



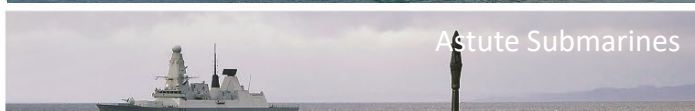
HNoMS Maud



QE Aircraft Carriers



Type 26 Frigate



Astute Submarines



Hunt Class Minhunters



Type 45 Destroyers



Type 23 Frigates



Dreadnought Submarines

ter Litchfield AssocRINA BEng (Hons), **Business Development & Technical Director CSD**
aniel Dobrowolski MPhys FDIRDI **Senior Physicist Coltraco Ultrasonics & Head of Durham**
Institute of Research, Development & Invention



BAE SYSTEMS

ASSURANCE AGAINST



WATER



FIRE



SMOKE



GAS

Enhancing Vessel Survivability through Advanced Cable Transits and Pipe Penetrations & Use of Ultrasonics

- Design & Inspection of Cable transits and Pipe Penetrations to Significantly Enhance Vessel Survivability;
 - Reduce Acoustic Signatures & Susceptibility to Attack
 - Prevent Progressive Flooding
 - Prevent Fire Spread through Effective Containment of Extreme Fires
- Use of NOFIRNO Cable Transits and NOFIRNO & SLIPSIL Pipe Penetrations to achieve these goals (without incurring additional costs)
- The latest Coltraco Ultrasonics Technology to detect and measure leaks, paving the way for future at-sea monitoring advancements



Designing Penetrations to Reduce Acoustic Signature & Susceptibility of Attack

- Flow of fluid through pipes can create noise detectable by submarines
- BAE Systems using :



NOFIRNO and SLIPSIL Plugs for Pipe Penetrations to isolate pipes from the structure, to reduce transmission of sound



BAE SYSTEMS

Enhancing the Stealth of Naval Ships & Submarines

Reducing underwater radiated noise (URN) signature from machinery noise transmitted via pipework and ship structure

BAE Systems performed Dynamic Stiffness measurements on NOFIRNO penetrations and determined significant reduction in transmitted noise.

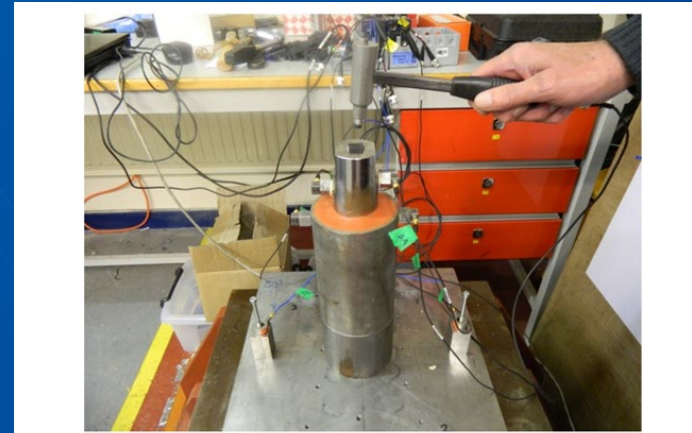
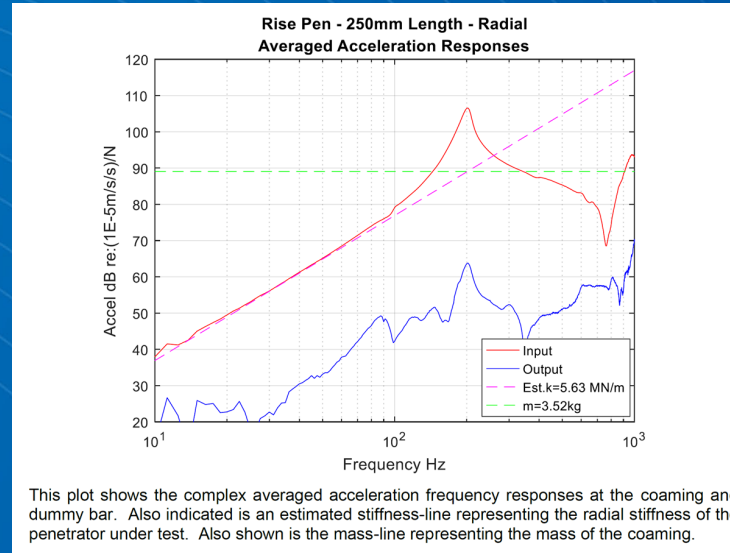


Figure 4 Photograph of the test rig set-up to measure the dynamic stiffness of the Rise NOFIRNO penetrator in the axial direction

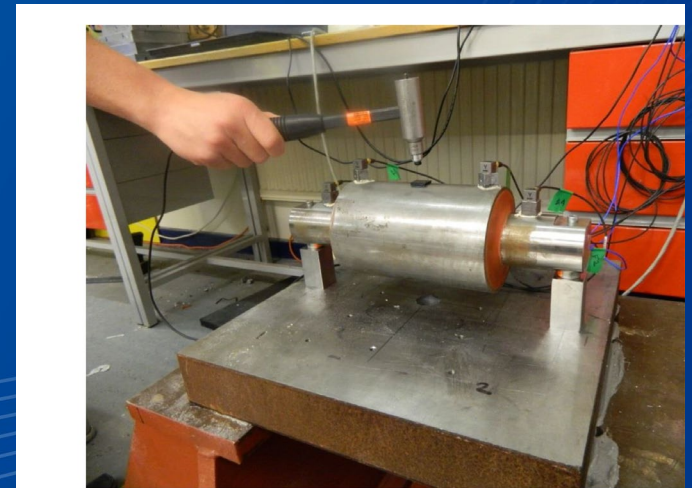


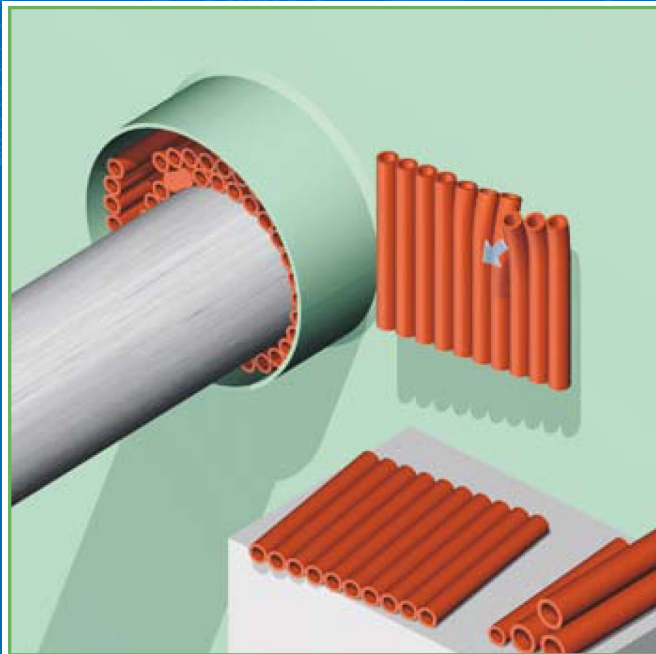
Figure 3 Photograph of the test rig set-up to measure the dynamic stiffness of the Rise NOFIRNO penetrator in the radial direction

Table 1 Summary of assessed dynamic stiffnesses of the penetrators tested

Penetrator	RADIAL		AXIAL	
	Mass Loading kg	Stiffness MN/m	Mass Loading kg	Stiffness MN/m
Rise 57mm X 180mm	2.54	4.64	6.89	2.3
Rise 57mm X 250mm	3.52	5.63	6.89	3.3



NOFIRNO Flexible Pipe Penetrations

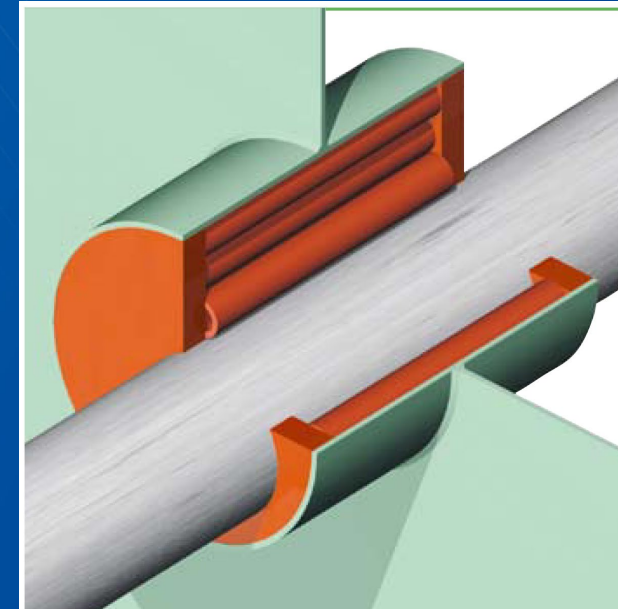


For oversized conduits and/or off centre ducted pipes, a combination of NOFIRNO® single and multi-filler sleeves can be used. NOFIRNO® sealant with a thickness of minimum 20 mm to be applied at both sides. Conduit depth minimum 180 mm.



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

Note: due to the curing process, the sealant cannot be applied on hot surfaces. Maximum temperature is 60 °C (140 °F). After full curing max. operating temperature is 180 °C.

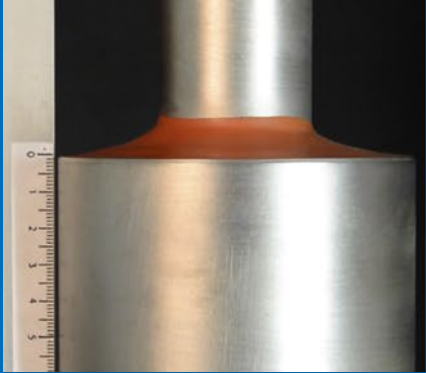


The NOFIRNO® sealing system is certified for A-0 and H-0 class without the use of any insulation. In these cases, the only difference is that the conduit depth is 250 mm instead of 180 mm. NOFIRNO® sealant with a thickness of minimum 20 mm to be applied at both sides. System is also gas and watertight.

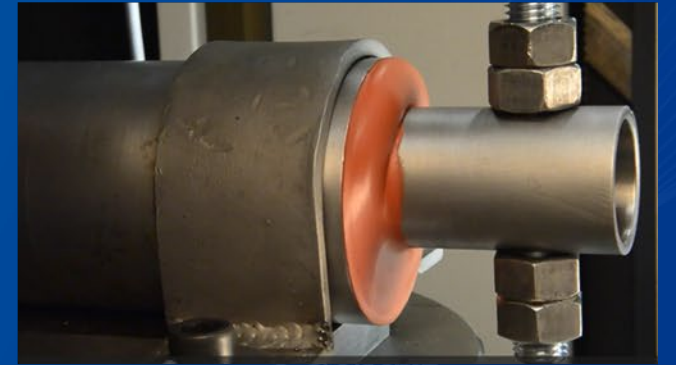
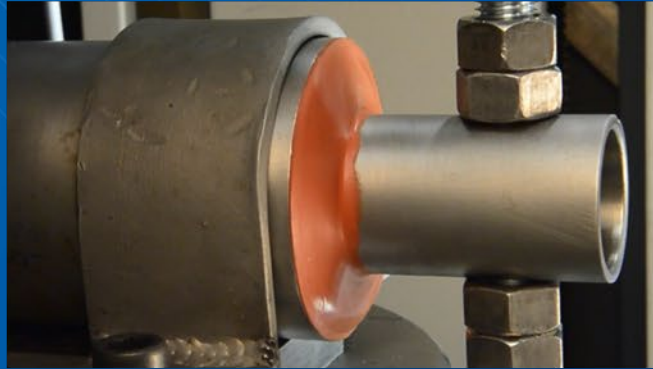




Axial Displacement
195%



Radial Displacement
30%

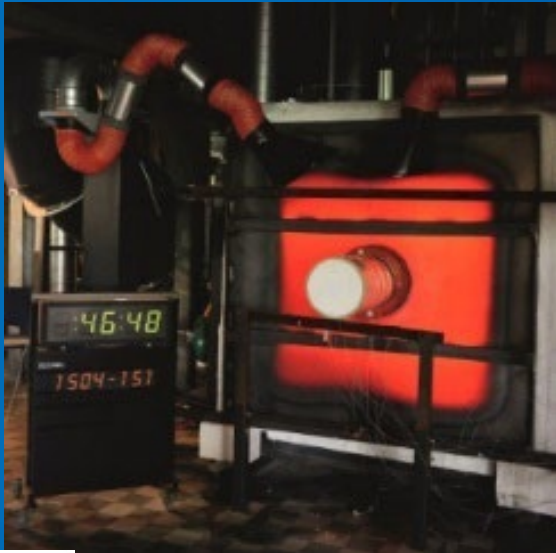


NOFIRNO Flexible Pipe Penetrations



- Lowest whole life costs; vibration stress and internal corrosion prevented.
- Reduces noise signature
- Improved Integrity & Survivability; certificated for A0, A60, H0, H120 and Jet Fire mins) -2 hours
- Watertight up to 7 Bar
- Shock rated

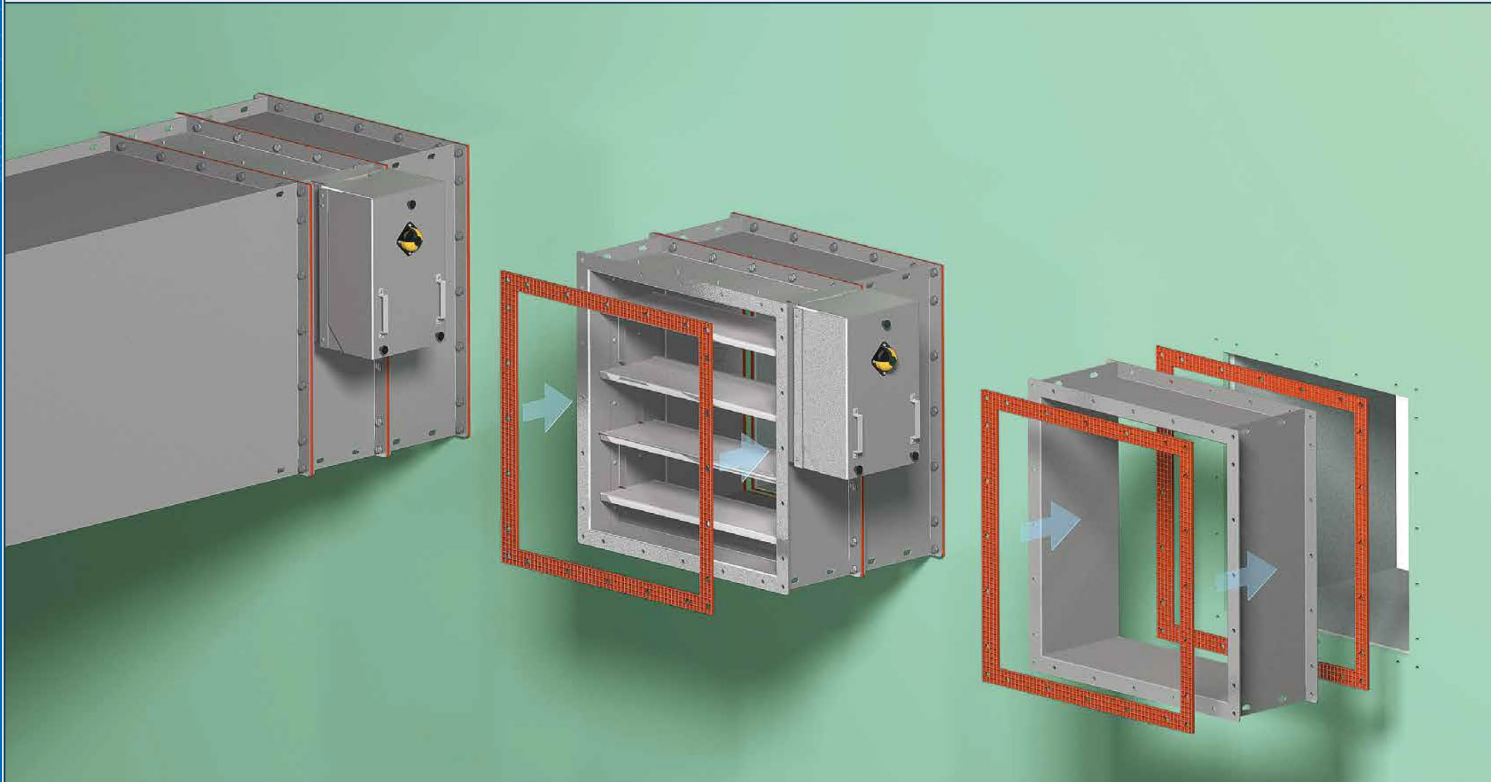
NOFIRNO Ventilation Duct Penetrations



- Reduced Noise and Vibration Signature
- Certified Fire Performance
 - A0 fire test witnessed by ABS on sizes up to 250mm nominal
- Space saving
 - Reduces requirement for 900mm long spigot to 250mm

NOFIRNO Profiled Gaskets – Ventilation Fire Dampers

SOLUTIONS IN MARINE AND OFFSHORE INSTALLATIONS
FIRE SAFE, GAS TIGHT GASKETS FOR FIRE DAMPERS



- Reduce transmitted noise
- Lowest tightening force of 6-8Nm
- No retightening of bolts required
- Gasket sheets 1000x1000mm, thickness 5 or 10mm
- Fire, Gas & Watertight
- A-0, 60 mins, No insulation required

**SAFETY
SEALING
SYSTEMS**

Round, square and rectangular shapes of NOFIRNO® gaskets with unique profiling for instance for Fire dampers
Fire safe, gas and watertight - Temperature range -50 °C up to +180 °C
Made of UV, Ozone and weathering resistant NOFIRNO® rubber
No re-tightening of bolts from time to time needed

NOFIRNO

Marine Manhole – NOFIRNO Profiled Gasket - A-0 Fire Tested



- A-0, 60 mins, No insulation required
- 6-15 Bar Pressure rated with lowest tightening force of 6-8Nm
- No retightening of bolts required
- Gasket sheets 1000x1000mm, thickness 5 or 10mm

Prevent Fire Spread through Effective Containment of Extreme Fires

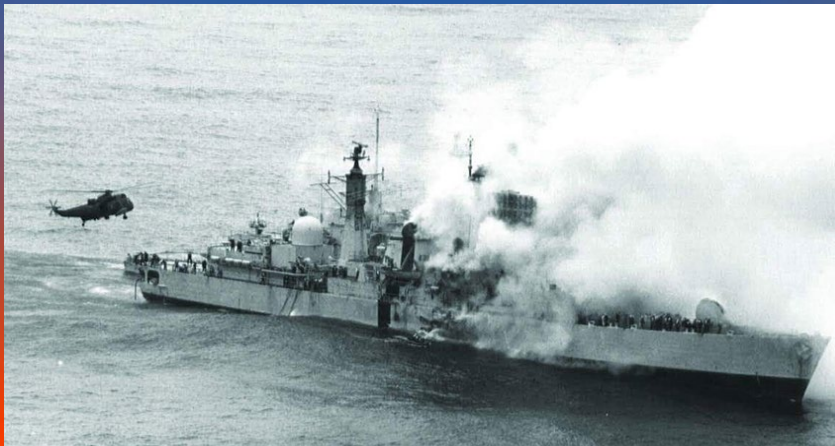
Reduce vessel vulnerability

RFS Moskva



Winston Churchill described “modern warships” as **eggshells armed with hammers**, but his description appears more valid today than when he was first quoted as saying it in 1914. Even one hit is enough to put the ship out of combat action or cause her sinking. But this shouldn't be the case!

HMS Sheffield

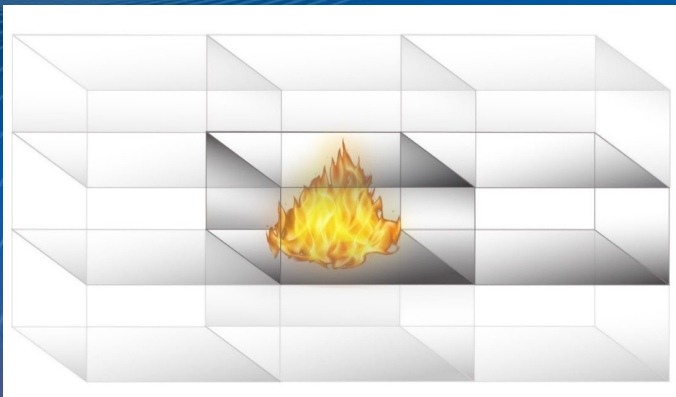


The ability to fight hurt - a vital design objective for Naval Vessels

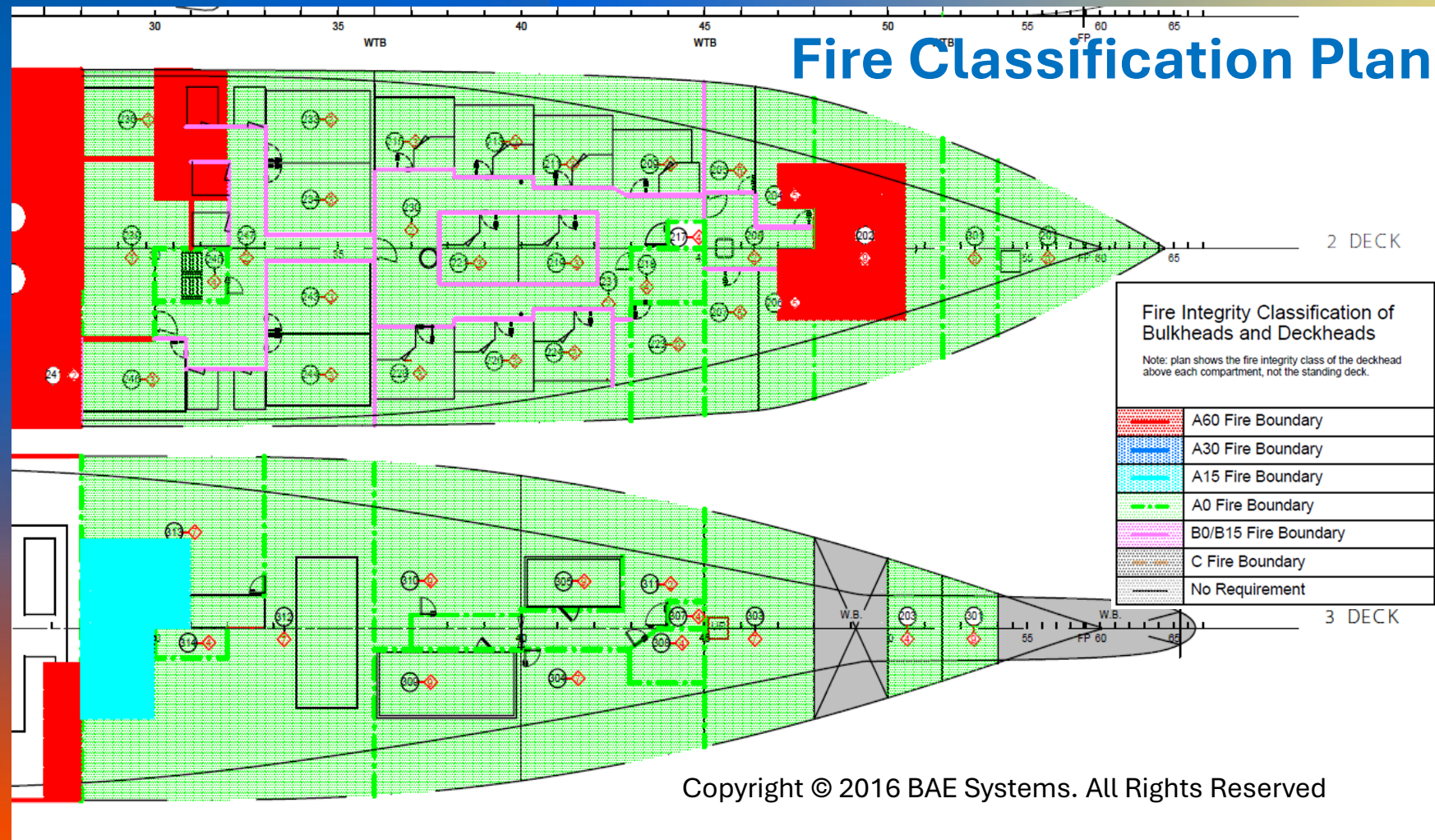
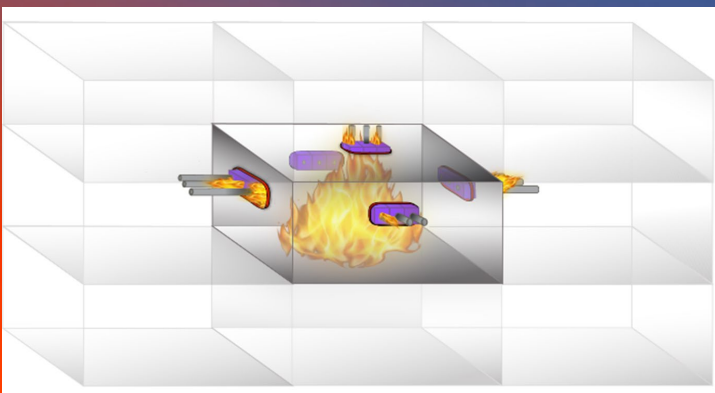


Fire Compartmentalisation

Only as Strong as the Weakest Link



Penetrations through "A" Class Fire Divisions may fail



SPACE below	SPACE above														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Control stations (1)	A-30	A-30	A-15	A-0	A-0	A-0	A-15	A-0	A-0	A-0	A-60	A-0	A-60	A-30	A-30
Stairways (2)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-30	A-0	A-30	A-0	A-30
Corridors (3)	A-15	A-0	A-60	A-60	A-0	A-0	A-15	A-0	A-0	A-0	A-30	A-0	A-30	A-0	A-30
Evacuation stations and external escape routes (4)	A-0	A-0	A-0	A-0	-	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-30
Open deck spaces (5)	A-0	A-0	A-0	A-0	-	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of minor fire risk (6)	A-60	A-15	A-0	A-60	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-15	A-30	A-30
Accommodation spaces of moderate fire risk (7)	A-60	A-15	A-15	A-60	A-0	A-0	A-15	A-0	A-0	A-0	A-0	A-0	A-30	A-30	A-30
Sanitary and similar spaces (8)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Tanks, voids and auxiliary machinery spaces having little or no fire risk (9)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-30
Auxiliary machinery spaces, cargo spaces, oil tanks and other similar spaces of moderate fire risk (10)	A-60	A-60	A-60	A-60	A-0	A-0	A-15	A-0	A-0	A-0	A-0	A-30	A-0	A-60	A-60
Machinery spaces and galleys(11)	A-60	A-60	A-60	A-60	A-0	A-60	A-60	A-0	A-0	A-30	A-30	A-0	A-60	A-60	A-60
Storerooms, workshops, pantries, etc.(12)	A-60	A-30	A-15	A-60	A-0	A-30	A-60	A-30	A-0	A-0	A-0	A-0	A-0	A-0	A-60
Other spaces in which flammable liquids are stowed (13)	A-60	A-60	A-60	A-60	A-0	A-30	A-60	A-0	A-0	A-0	A-0	A-0	A-0	A-30	A-60
Special purpose spaces (14)	A-60	A-60	A-60	A-60	A-0	A-30	A-60	A-0	A-0	A-0	A-0	A-0	A-0	A-30	A-60
Explosive risk spaces (15)	A-30	A-30	A-30	A-30	A-0	A-30	A-30	A-0	A-0	A-30	A-60	A-60	A-60	A-60	A-60

Table P2-VI-4: Solution 1 - Decks not forming steps in vertical main fire zones nor bounding horizontal main fire zones (Type A ships)

SPACES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Control stations (1)	A-0	A-0	A-0	A-0	A-0	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60	A-60	A-30
Stairways (2)		A-0 [a]	A-0	A-0	A-0	A-0	A-15	A-0	A-0	A-15	A-30	A-15	A-30	A-30	A-30
Corridors (3)			B-15	A-60	A-0	B-15	B-15	B-15	A-0	A-15	A-30	A-0	A-30	A-30	A-30
Evacuation stations and external escape routes (4)				-	A-0	A-60 [b]	A-60 [b]	A-60 [b]	A-0	A-0	A-60 [b]	A-60 [b]	A-60 [b]	A-60 [b]	A-30 [b]
Open deck spaces (5)					-	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of minor fire risk (6)						B-0	B-0	C	A-0	A-0	A-30	A-0	A-30	A-30	A-30
Accommodation spaces of moderate fire risk (7)							B-0	C	A-0	A-15	A-60	A-15	A-60	A-60	A-30
Sanitary and similar spaces (8)								C	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Tanks, voids and auxiliary machinery spaces having little or no fire risk (9)									A-0 [a]	A-0	A-0	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, oil tanks and other similar spaces of moderate fire risk (10)										A-0 [a]	A-0	A-0	A-15	A-30	A-60
Machinery spaces and galleys(11)											A-30 [a]	A-0	A-60	A-60	A-60
Storerooms, workshops, pantries, etc.(12)												A-0 [a]	A-0	A-30	A-60
Other spaces in which flammable liquids are stowed (13)													A-30	A-60	A-60
Special purpose spaces (14)														A-30 [a]	A-60
Explosive risk spaces (15)															A-60

Table P2-VI-3: Solution 1 - Bulkheads bounding neither vertical main fire zones nor horizontal main fire zones (Type A ships)



ANEP 77 Edition G Version 3

PART 1 CHAPTER VI FIRE SAFETY

Regulation 8 Containment of Fire

Functional Objective

8.1 A fire shall be contained in the space of origin.

Performance Requirements

8.2 The ship shall be subdivided by thermal and structural boundaries or equivalent.

8.2.1 Fire containment at boundaries shall have due regard to the fire risk of the space, function of the space, and function of adjacent spaces.

8.2.2 The fire integrity of the boundary shall be maintained at openings and penetrations.

8.2.3 Active or passive containment arrangements shall be provided.

8.3 Fire boundaries, openings and penetrations shall be demonstrated in accordance with a recognised standard.

Solutions for this Regulation are contained in Part 2.

Justification & Guidance for this Regulation are contained in Part 3.



- ANEP 77 Naval Ship Rules:

Note:

“Tests on penetrations shall be representative of the division in which the penetration will be fitted.

Many penetration systems require additional insulation particularly if the fire hazard is from the non-insulated side of the bulkhead.”

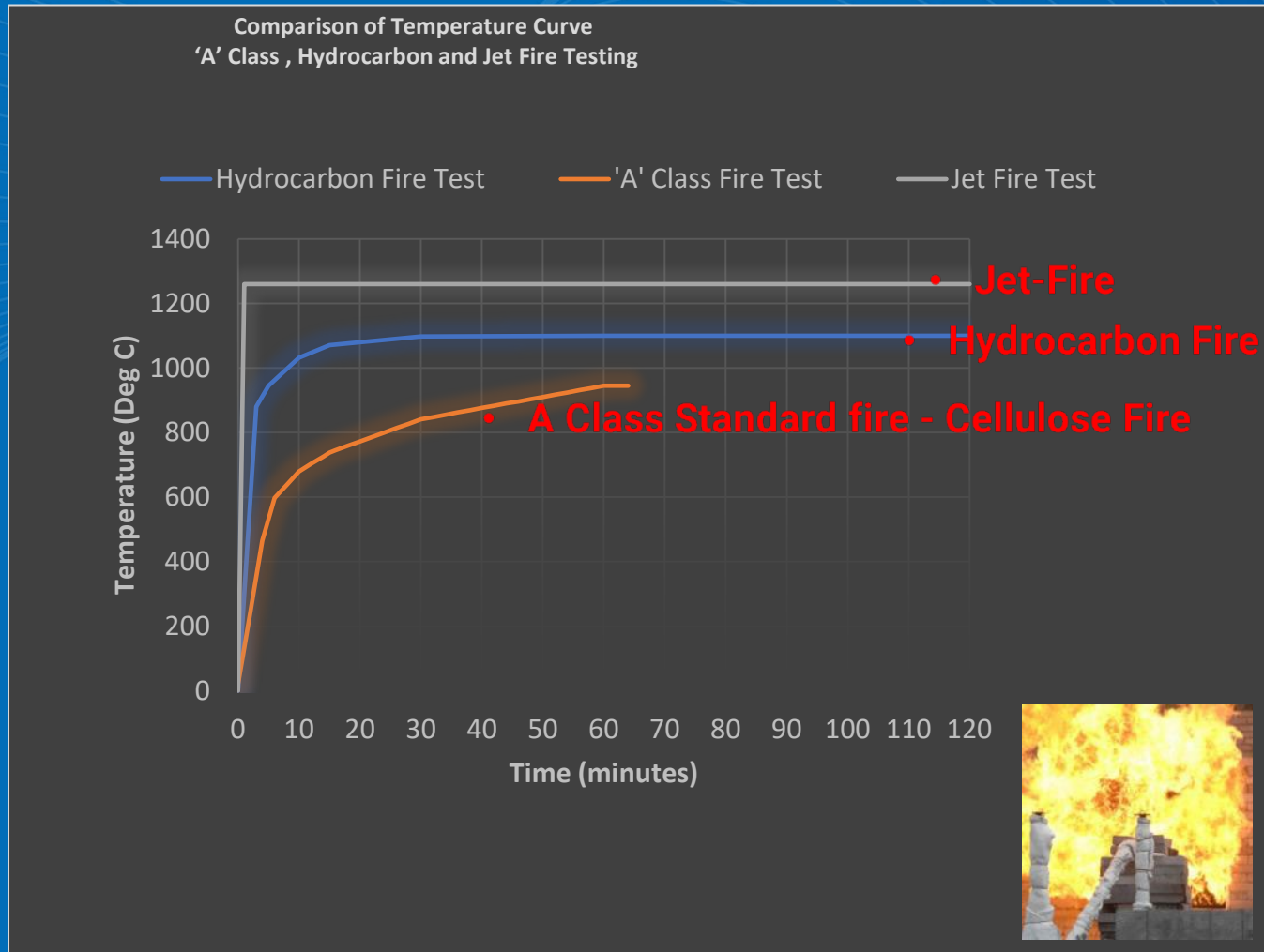


“A-0” Class Fire Testing



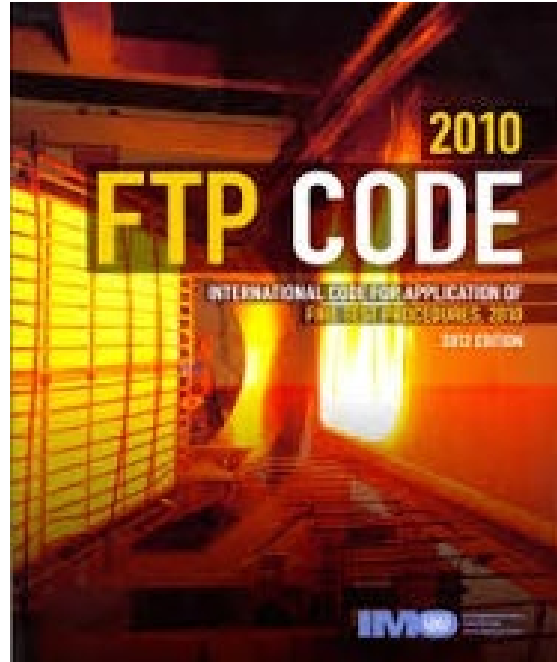
What is the Fire Hazard ?

Types of Fire



- **A Class Standard fire - Cellulose Fire** [BSEN 1366 & any A-Classification = A0 to A-60]
 - Fire load: wood, cotton, etc., such as in offices /multi-storey buildings
 - achieves 945 °C after one hour
 - Heatflux = 110 -130 kW/m2.
- **Hydrocarbon Fire** [EN 1363-2 (1999), ASTM E1529 (2010), SINTEF, Lloyds Register, & any H-Classification = H0 to H-120]
 - Fire load: hydrocarbons [HC] and HC-products,
 - a few minutes up to 1094°C
 - Heatflux = 200 -230 kW/m2.
- **Jet-Fire** [J-Classification = J30 to J120]
 - Fire load: natural gas or crude oil – such as at off-shore platforms or missile strike
 - Time-Temperature Curve rises immediately up to approx. 1260°C with a fire load flow velocity >160 kms/hr
 - Heatflux = 300-320 kW/m2

2010 FTP Code

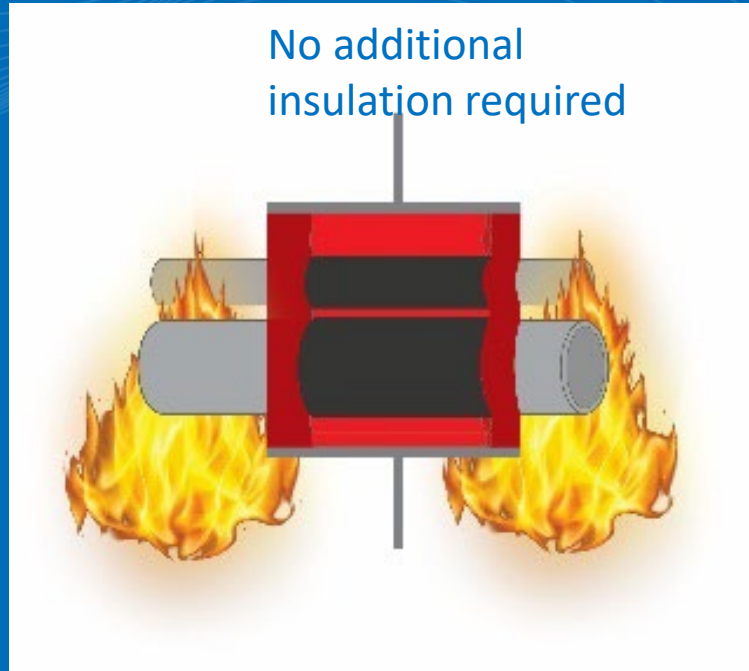


- Adopted by IMO July 2012
- Provides international requirements for laboratory testing, type-approval and fire test procedures
- **Identifies the additional insulation requirements for many A60 penetrations on the normally non insulated side.**
- **Separate fire tests for cable & pipe penetrations through “A-0” divisions and “A-60” divisions.**

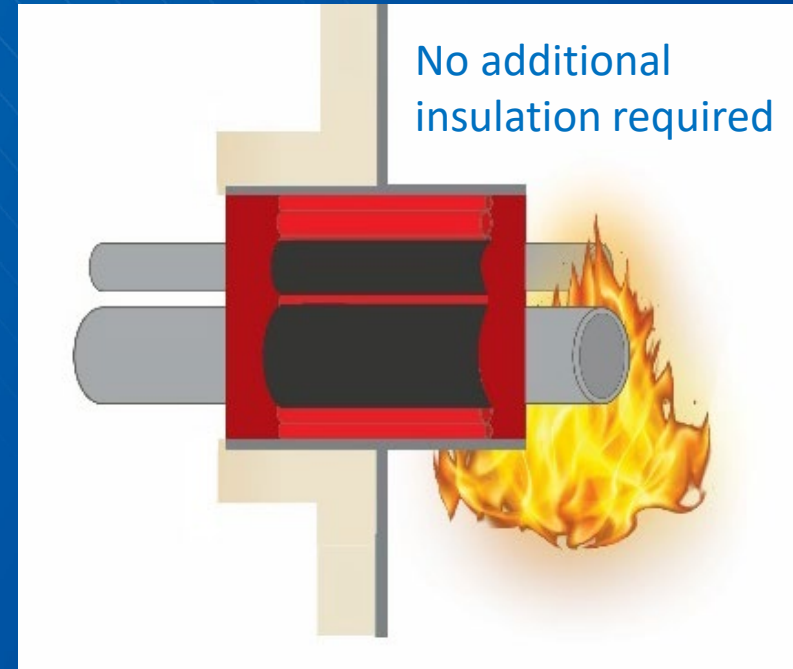


NOFIRNO Cable Transits & Pipe Penetrations

“A-0” non-insulated fire division

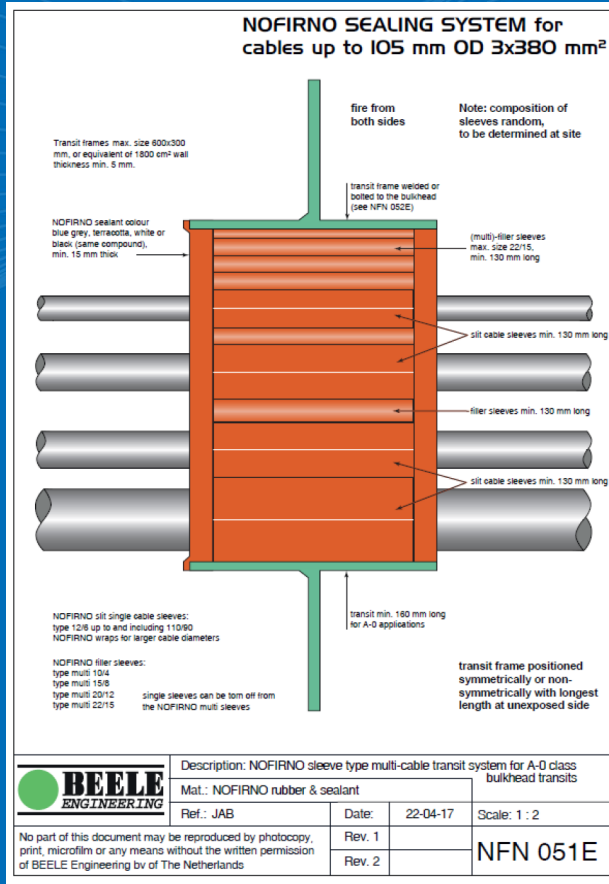


“A-60” Fire from non-insulated side

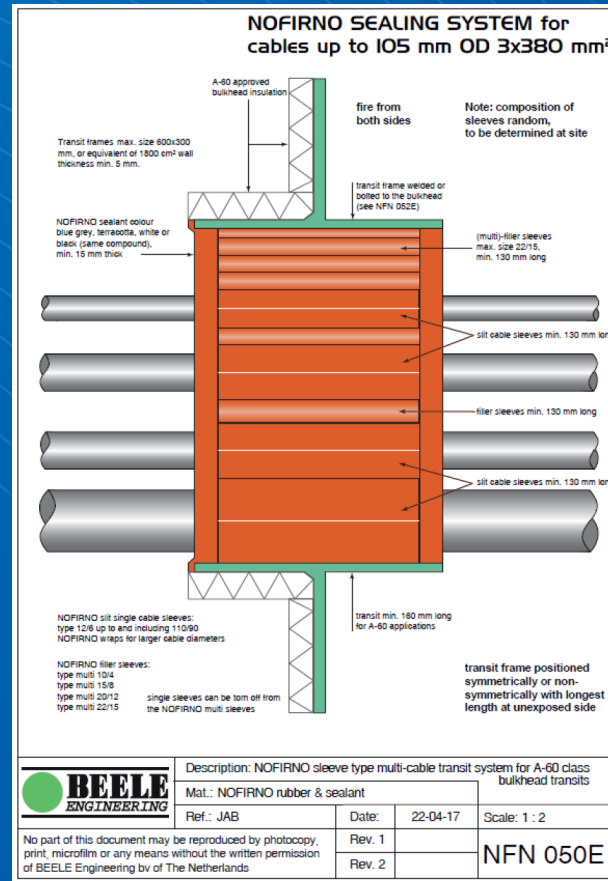


NOFIRNO Type Approval Certification Drawings:

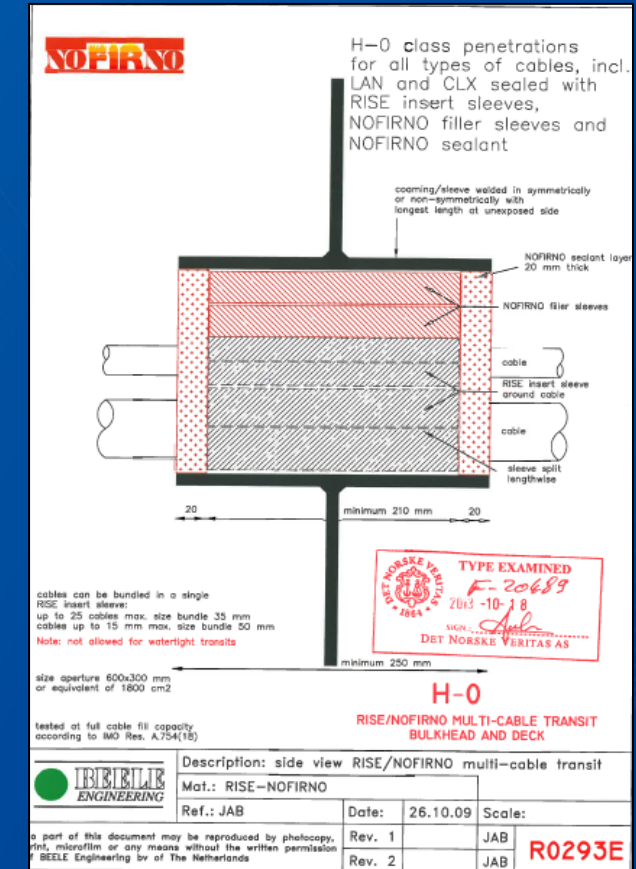
A-0 (1 hour) Fire



A-60 (1 hour) Fire



H-0 (2 Hours) Hydrocarbon Fire

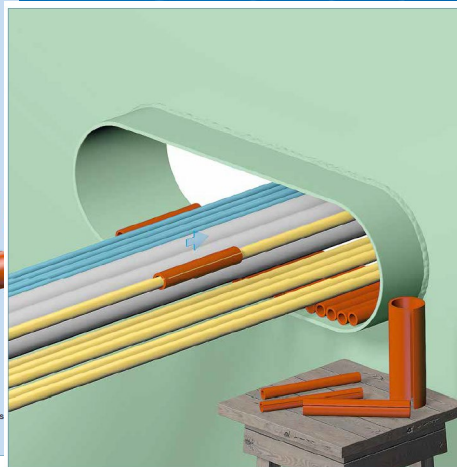


NO FIRNO

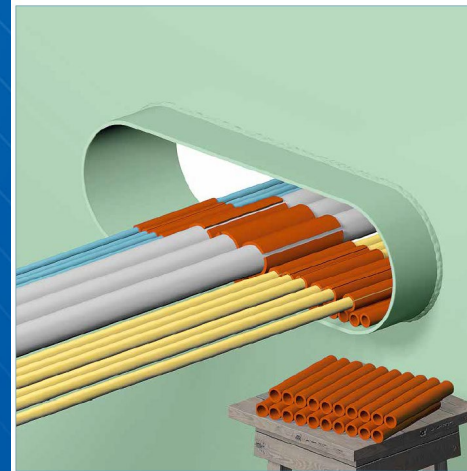
Multi - Cable Transits



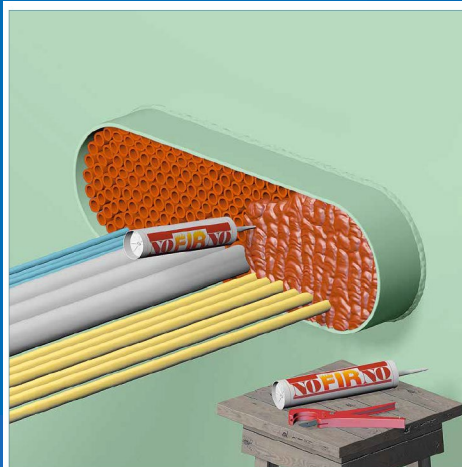
NO FIRNO® cable insert sleeves are used to separate cables inside the conduit opening. This allows for ease of application of the NO FIRNO® sealant in between and around the ducted cables. The NO FIRNO® cable sleeves are available in 29 sizes and in lengths of 60, 80, 110, 130, 140, 160 and 210 mm. The NO FIRNO® cable insert sleeves are split lengthwise and can therefore be placed around the cables in front of the conduit opening.



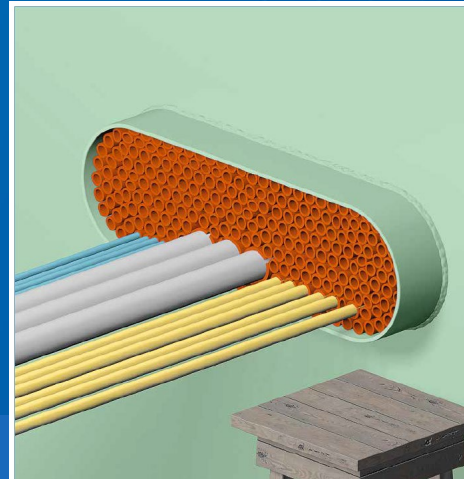
NO FIRNO® cable sleeves are applied around each cable. The cable sleeves are split lengthwise and can therefore be placed around the cables in front of the conduit.



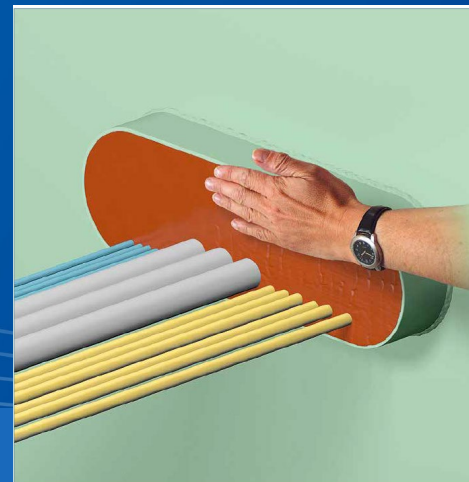
The remaining free space in the conduit opening is filled with NO FIRNO® filler sleeves type 18/12, 20/12 or 22/15 or a combination of these types. The smaller sleeves sizes 10/4 and 15/8 are used to fill the smaller open spaces present in the complete set of filler sleeves. For ease of filling, the NO FIRNO® filler sleeves are supplied non-split. They are delivered also as multi-filler sleeves (multi-sets of 6, 8, 10 and 12 sleeves) which is extremely helpful for filling larger empty spaces.



The multi-cable transit should be overfilled with NO FIRNO® sealant, because some sealant will be pushed into the empty spaces between the NO FIRNO® sleeves around the cables, and into the hollow NO FIRNO® (multi) filler sleeves during further finishing. This will contribute also to obtain higher tightness ratings. Skin formation of the sealant takes place after ca. 10-15 minutes. In case of larger transits with a low cable filling rate, do not apply more sealant than can be finished within this time-frame.

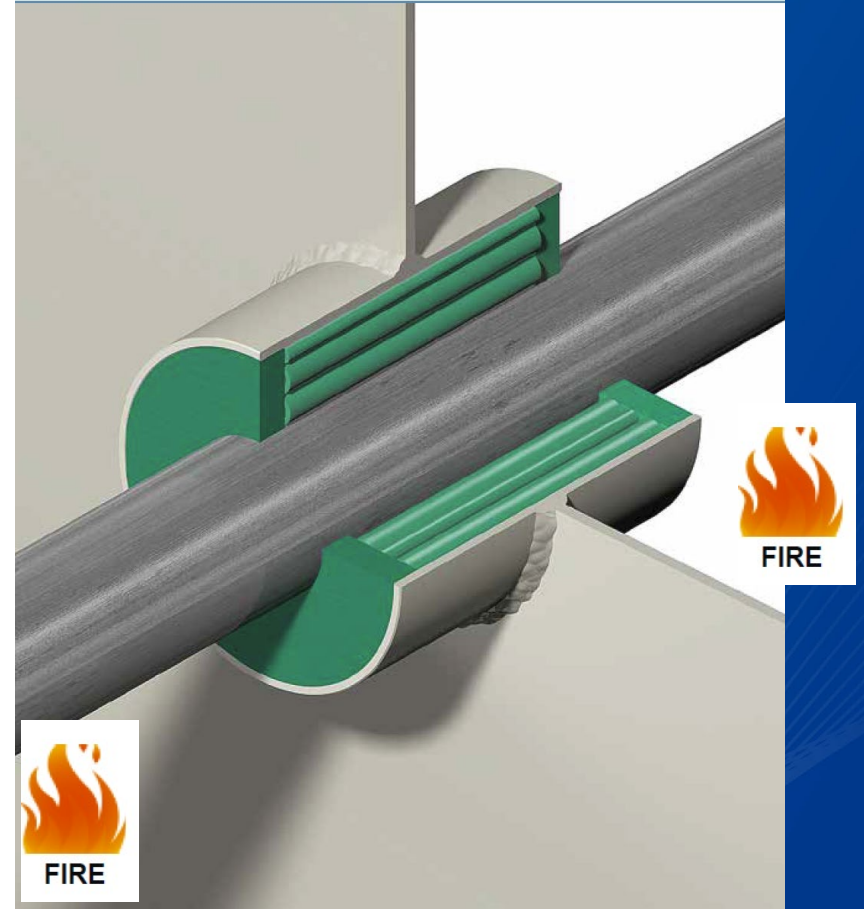
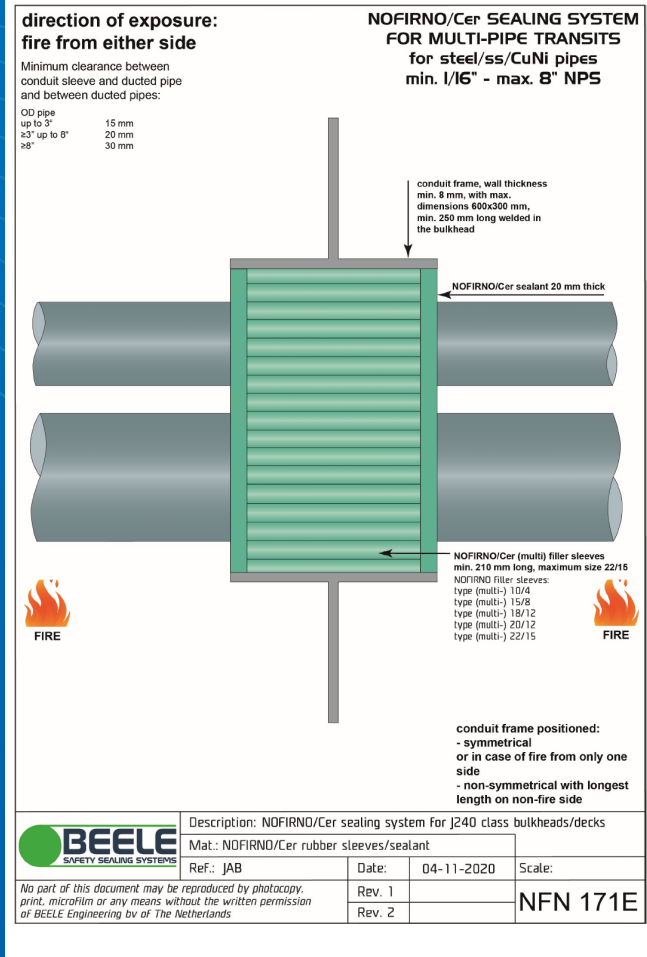


Before applying the NO FIRNO® sealant, it is advisable to perform a final check on the packing of the insert and filler sleeves. A tight fit of the whole set of sleeves, in the required ratio, is not only vital for the mechanical stability of the sealing system, but also for the fire stopping properties. A final check should therefore be a part of quality control.



The surface can be smoothed by hand. Just wet the hands thoroughly with water. No dirty hands when working with NO FIRNO® and a very neat surface is the result. Note: this should only be a smoothing procedure. Do not pack or compress the sealant further.

Jet Fire - 4 Hours - no Insulation – NOFIRNO/Cer



RISE NOFIRNO

Increase Safety & Survivability

- ANEP 77 – Naval Ship Code
- Hydrocarbon 2 hours & Jet Fire
- Watertight Integrity up to 6.9 bar
- CBRN Protection - Chemical, Biological, Radiological or Nuclear
- Shock rated to 850g
- Explosion rated to 1.5 Bar
- Reduce Vibration & Noise Signature for ASW.
- Cathodic Protection



Type 26 Frigate - NOFIRNO & SLIPSIL Plugs – for Cable & Pipe Penetrations

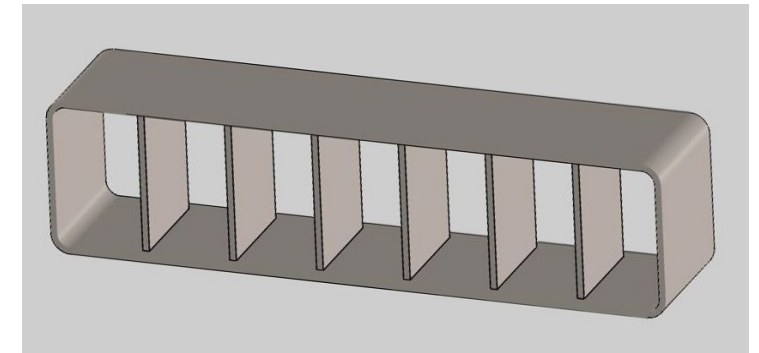


NOFIRNO Multi-cable Transits
NOFIRNO Pipe Penetrations
SLIPSIL Sealing Plugs

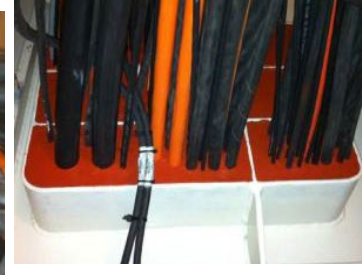
- Highest level of **fire & watertight integrity** protection
- 50% space reduction
- Ease of re-entry to change cable
- “A-0” and “H-0” fire conditions
- **Reduce Vibration & Noise Signature for ASW.**



New Frames to
replace MCT Transits



Recent New Build Contracts



TECHNICAL
SERVICES

ASSURANCE AGAINST



WATER



FIRE



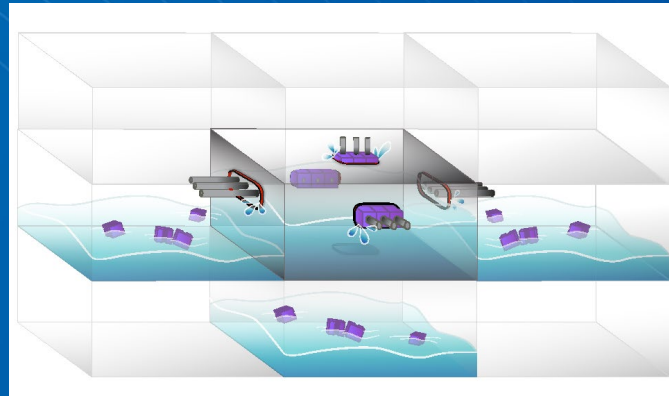
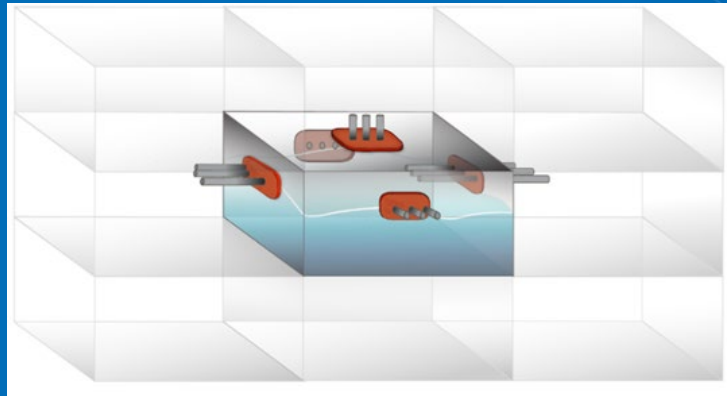
SMOKE



GAS

Prevent Progressive (secondary) Flooding by Containing the Flood within main Watertight Subdivision

- Flooding needs to be **contained** in the space of origin
 - The effective sealing performance of penetrations plays a safety critical role
 - Correct installation of Cable & Pipe Penetrations, as tested, is critical to the flood and gas tight performance

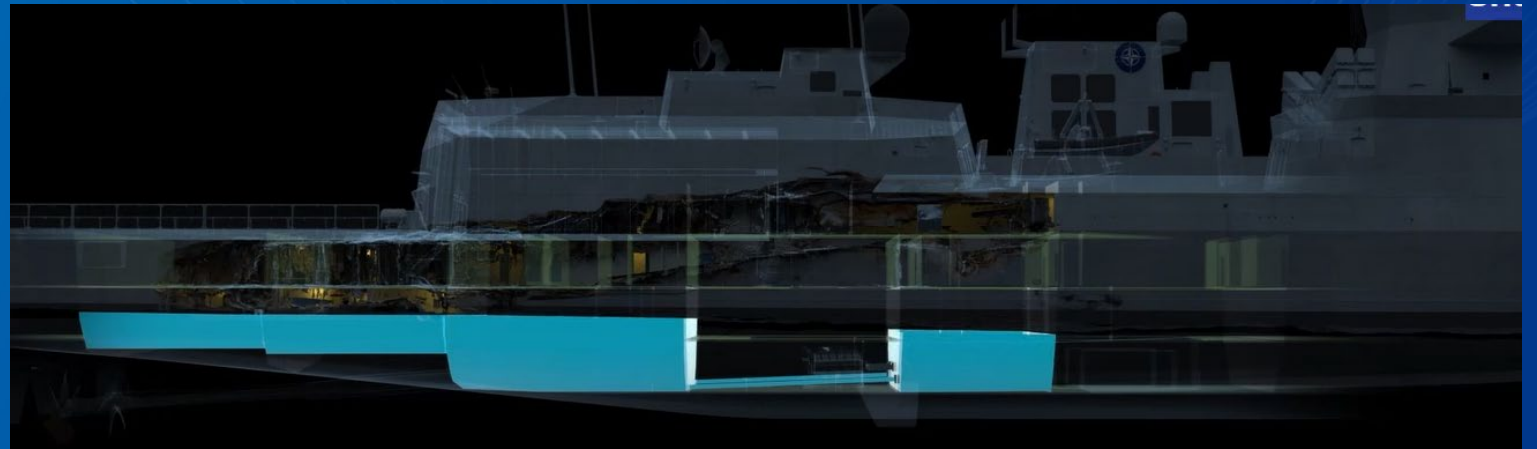


- Through life sealing performance is key

A typical Frigate is subdivided into about 14 main compartments by 13 transverse watertight and fire rated bulkheads. Should survive flooding of 3 main watertight compartments

1500 Multi – Multi Cable Transits on a Frigate

Things Unfortunately do go wrong...Norwegian frigate HNoMS Helge Ingstad



HMS Nottingham - Failure of penetrations lead to secondary (progressive) flooding



- A typical Frigate is subdivided into about 14 main compartments by 13 transverse watertight and fire rated bulkheads.
- Should survive flooding of 3 main watertight compartments
- 1500 Multi - Cable Transits on a typical frigate all with the potential to compromise integrity

The Naval Ship Code - ANEP 77

Annex A Appendix 6 – Watertight Integrity Surveys

Survey record for Buoyancy & Stability

General Requirements	Survey Type		
	Initial	Periodic	Renewal
Check the primary watertight boundaries to the submergence limit are watertight	100%	25%	100%
Check the secondary watertight boundaries to the submergence limit are watertight	100%	N/A	25%
Watertight Doors			
Check watertight door type & structure & chalk test and/or hose test as appropriate	100%	N/A	100%
Check watertight door seals	100%	DCD	100%
Penetrations			
Check penetrations are of an approved type	100%	N/A	100%
Check the condition of penetrations through watertight bulkheads is satisfactory	100%	25%	100%
Check the condition of penetrations through the damage control deck is satisfactory	100%	10%	100%
Check the condition of penetrations through other decks is satisfactory	100%	N/A	25%

IACS International Association of Classification Societies

Z17

Z17 Procedural Requirements for Service Suppliers
(1997)
(Rev.1)
June 1999)
(Rev.2
Nov 1999)
(Rev.3
July 2002)
(Rev.4
July 2003)
(Rev.5
Feb 2004)
(Rev.6
June 2007)
(Rev.7
Nov 2007)
(Rev.8
July 2008)
(Rev.9
June 2012)
(Corr.1
Aug 2012)
(Rev.10
Jan 2015)
(Rev.11
June 2015)
(Rev.12
Nov 2016)
(Rev.13
Jan 2018)
(Rev.14
Mar 2019)
(Rev.15
Oct 2020)
(Corr.1
Dec 2020)
(Rev.16
Aug 2021)

CONTENTS

1. General
2. Objective
3. Definitions
4. Application
5. Procedure for Approval and Certification
6. Certification
7. Information Regarding Alterations to the Certified Service Operating System
8. Cancellation of Approval
9. Existing Approvals

Annex 1 Special Requirements for Various Categories of Service Suppliers

Revision notes:

1. Rev.4 added in Annex, Section 10, 11 & 12, with reference in 3.1.2.
2. Rev.5 clarified applicability to thickness measurement companies in 3.1.1 and Annex 1, 1.1.
3. Rev.6 is to be uniformly implemented by IACS Societies and Associates from 1 January 2008.
4. Rev.7: Section 13 is added to Annex 1. This section applies to requests for recognition of test laboratories received on or after 1 January 2008.
5. Rev.8: Reference to IACS Recommendations 101 and 102 added.
6. Rev.9: Includes procedures for approval of test laboratories against res. MSC.288(87) and applies to requests for recognition of approval of testing laboratories received on or after 1 July 2013. However, deletion of the reference to PR 34 in Rev.9 applies from 1 July 2012.
7. Rev.10: Full document review carried out - Rev.10 is to be uniformly implemented by IACS Societies from 1 January 2016.
8. Rev.11: Full document review in order to verify the compliance with R.O. Code, IMO Res. MSC 349(92), carried out - Rev.11 is to be uniformly implemented by IACS Societies from 1 July 2016.
9. Rev.12: Section 15 of Annex 1 revised - Rev.12 is to be uniformly implemented by IACS Societies from 1 January 2018.
10. Rev.13: Section 3 of Annex 1 revised - Rev.13 is to be uniformly implemented by IACS Societies from 1 January 2019.
11. Rev.14: Section 13 of Annex 1 revised - Rev.14 is to be uniformly implemented by IACS Societies from 1 January 2020.
12. **Rev.15: Section 5 revised, Section 17 of Annex 1 newly added - Rev.15 is to be uniformly implemented by IACS Societies from 1 July 2021.**
13. **Rev.16: Section 18 of Annex 1 newly added - Rev.16 is to be uniformly implemented by IACS Societies from 1 January 2022.**

Page 1 of 46 IACS Req. 1997/Rev.16 2021

Z23

Z23 Hull Survey for New Construction
(July 2006)
(Rev.1
Mar 2007)
(Corr.1
Oct 2007)
(Rev.2
Apr 2009)
(Corr.1
Aug 2012)
(Rev.3
June 2013)
(Rev.4
Mar 2014)
(Rev.5
Feb 2015)
(Rev.6
Nov 2016)
(Rev.7
Oct 2020)

1. Scope

The scope of this UR includes the following main activities:

- 1.1 Examination of the parts of the ship covered by classification rules and by applicable statutory regulations for hull construction, to obtain appropriate evidence that they have been built in compliance with the rules and regulations, taking account of the relevant approved drawings.
- 1.2 Appraisal of the manufacturing, construction, control and qualification procedures, including welding consumables, weld procedures, weld connections and assemblies, with indication of relevant approval tests.
- 1.3 Witnessing inspections and tests as required in the classification rules used for ship construction including materials, welding and assembling, specifying the items to be examined and/or tested and how (e.g. by hydrostatic, hose or leak testing, non destructive examination, verification of geometry) and by whom.

Note:

1. This UR is to be uniformly implemented by IACS Societies on ships contracted for construction on or after 1 January 2008.
2. The "contracted for construction" date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of "contract for construction", refer to IACS Procedural Requirement (PR) No. 29.
3. The changes introduced in Revision 2 of the UR are to be uniformly implemented by IACS Societies on ships contracted for construction (as defined in IACS PR 29) from 1 July 2010.
4. The changes introduced in Revision 3 of the UR are to be uniformly implemented by IACS Societies on ships contracted for construction (as defined in IACS PR 29) from 1 July 2016.
5. The changes introduced in Revision 4 of the UR are to be uniformly implemented by IACS Societies on ships contracted for construction (as defined in IACS PR 29) from 1 July 2016.
6. The changes introduced in Revision 5 of the UR are to be uniformly implemented by IACS Societies on ships contracted for construction (as defined in IACS PR 29) from 1 July 2016.
7. The changes introduced in Revision 6 of the UR are to be uniformly implemented by IACS Societies on ships contracted for construction (as defined in IACS PR 29) from 1 January 2018.
8. The changes introduced in Revision 7 of the UR are to be uniformly implemented by IACS Societies on ships contracted for construction (as defined in IACS PR 29) from 1 July 2021.

Page 1 of 8 IACS Req. 2006/Rev.7 2020

Z28

Z28 Surveys of Watertight Cable Transits
(Oct 2020)
(Corr.1
June 2021)

1. Application

- 1.1 These requirements apply to all vessels and Mobile Offshore Units (MOUs) contracted for construction* on or after 1st July 2021 and are in addition to the requirements of URs Z23, Z7 and Z15.
- 1.2 Watertight cable transits are to be installed and maintained in accordance with the manufacturer's requirements and in accordance with the requirements of the relevant Type Approval certification.
- 1.3 For MOUs, watertight cable transit seal systems should be inspected in accordance with item 8.6, Table 1 of UR Z23.

2. Cable Transit Seal Systems Register

2.1 New Construction

2.1.1 A Cable Transit Seal Systems Register (Register) is to be provided by the shipbuilder for all watertight cable transits fitted to the vessel or MOU. For an example of a register see Appendix 3 of UR Z23 – "Recommendatory Sample - Cable Transit Seal Systems Register". The Register can be in either a hard copy or digitized media. It is to include a marking / identification system, documentation referencing manufacturer manual(s) for each type of cable transit installed, the Type Approval certification for each type of transit system, applicable installation drawings, and a recording of each installed transit documenting the as built condition after final inspection in the shipyard. It is to include sections to record any inspection, modification, repair and maintenance.

2.1.2 The Register shall be reviewed by the attending Surveyor to confirm it contains a list of the watertight cable transits, applicable cable transit information and sections to maintain in-service maintenance and survey records.

2.1.3 For manned vessels the Register is to be held onboard of the vessel or MOU. For unmanned vessels, if a suitable storage location does not exist onboard, the Register may be held ashore. The Register is to be readily available for the attending surveyor.

2.2 Vessel and MOU In Service

2.2.1 The owner is to maintain the Register to record any disruption (repair, modification or opening out and closing) to a cable transit or to record the installation of a new cable transit.

Note:

1. This UR is to be uniformly implemented by IACS Societies on or after 1 July 2021.

Page 1 of 2 IACS Req. 2020/Corr.1 2021

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“... can we save the ship?”

”...or must we return to port?”



“Is the vessel seaworthy after maintenance?”

About Coltraco Ultrasonics



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Headquartered in **London**, we are a British high-exporting advanced manufacturer.

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- Our **Research Organisations**, the Durham Institute of Research, Development & Invention (DIRDI)
- Our **Centre for Underwater Acoustic Analysis** (CUAA)

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The Portascanner® WATERTIGHT PRO is a unique world first. There is nothing comparable globally:

- Identifies the exact location of any leak sites present (a pre-existing capability)
- Measures the physical (cross-sectional) size of any such leaks (mathematically complex and innovative)
- Calculates the flow rate of water through each leak under a user-specified pressure head (has never been achieved before)



Generate Reports Automatically



The **Portascanner® WATERTIGHT PRO** provides data on cable transits, hatches, hatch covers, watertight doors, and bulkheads in easily digestible reports.

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Coltraco Ultrasonics | Ultrasonics Safety Instrumentation and Systems Manufacturer | United Kingdom

Quick Test
Vessel: ██████████
Compartment: MAST
Structure: CABLE GLAND P54

Invoice Address
Coltraco Ultrasonics
Unit 1, Chewton Fields,
Radstock, BA3 4BX,
United Kingdom

Technical Department
Coltraco Ultrasonics
NETPark Research Institute
Joseph Swan Road, Sedgfield
County Durham, TS21 3FB,
United Kingdom

VAT Reg GB 643 3514 54
Registered in England No 295 5021
Tel (Main): +44 1761 241 601
Tel (Support): +44 1740 618 240

22

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Quick Test
Vessel: Test Vessel
Compartment: Test Compartment
Structure: Hatch 2

Invoice Address
Coltraco Ultrasonics
Unit 1, Chewton Fields,
Radstock, BA3 4BX,
United Kingdom

Technical Department
Coltraco Ultrasonics
NETPark Research Institute
Joseph Swan Road, Sedgfield
County Durham, TS21 3FB,
United Kingdom

VAT Reg GB 643 3514 54
Registered in England No 295 5021
Tel (Main): +44 1761 241 601
Tel (Support): +44 1740 618 240

5

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Vessel: Test Vessel
Compartment: Test Compartment
Structure: Hatch 1

Leak Number	OHV (dB)	Val (dB)	Val (%OHV)	Cross-Sectional Area (mm²)	Water Ingress Rate (m³/h)
1	126.97	83.33	8.11	15.37	0.881
2	132.61	89.94	8.57	16.28	0.951
3	131.32	73.45	3.58	6.59	0.289
TOTAL	-	-	-	38.24	2.121

Additional comments: Significant corrosion present.

Invoice Address
Coltraco Ultrasonics
Unit 1, Chewton Fields,
Radstock, BA3 4BX,
United Kingdom

Technical Department
Coltraco Ultrasonics
NETPark Research Institute
Joseph Swan Road, Sedgfield
County Durham, TS21 3FB,
United Kingdom

VAT Reg GB 643 3514 54
Registered in England No 295 5021
Tel (Main): +44 1761 241 601
Tel (Support): +44 1740 618 240

4

Generate Reports Automatically



The Portascanner® WATERTIGHT PRO provides data on cable transits, hatches, hatch covers, watertight doors, and bulkheads in easily digestible reports.

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Test Date: 15/08/2023
Vessel: Test Vessel
Compartment: Test Compartment

Total ingress rate for
Test Compartment at
a pressure of 0.30 bar
(3.05 metres head)

2.12 m³/h

Benefits to Global Navies



- Identify, measure, and remedy potential leak sites in port
 - Understand and prioritise water ingress at sea
 - Know the time a compartment takes to flood



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Astute Submarines- CSD Provided Watertight Integrity Inspections of Penetrations in Critical Bulkheads



- CSD Inspection of Cable Transits, Pipe Penetrations & Watertight Doors
- Detailed Report including repair actions
- Repair
- Test

BAE SYSTEMS

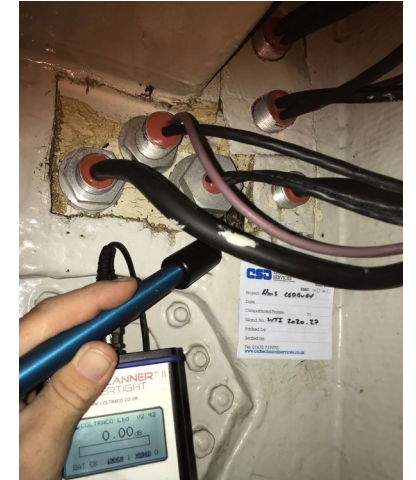
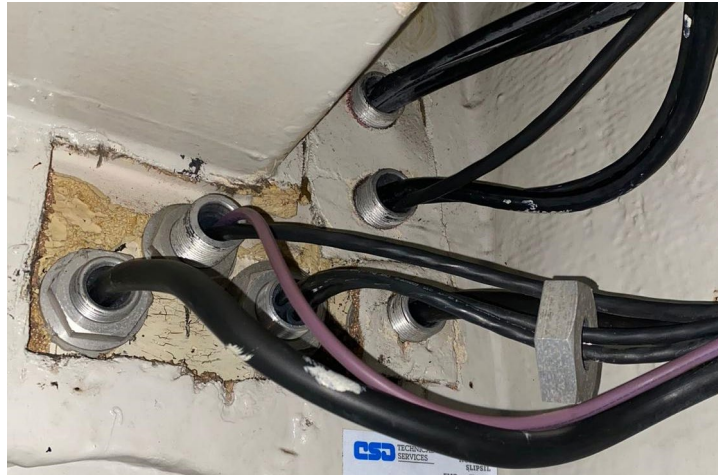
CSD Replacement of 'Shrink-boot' & single bulkhead glands with RISE NOFIRNO



Hunt Class - Mine Hunters



Proved Integrity using Ultrasonics



Hunt Class - Mine Hunters – Removal of Legacy Goo Glands



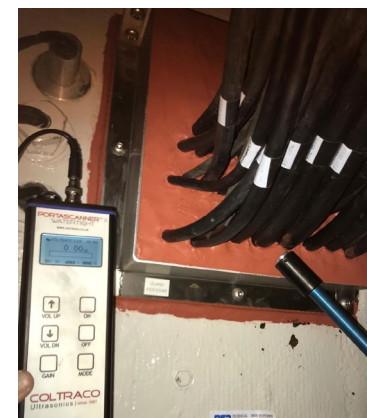
BAE SYSTEMS



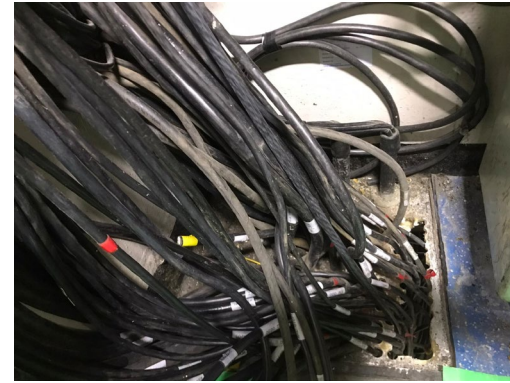
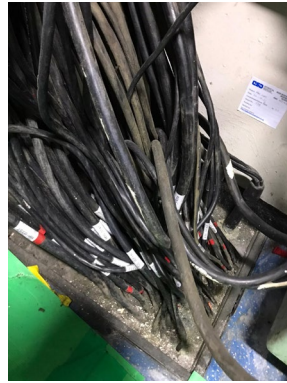
Hunt Class - Mine Hunters – Removal of Legacy Goo Glands , Replace with RISE NOFIRNO



BAE SYSTEMS



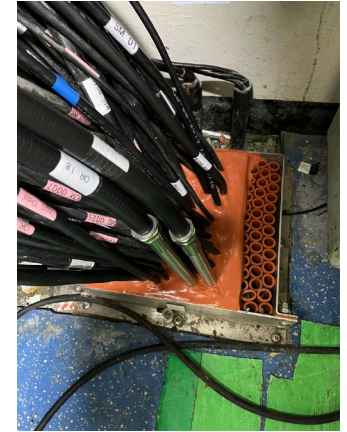
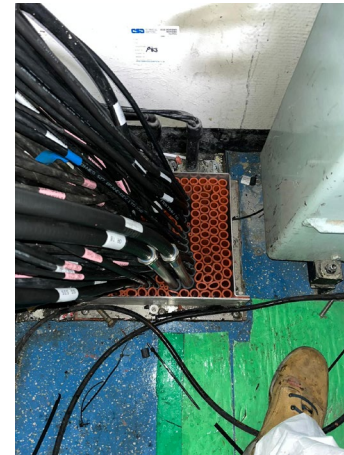
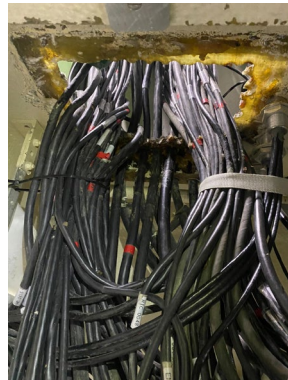
Hunt Class - Mine Hunters – Removal of Legacy Goo Glands , Replace with RISE NOFIRNO



BAE SYSTEMS



**2 Deck Passageway ADJ
To
OPS Room FWD
Bulkhead**



Hunt Class – Mine-Hunters – Removal of deck tubes



BAE SYSTEMS



Hunt Class - Mine Hunters – CSD Developed & Installed a solution to provide Smoke Tight Integrity

Proved tight using Ultrasonics

Draft Method Statement for your consideration:

- Remove work-in-way on both sides of the cable transit to provide good working access
- Carry out Portascanner check (if arrangement allows), record result.
QHP photograph #1 - Portascanner display
- Remove current 'biscuit' materials to reveal legacy cables passing through the structure
QHP photograph #2
- Release any cable ladders / trays to provide sufficient slack to the transiting cables
- Slide a 30mm NOFIRNO sleeve over each transiting cable and position centrally within structure.
QHP photograph #3 - Does the structure require cutting to provide additional space?
If yes - STOP and discuss with Hunt COM WTA Constructive Engineers & CSD Technical Services
- Locally abrade a 20mm border around the structure & clean with degreaser cloths
- Clean all transiting cables with degreaser cloths
- Final fitment of NOFIRNO sleeves within the structure; ensure evenly space, centrally located within the structure & fit additional NOFIRNO sleeves within the structure to provide additional capacity and a solid and secure fit
QHP photograph #4
- Apply approx. 5mm thick NOFIRNO sealant across the both sides of the transit.
- Finish NOFIRNO sealant with a 45° chamfer and a smooth even finish.
- Carry out Portascanner check (if arrangement allows), record result.
QHP photograph #5

THIS DRAWING AND DESIGN REMAINS THE PROPERTY OF CSD SEALING SYSTEMS AND MAY NOT BE REPRODUCED WITHOUT THE WRITTEN PERMISSION OF CSD.

CSD SEALING SYSTEMS
CSD Sealing Systems, Unit 6
Easter Park, Nelson Park West,
Crawlington, NE33 1WQ
TEL: 01870 739970
www.csdsealingsystems.co.uk

Smoke integrity proposal

FILENAME: ST-001-01	DATE: 10/07/2020
DRAWN: AM	Rev: 03
MATERIAL: Material <not specified>	
FINISH: type finish here	
WEIGHT: 8.8 (kg)	SCALE: 1:10 SHEET 1 OF 1 A3

Deck: 3 Deck	Action A032
Compartment: FWD Battle Store	PDMA 051a
Description: between #4 & #5 Stair; AR of the door.	Defect 5

Defect Image:

Missing Collar Plate

Surveyor Comments:
52 There are missing collar plates to both sides of the cable penetration to the 5502 Battle Store between #4 & #5 Stair, AR of the door. See Fig 5 on sheet 4.

Suggested Repair Action:
RENEW plywood or GFR collar plates. (P3)

5 (051a) NOT FITTED

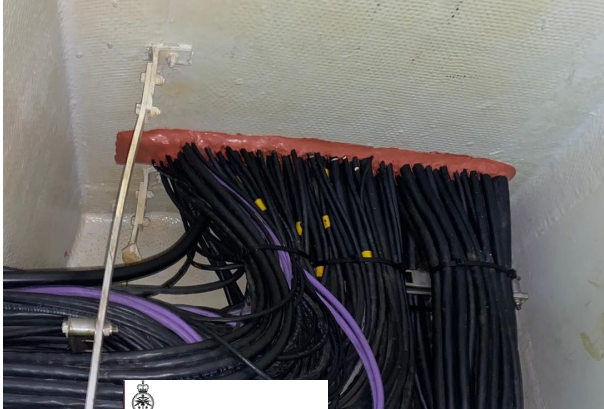
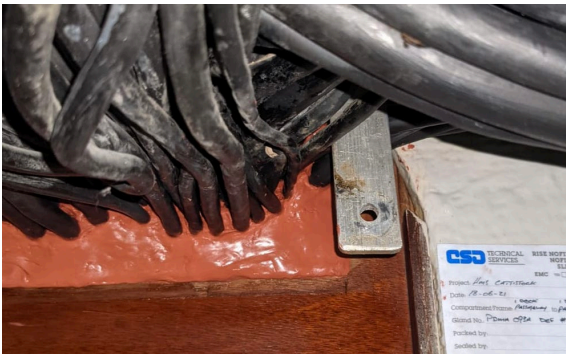
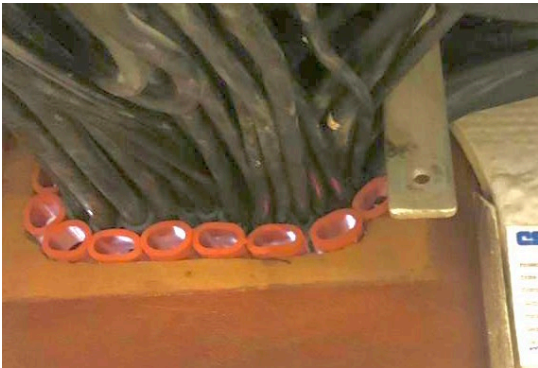
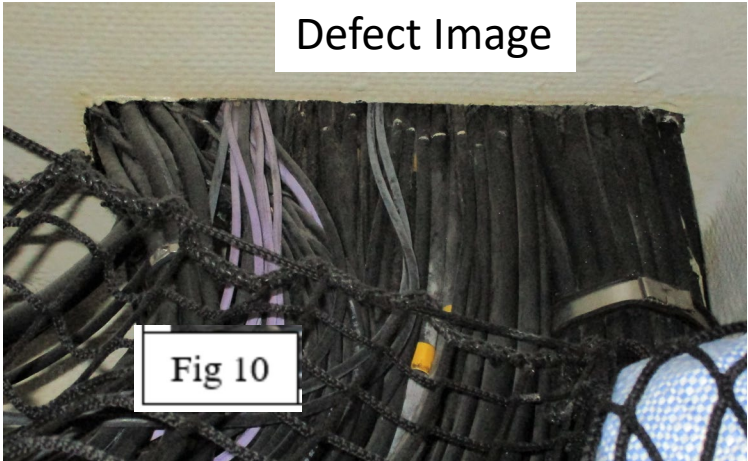
The **Hunt COM WTA** requested CSD Technical Services to provide a solution for the purpose of **preventing** smoke transfer between the specified ship compartments,

the solution will also provide improvements in privacy through reductions in noise transferring between adjacent compartments.



Hunt Class - Mine Hunters –Improving Smoke Integrity

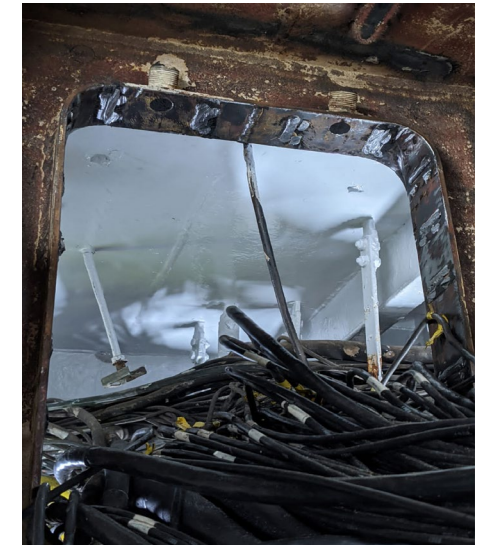
Defect Image



Type 23 Frigates –Life Extension and watertight integrity improvements



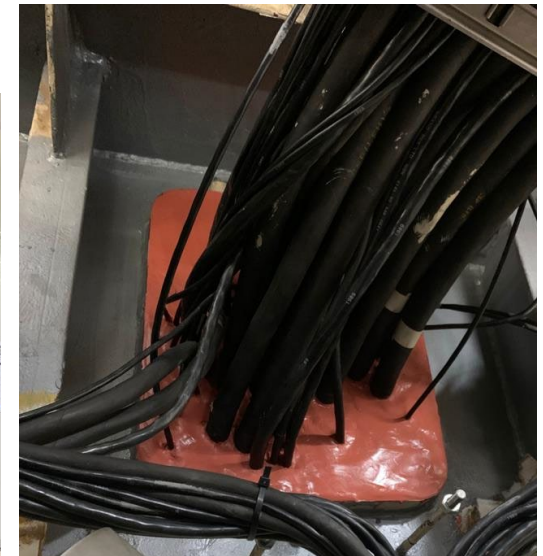
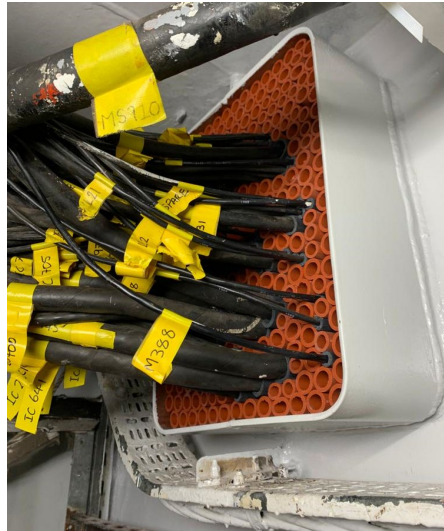
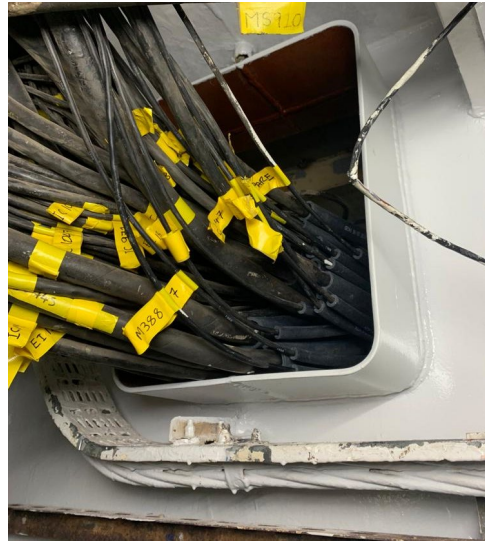
- “Goo” Gland De-construction, removal and replacement using RISE-NOFIRNO.
- Increase capacity for new cable by > 100%
- Improve **fire performance** and **watertight integrity**



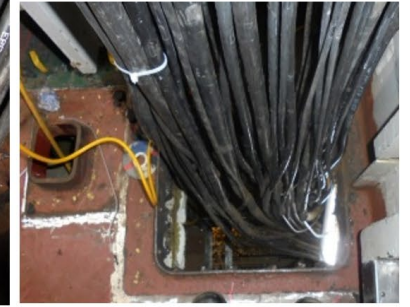
Type 23 Frigates –Life Extension & WTI Defects



- “Goo” Gland De-construction, removal and replacement using **RISE-NOFIRNO**.
- Increase capacity for new cable by > 100%
- Improve **fire performance** and **watertight integrity**



Type 23 Frigates –Life Extension



- “Goo” Gland De-construction, removal and replacement using RISE-NOFIRNO.
- Increase capacity for new cable by > 100%
- Improve **fire performance** and **watertight integrity**



Type 23 Frigates –Life Extension

RISE NOFIRNO extension frames to replace block cable transits

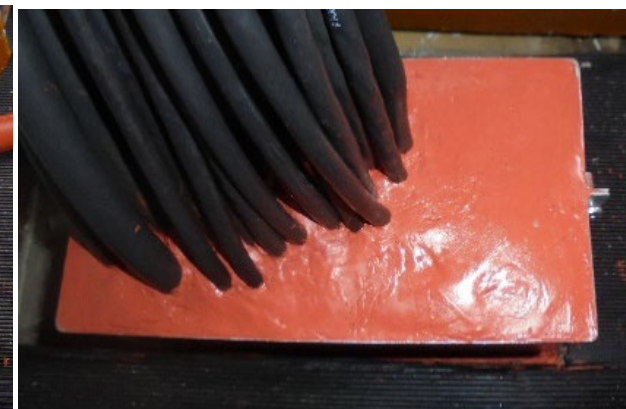
- 70% increase in cable capacity achieved



Full Roxeltec frame with 36 cables.



Same 36 cables with RISE NOFIRNO extension frame inserted, space for 26 more cables.



Sealed with RISE NOFIRNO, allowing easy addition and removal of an additional 26 similar sized cables.



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Enhancing vessel survivability for over 30 years

Our solutions offer:

- ✓ Highest performing flood and fire protection
- ✓ Noise and vibration reduction
- ✓ Tailored design and installation services
- ✓ Ongoing support throughout the vessel's lifespan
- ✓ Cable Transit Ultrasonic Watertight Integrity Inspection & training

