E
		Rev. 2		

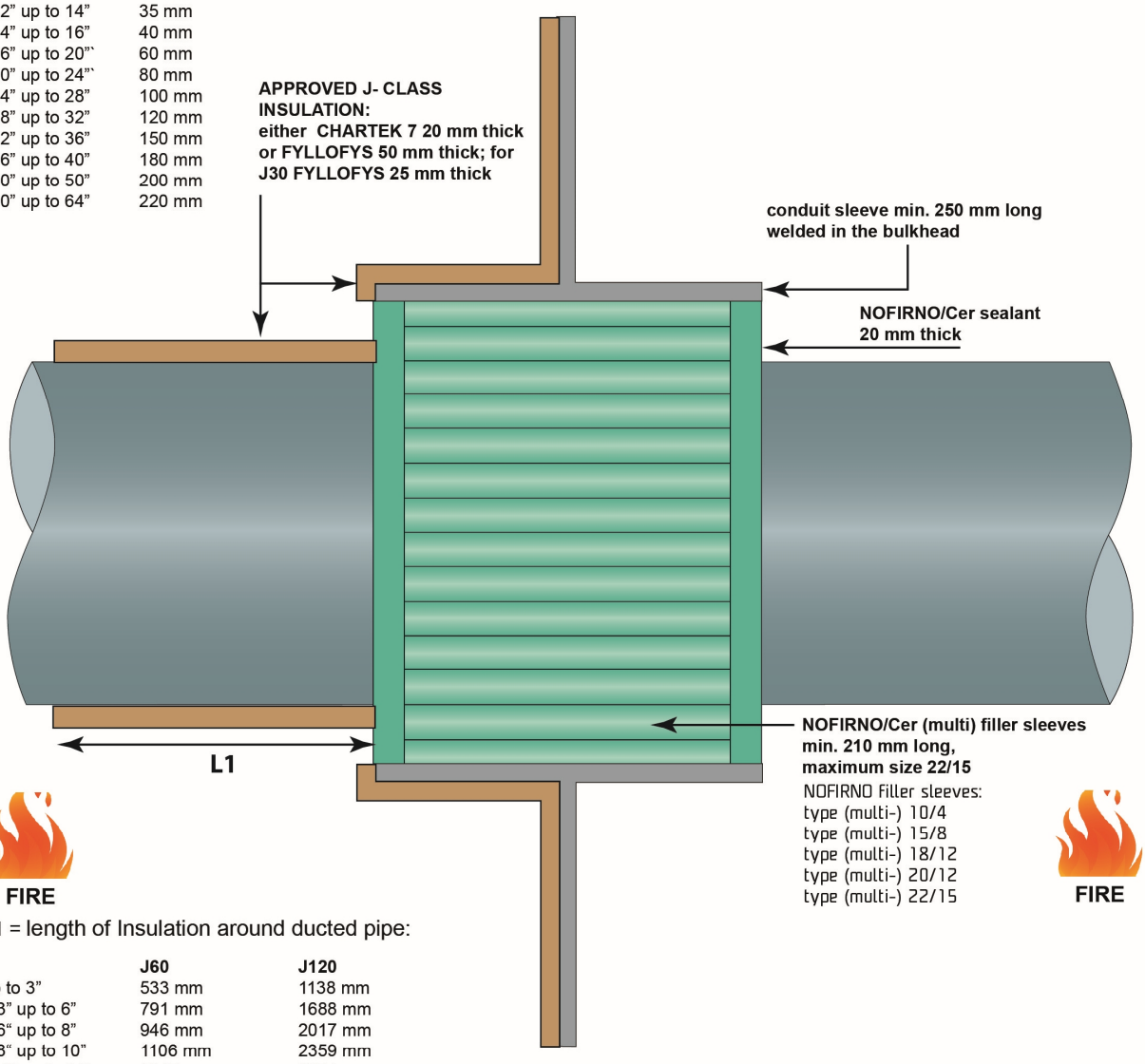
NOFIRNO/Cer sealing system for jet fire resistant pipe penetrations

direction of exposure: fire from either side

NOFIRNO/Cer SEALING SYSTEM for steel/ss/CuNi pipes up to 1600 mm - 64" NPS

Minimum clearance between conduit sleeve and ducted pipe:

OD pipe	
up to 3“	15 mm
≥3” up to 8“	20 mm
≥8” up to 12”	30 mm
≥12” up to 14”	35 mm
≥14” up to 16”	40 mm
≥16” up to 20”`	60 mm
≥20” up to 24”`	80 mm
≥24” up to 28”	100 mm
≥28” up to 32”	120 mm
≥32” up to 36”	150 mm
≥36” up to 40”	180 mm
≥40” up to 50”	200 mm
≥50” up to 64”	220 mm



L1 = length of Insulation around ducted pipe:

	J60	J120
up to 3”	533 mm	1138 mm
≥ 3” up to 6”	791 mm	1688 mm
≥ 6“ up to 8”	946 mm	2017 mm
≥ 8“ up to 10”	1106 mm	2359 mm
≥10” up to 14”	1347 mm	2874 mm
≥14” up to 18”	1640 mm	3498 mm
≥18” up to 24”	2074 mm	4425 mm
≥24” up to 30”	2506 mm	5346 mm
≥30” up to 36”	2936 mm	6263 mm
≥36” up to 40”	3222 mm	6973 mm
≥40” up to 50”	3793 mm	8091 mm
≥40” up to 64”	4861 mm	10371 mm

Note: alternative 50% of length on both sides of the penetration.

conduit sleeve positioned:
- symmetrical
or
- non-symmetrical with longest length on insulated side

BEELE SAFETY SEALING SYSTEMS

Description: NOFIRNO/Cer sealing system for J120 class bulkheads

Mat.: NOFIRNO/Cer rubber sleeves/sealant

Ref.: JAB	Date:	04-11-2020	Scale:
	Rev. 1		NFN 168E
	Rev. 2		

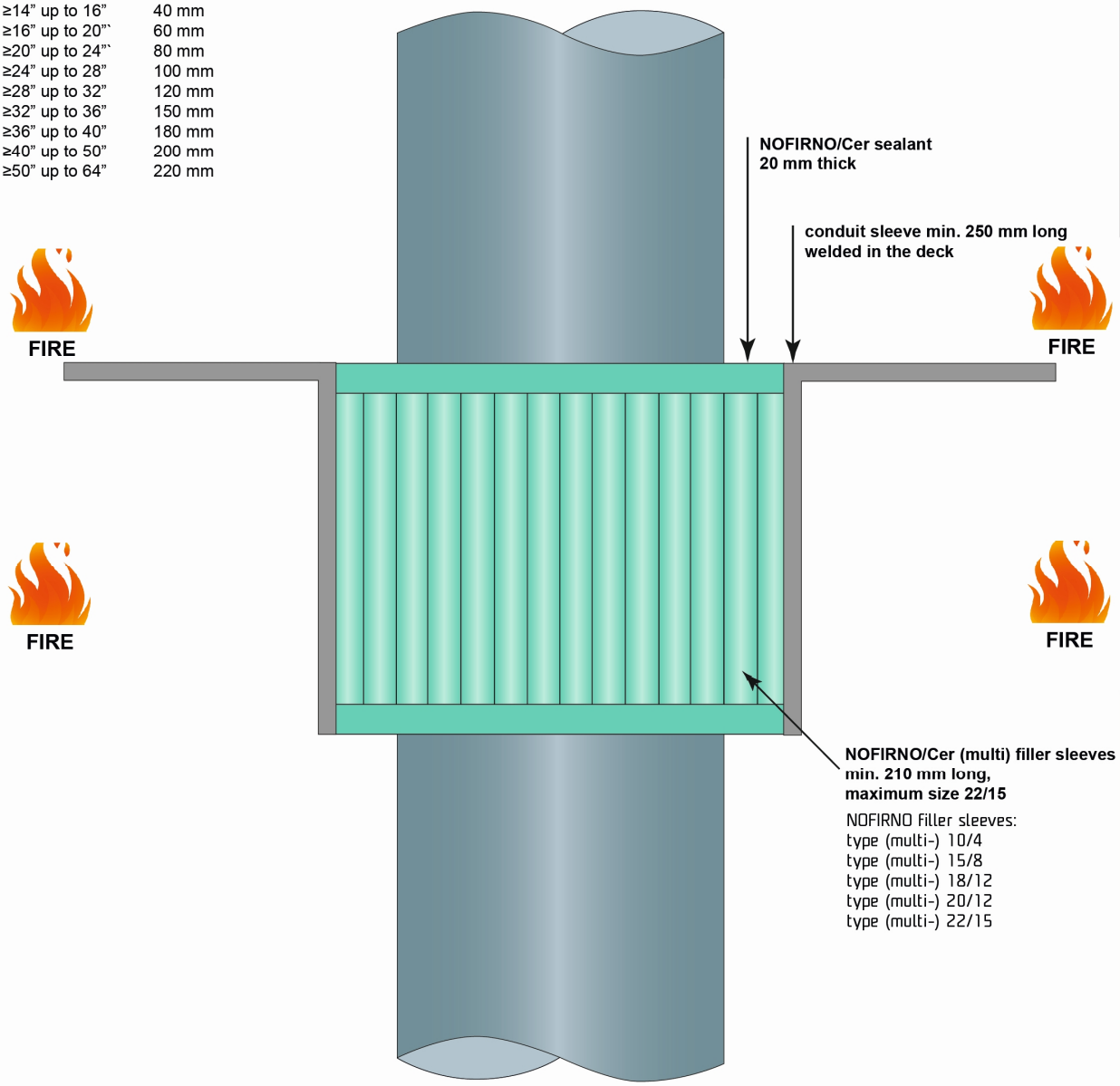
NOFIRNO/Cer sealing system for jet fire resistant pipe penetrations

direction of exposure: fire from either side

NOFIRNO/Cer SEALING SYSTEM for steel/ss/CuNi pipes up to 1600 mm - 64" NPS

Minimum clearance between conduit sleeve and ducted pipe:

OD pipe	
up to 3“	15 mm
≥3” up to 8“	20 mm
≥8” up to 12”	30 mm
≥12” up to 14”	35 mm
≥14” up to 16”	40 mm
≥16” up to 20”`	60 mm
≥20” up to 24”`	80 mm
≥24” up to 28”	100 mm
≥28” up to 32”	120 mm
≥32” up to 36”	150 mm
≥36” up to 40”	180 mm
≥40” up to 50”	200 mm
≥50” up to 64”	220 mm



BEELE SAFETY SEALING SYSTEMS

Description: NOFIRNO/Cer sealing system for J240 class decks			
Mat.: NOFIRNO/Cer rubber sleeves/sealant			
Ref.: JAB	Date:	04-11-2020	Scale:
Rev. 1			NFN 169E
Rev. 2			

NOFIRNO/Cer sealing system for jet fire resistant pipe penetrations

direction of exposure: fire from either side

NOFIRNO/Cer SEALING SYSTEM for steel/ss/CuNi pipes up to 1600 mm - 64" NPS

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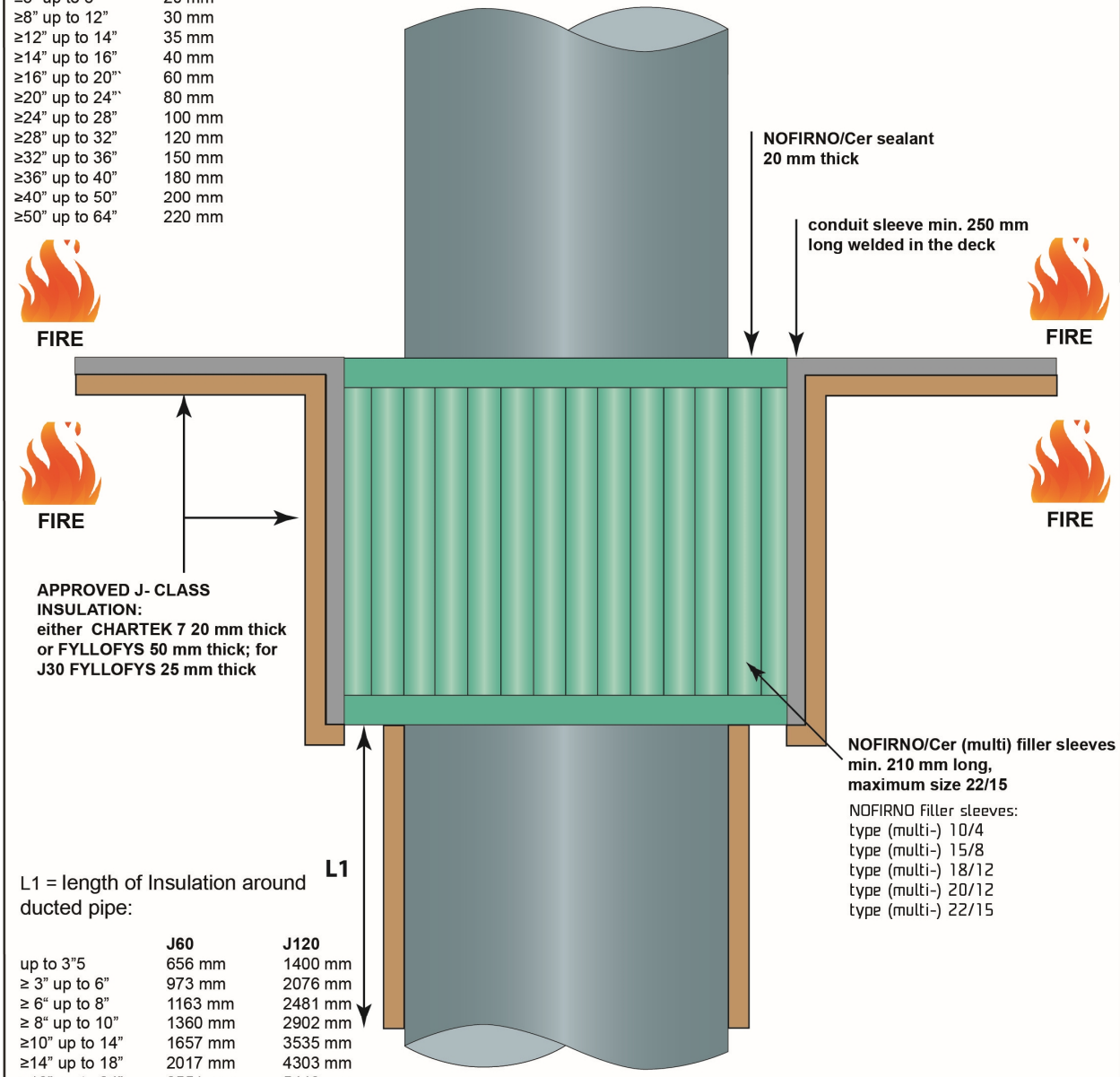

NOFIRNO Filler sleeves:
type (multi-) 10/4
type (multi-) 15/8
type (multi-) 18/12
type (multi-) 20/12
type (multi-) 22/15

L1 = length of Insulation around ducted pipe:

	J60	J120
up to 3”5	656 mm	1400 mm
≥ 3” up to 6”	973 mm	2076 mm
≥ 6“ up to 8”	1163 mm	2481 mm
≥ 8“ up to 10”	1360 mm	2902 mm
≥10” up to 14”	1657 mm	3535 mm
≥14” up to 18”	2017 mm	4303 mm
≥18” up to 24”	2551 mm	5443 mm
≥24” up to 30”	3082 mm	6575 mm
≥30” up to 36”	3611 mm	7703 mm
≥36” up to 40”	3963 mm	8453 mm
≥40” up to 50”	4665 mm	9952 mm
≥40” up to 64”	5980 mm	12756 mm

Note: alternative 50% of length on both sides of the penetration.

conduit sleeve positioned totally below deck up to totally above deck

BEELE SAFETY SEALING SYSTEMS

Description: NOFIRNO/Cer sealing system for J60-J120 class decks

Mat.: NOFIRNO/Cer rubber sleeves/sealant

Ref.: JAB | Date: 04-11-2020 | Scale:

Rev. 1

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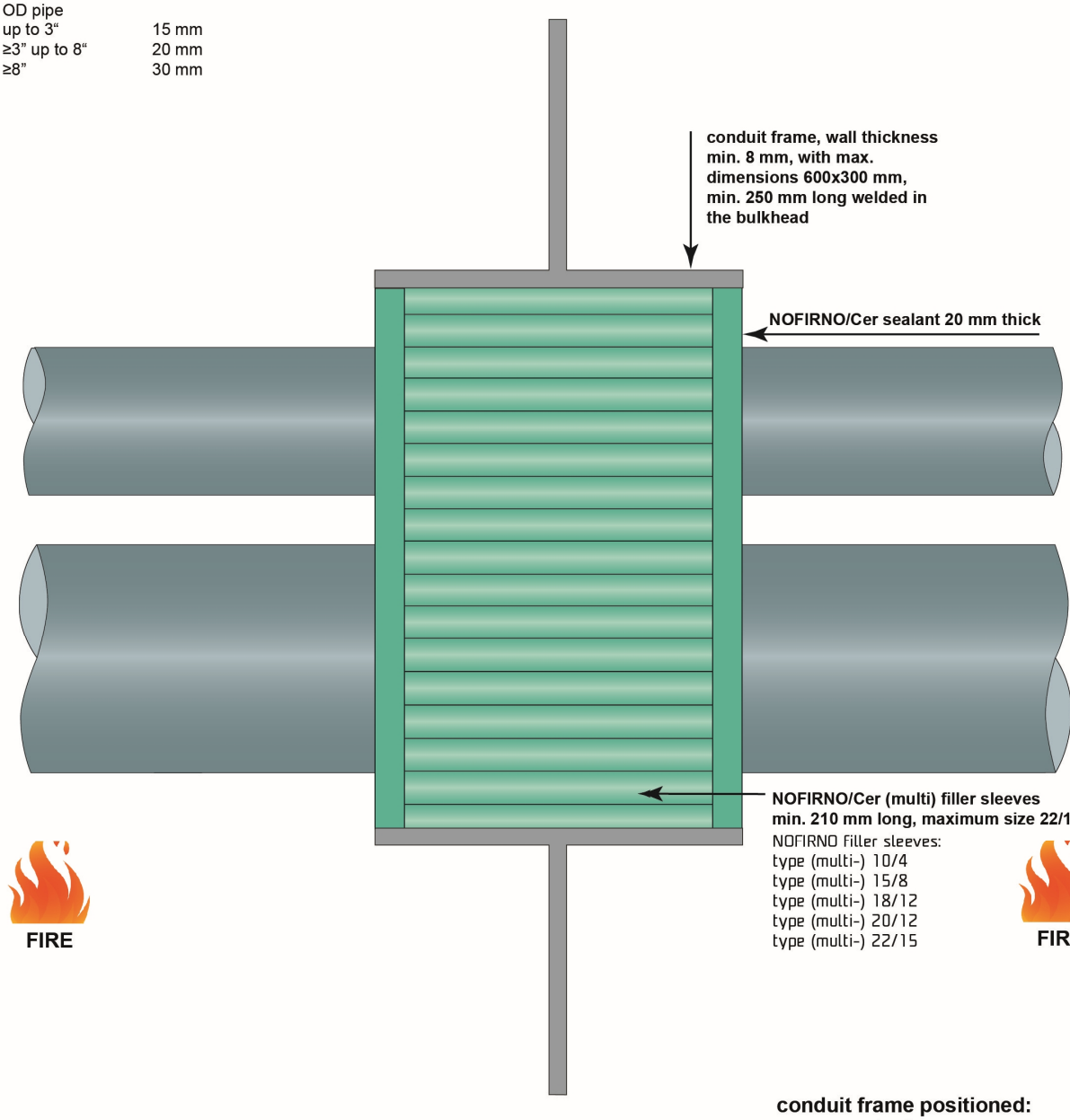
NOFIRNO/Cer sealing system for jet fire resistant pipe penetrations

direction of exposure:
fire from either side

Minimum clearance between conduit sleeve and ducted pipe and between ducted pipes:

OD pipe	
up to 3“	15 mm
≥3” up to 8“	20 mm
≥8”	30 mm

NOFIRNO/Cer SEALING SYSTEM FOR MULTI-PIPE TRANSITS for steel/ss/CuNi pipes min. 1/16" - max. 8" NPS



conduit frame positioned:
- symmetrical
or in case of fire from only one side
- non-symmetrical with longest length on non-fire side

BEELE SAFETY SEALING SYSTEMS

Description: NOFIRNO/Cer sealing system for J240 class bulkheads/decks

Mat.: NOFIRNO/Cer rubber sleeves/sealant

Ref.: JAB	Date:	04-11-2020	Scale:
	Rev. 1		NFN 171E
	Rev. 2		

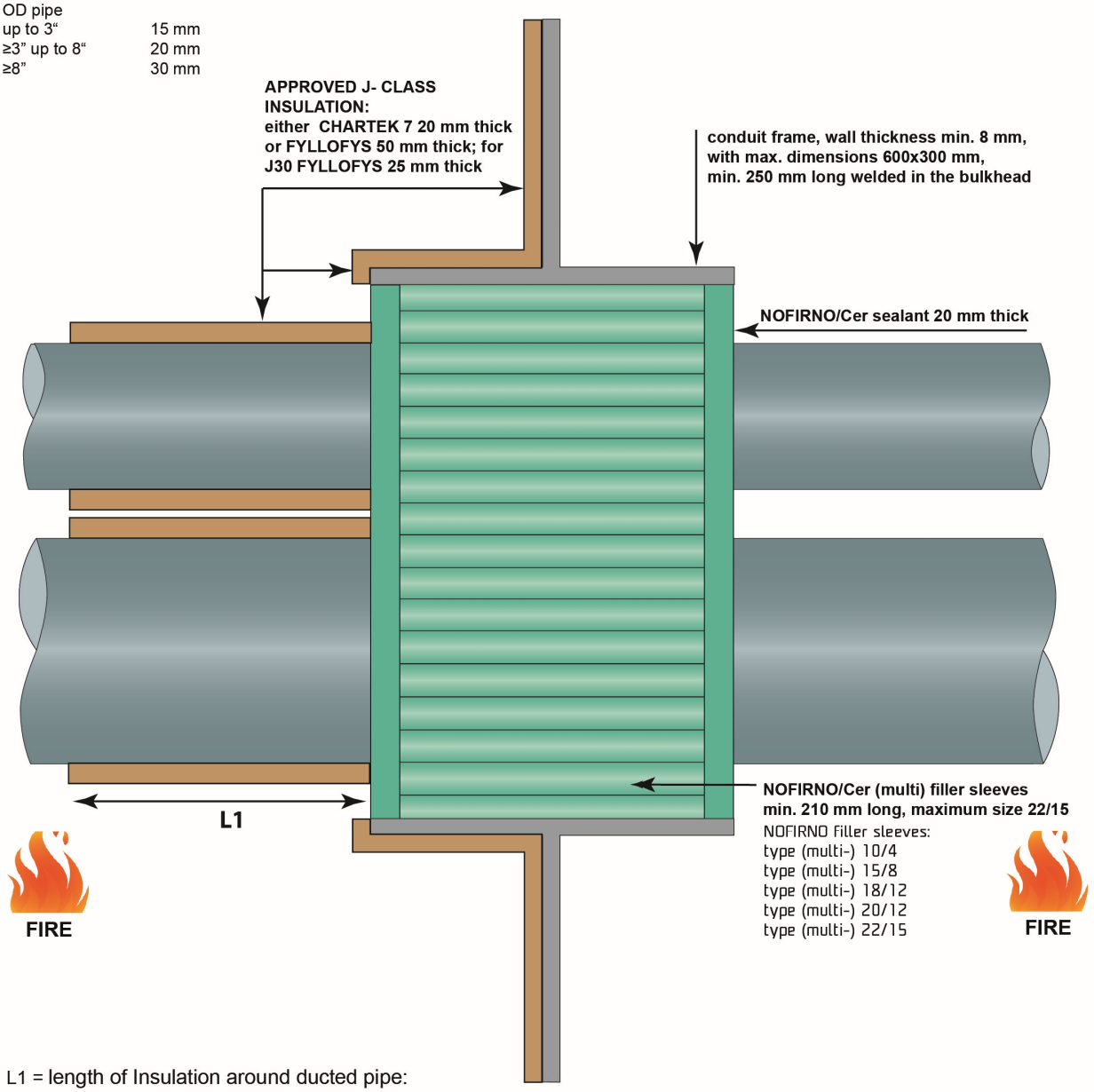
NOFIRNO/Cer sealing system for jet fire resistant pipe penetrations

direction of exposure: fire from either side

NOFIRNO/Cer SEALING SYSTEM FOR MULTI-PIPE TRANSITS for steel/ss/CuNi pipes min. 1/16" - max. 8" NPS

Minimum clearance between conduit sleeve and ducted pipe and between ducted pipes:

OD pipe	
up to 3“	15 mm
≥3” up to 8“	20 mm
≥8”	30 mm



L1 = length of Insulation around ducted pipe:

	J60	J120
up to 3”	550 mm	1150 mm
≥ 3” up to 6”	800 mm	1700 mm
≥ 6“ up to 8”	1000 mm	2050 mm
≥ 8“ up to 10”	1200 mm	2400 mm

Note: alternative 50% of length on both sides of the penetration.

conduit frame positioned:
- symmetrical
or
- non-symmetrical with longest length on insulated side

BEELE SAFETY SEALING SYSTEMS	Description: NOFIRNO/Cer sealing system for J60-J120 class bulkheads			
	Mat.: NOFIRNO/Cer rubber sleeves/sealant			
	Ref.: JAB	Date:	04-11-2020	Scale:
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		Rev. 2		

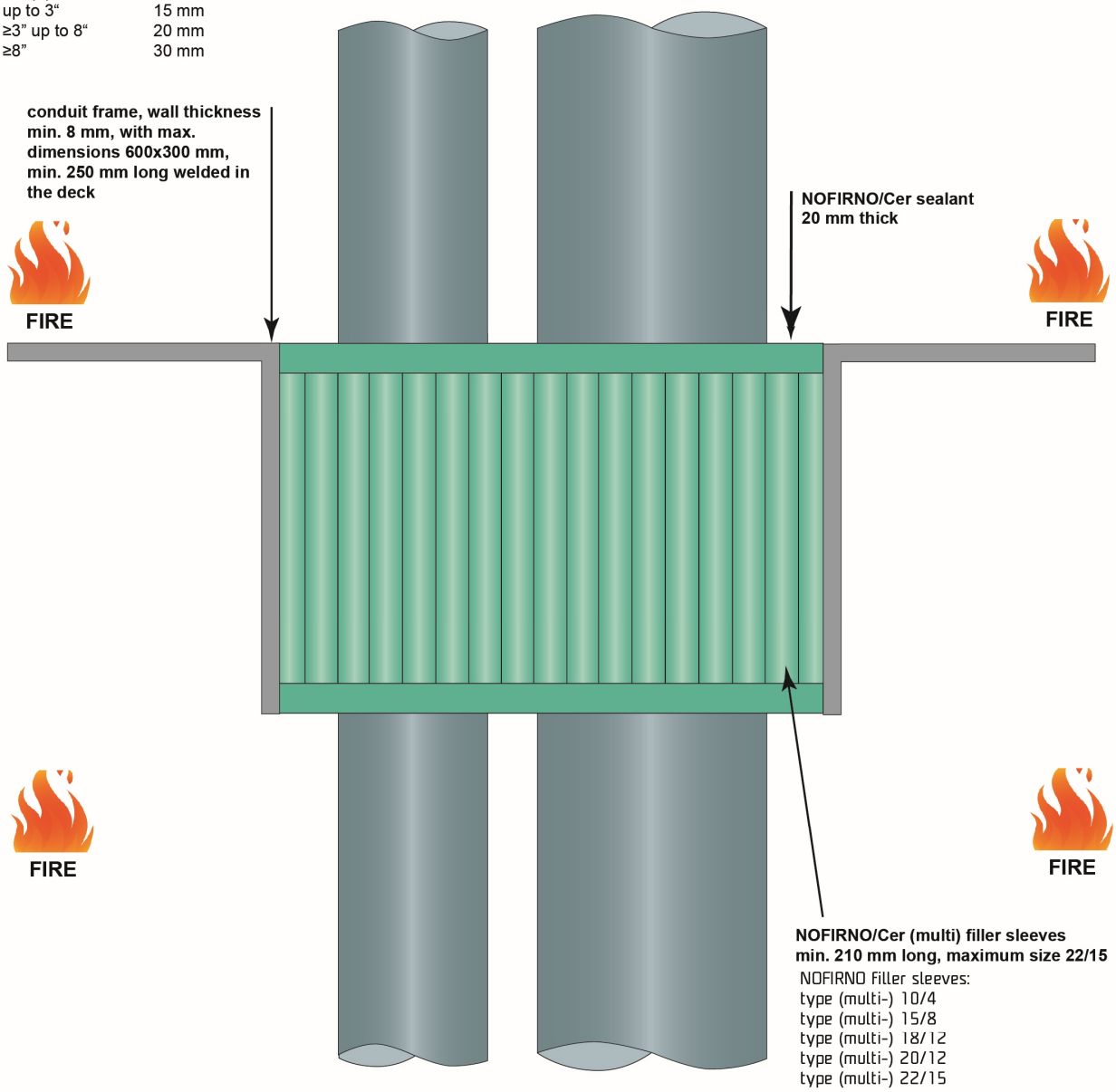
NOFIRNO/Cer sealing system for jet fire resistant pipe penetrations

direction of exposure:
fire from either side

Minimum clearance between conduit sleeve and ducted pipe and between ducted pipes:

OD pipe	
up to 3“	15 mm
≥3” up to 8“	20 mm
≥8”	30 mm

NOFIRNO/Cer SEALING SYSTEM FOR MULTI-PIPE TRANSITS for steel/ss/CuNi pipes min. 1/16” - max. 8” NPS



BEELE SAFETY SEALING SYSTEMS

Description: NOFIRNO/Cer sealing system for J240 class decks			
Mat.: NOFIRNO/Cer rubber sleeves/sealant			
Ref.: JAB	Date:	04-11-2020	Scale:
Rev. 1			NFN 173E
Rev. 2			

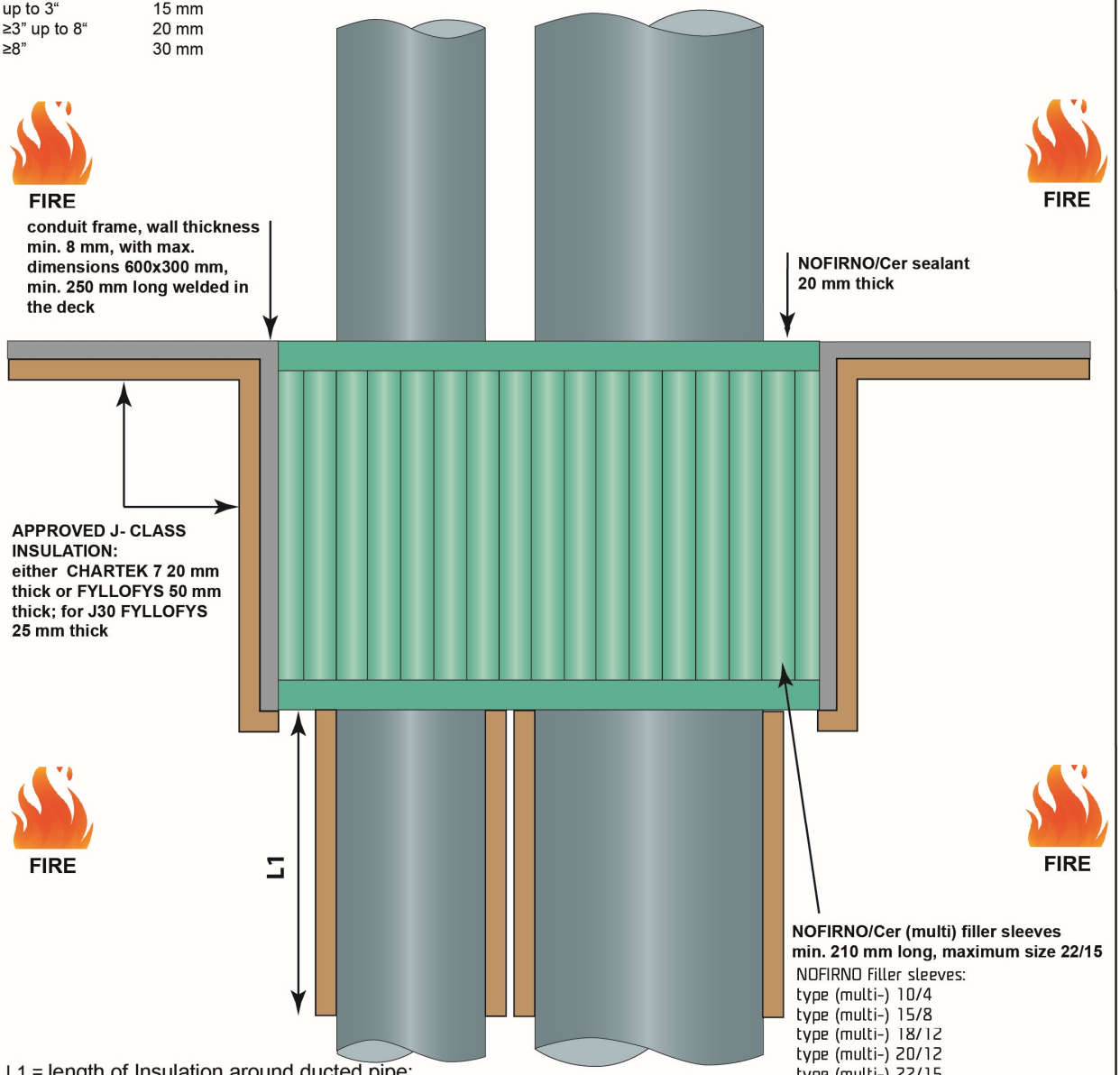
NOFIRNO/Cer sealing system for jet fire resistant pipe penetrations

direction of exposure: fire from either side

Minimum clearance between conduit sleeve and ducted pipe and between ducted pipes:

OD pipe	
up to 3“	15 mm
≥3” up to 8“	20 mm
≥8”	30 mm

NOFIRNO/Cer SEALING SYSTEM FOR MULTI-PIPE TRANSITS for steel/ss/CuNi pipes min. 1/16” - max. 8” NPS



L1 = length of Insulation around ducted pipe:

	JH60	JH120
up to 3”	550 mm	1150 mm
≥ 3” up to 6”	800 mm	1700 mm
≥ 6“ up to 8”	1000 mm	2050 mm
≥ 8“ up to 10”	1200 mm	2400 mm

Note: alternative 50% of length on both sides of the penetration.

conduit frame positioned totally below deck up to totally above deck

BEELE SAFETY SEALING SYSTEMS

Description: NOFIRNO/Cer sealing system for J60-J120 class decks

Mat.: NOFIRNO/Cer rubber sleeves/sealant

Ref.: JAB | Date: 04-11-2020 | Scale:

Rev. 1

Rev. 2

NFN 174E