



CERTIFICATE OF FIRE APPROVAL


This is to certify that

The product detailed below will be accepted for compliance with the applicable Lloyd's Register Rules and Regulations and with the International Convention for the Safety of Life at Sea, (SOLAS), 1974, as amended, for use on ships and offshore installations classed with Lloyd's Register, and for use on ships and offshore installations when authorised by contracting governments to issue the relevant certificates, licences, permits etc.

Manufacturer	Roxtec International AB
Address	Box 540 S-37123 Karlskrona Sweden
Type	PIPE PENETRATION (STANDARD FIRE TEST)
Description	Fire Resisting Plastic Pipe Penetration Seals – Type: “Roxtec Sleeve-it Pipe Penetration Seals” for A-60 Class Bulkheads and Decks
Specified Standard	IMO Res. MSC.307 (88)-(2010 FTP Code) Annex 1 Part 3 IMO Res. MSC.61 (67)- (FTP Code) Annex 1 Part 3 IMO MSC/Circ.1120 IMO Res. MSC.307 (88)-(2010 FTP Code) Section 8

The attached Design Appraisal Document forms part of this certificate.

This certificate remains valid unless cancelled or revoked, provided the conditions in the attached Design Appraisal Document are complied with and the equipment remains satisfactory in service.

Date of issue	15 March 2018	Expiry date	14 March 2020
Certificate No.	SAS F150308/M3	Signed	
Sheet No	1 of 16	Name	S. Abraham Surveyor to Lloyd's Register EMEA A Member of the Lloyd's Register Group

Note:

This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify Lloyd's Register of any modification or changes to the equipment in order to obtain a valid Certificate.

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APPROVAL DOCUMENTATION

Fire tests conducted to IMO Res.MSC.61(67)-(FTP Code), Annex 1 Part 3:

Building Research Establishment (BRE), Garston, United Kingdom, Fire Test Reports No. 208972, 208971, dated 20 March 2003 and 12 February 2003 respectively, No. 223969, 223968, dated 1 September 2005 and 5 September 2005 respectively; Bodycote Warrington, United Kingdom, Fire Test Reports No. 164476B, 170080/B, 183387A and 180251A dated 27 July 2007, 30 April 2008, 23 October 2009 and 26 May 2009 respectively; Gerbam DGA Fire Test Laboratory, France, Fire Test Report Nos. 881/07/A/NP/R-102 and 878/07/A/NP/R-102, dated 21 March 2007 and 28 March 2007 respectively. Exova Warringtonfire, Warrington, United Kingdom, Fire Test Report No. 189958 dated 09 February 2010, No.190890/A dated 26 May 2010, No: 198004A dated 7 December 2010, No: 303584A and No: 303585A both dated 7 April 2011, No: 307171A dated 17 June 2011, No: 309855A dated 23 December 2011, No: 314670 dated 25 June 2012, No: 309638A dated 20 September 2011, No: 313700 dated 30 January 2012 and No: 316943 dated 29 October 2012. Bodycote Warrington, United Kingdom, Fire Test Reports No. 177105A dated 6 January 2009, 175486/A dated 31 October 2008 and Supplement No: 1 dated 23 February 2012 to Bodycote Warrington Fire test report no: 175486/A.

Fire Tests conducted to IMO Res. MSC.307 (88)-(2010 FTP Code) Annex 1 Part 3:

Exova Warringtonfire, Warrington, United Kingdom Fire Test Reports No: 320402A dated 29 October 2012, No: 327509 dated 10 July 2013, No: 324083 dated 24 April 2013, No: 330891 dated 5 September 2013, No: 329449 dated 13 August 2013, No: 325332 dated 10 July 2013, 327510 dated 22 May 2013, No: 314669 dated 26 April 2012, No: 334429 dated 17 December 2013 and No: 337717 dated 13 May 2015. SP Technical Research Institute of Sweden, Fire Test Reports No: 5P00771 dated 25 November 2015, 5P00772 dated 10 December 2015, 5P08394 dated 2 March 2016 and 5P08395 dated 17 March 2016. Danish Institute of Fire and Security Technology, Hvidovre, Denmark; Fire test reports No: PGA10870A dated 13 December 2016 and PGA10871A Rev. 2 dated 16 January 2018. RISE (SP) Research Institutes of Sweden AB, Boras, Sweden; Fire test report No: 7P02024 dated 8 June 2017.

Manufacturer's Drawings (For reference only; product installation and insulation arrangements to be in accordance with Conditions of Certification as described below):

Drawing no: SI/12/105 dated 01 June 2012 and no: SI/11/69 dated 4 July 2011 for Sleeve-it Meyer Werft Cabin Collar, Type: Sleeve-it-MW-MAR-25M-D, S1036168 Revision B dated 8 November 2013. Drawings No: SI/08/016, SI/08/018 and SI/08/021 dated 14 October 2008, 14 October 2008 and 20 October 2008 respectively, for "Sleeve-it Transition Collars from steel to plastic pipe". Drawings No: S1026329 Revision H dated 10 November 2016 for Roxtec Sleeve-it Fire Collars and S1026339 Revision E dated 15 November 2016 for Roxtec Sleeve-it Weather tight Collars. Drawing S1528866 and installation manual ASS2012001301 (Article number: 183208 Document number: DOC-001830 rev A) for Roxtec Sleeve-it Fire Penetration Seal Modification.

Roxtec Sleeve-it Installation Manuals reference: ASS2012001301 version C and ASS2012001201 version D

CONDITIONS OF CERTIFICATION

1. When used in conjunction with A-60 Class steel bulkheads and decks with approved insulation arrangements (Please see tables and 2 and 3 below for details of the tested and approved arrangements in A-60 divisions)
2. For applications in A-0, A-15 or A-30 Class steel bulkheads and decks, a 200mm diameter collar of insulation must be added to bring the insulation collar up to A-60 classification around the pipe or Roxtec Sleeve-it pipe penetration. [The 200mm diameter insulation collar must be fitted for all Roxtec Sleeve-it pipe penetrations on both sides in bulkheads and on the underside of decks; excluding the following penetrations that were tested in A-0 steel deck or bulkhead and therefore accepted for A-0, A-15 or A-30 applications with arrangements as described in the table 1]

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Table 1: Tested arrangements in A-0 steel divisions

Pipe Material	Tested Pipe Nominal Diameter	Tested in-Steel bulkhead s/ decks	Position of Roxtec Sleeve-it pipe penetration	Additional insulation collar for Roxtec Sleeve-it pipe penetrations
uPVC	25mm	Steel deck	Fire exposed side (under side)	Additional insulation collar not required
Polyethylene, PE	160mm	Steel deck	Fire unexposed side (Top side)	Additional 200mm diameter insulation collar to be fitted on the underside of the deck
COES Blue Power Flame retardant Polypropylene, PPR	125mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional insulation collar not required
George Fischer "Fuseal Sea Drain" Flame retardant Polypropylene, PPR	169mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional insulation collar not required
George Fischer, Polybutylene, PB	160mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional 200mm diameter insulation collar to be fitted around the Sleeve-it penetration.
George Fischer, Standard Polypropylene, PPR	160mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional 200mm diameter insulation collar to be fitted around the Sleeve-it penetration.
George Fischer, Polyethylene, PE	160mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional 200mm diameter insulation collar to be fitted around the Sleeve-it penetration.
George Fischer, Polyvinyl chloride, PVC	160mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional insulation collar not required
George Fischer Multi-layer pipe PE-RT/AL/PE-HD	32mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional insulation collar not required
Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene)	200mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional 200mm diameter insulation collar to be fitted around the Sleeve-it penetration.
Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene)	125mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional insulation collar not required
Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene)	40mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional insulation collar not required
Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene)	40mm	Steel deck	Fire exposed side (underside)	Additional 200mm diameter insulation collar to be fitted around the Sleeve-it penetration

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Table 1: Tested arrangements in A-0 steel divisions (continued)

Uninsulated Fincantieri stainless steel Straight Scupper with Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene) pipe and Sleeve-it Sleeve (Straight)type Transition Collar	50mm	Steel deck	Fire exposed side (underside)	Additional insulation collar not required ^(a)
Uninsulated Fincantieri stainless steel Elbow Scupper with Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene) pipe and Sleeve-it Sleeve (Straight)type Transition Collar	75mm	Steel deck	Fire exposed side (underside)	Additional insulation collar not required ^(b)
George Fischer Multi-layer pipe PE-RT/AL/PE-HD	32mm	Steel deck	Fire exposed side (underside)	Additional insulation collar not required
George Fischer Multi-layer pipe PE-RT/AL/PE-HD	63mm	Steel deck	Fire exposed side (underside)or Fire unexposed side (Topside)	Additional insulation collar not required
JRG Sanipex Multi-Layer Pipe (c), (d) & (e) PE/ALU/PE	16mm	Steel bulkhead	Fire exposed side or Fire unexposed side	Additional insulation collar not required; Kaiflex thermal insulation to be used for refrigerated services as per additional notes (c) & (d)
JRG Sanipex Multi-Layer Pipe (c), (f) & (g) PE/ALU/PE	63mm	Steel bulkhead	Fire Exposed side or Fire Unexposed side	Additional insulation collar not required; Kaiflex thermal insulation to be used for refrigerated services as per additional note (f)

- (a) Coes Blue Power Polypropylene, PPR (50mm) may also be used in conjunction with this penetration for A-0 applications without additional insulation collar
- (b) Coes Blue Power Polypropylene, PPR (75mm) and George Fischer Fuseal Sea Drain PPr (75mm) may also be used in conjunction with these scuppers for A-0 applications without additional insulation collar
- (c) Pipes insulated with Kaiflex thermal insulation are restricted for refrigerated services (refrigeration systems and chilled water piping for air conditioning) only. Kaiflex thermal insulation to be separately approved for low flame spread characteristics in accordance with IMO FTP Code Annex 1, Part 5
- (d) For refrigerated services, 16mm OD x 1.2mm pipe to be used with 0.7mm thick x 75mm OD x 65mm deep Sleeve-it pipe penetration with 3 layers of Intumex L intumescent (2.5mmx60mmwide) on the fire exposed side or on the fire unexposed side, with Kaiflex thermal insulation (25mm thick) fitted along the pipe for the full length
- (e) For general applications, 16mm OD x 1.2mm pipe to be used with 0.7mm thick x 30mm OD x 65mm deep Sleeve-it pipe penetration with 2 layers of TRP Intumescent (1.8mm x 60mmwide) on the fire exposed side or fire unexposed side



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- (f) For refrigerated services, 63mm OD x 4.5mm pipe to be used with 0.7mm thick x 135mm OD x 60mm deep Sleeve-it pipe penetration with 4 layers of Intumex L (2.5mmx60mmwide) to be used on the fire exposed side OR 0.7mm thick x 75mm OD x 65mm deep Sleeve-it pipe penetration with 4 layers of Intumex L (2.5mmx60mmwide) on the fire unexposed side. In both cases, the plastic pipe is to be insulated with Kaiflex thermal insulation (25mm thick) along the full length
- (g) For general applications, 63mm OD x 4.5mm pipe to be used with 0.7mm thick x 75mm OD x 65mm deep Sleeve-it pipe penetration with 3 layers of Intumex L (2.5mmx60mmwide) to be used either on the fire exposed side or on the fire unexposed side
3. A range of Roxtec Sleeve-it pipe penetrations may also be used for some types of plastic pipes in suitably insulated aluminium bulkheads and decks; the acceptable arrangements are as identified by foot notes (a) and (b) in Table 2 and (c) and (d) in table 3
4. For all applications in aluminium divisions, an additional 200mm diameter insulation collar should be fitted around the Roxtec Sleeve-it pipe penetrations on both sides of the bulkhead and on the underside of the deck and insulation should be extended to cover the full side(s) and the face(s) of the Roxtec Sleeve-it pipe penetrations, with an overlap of at least 20mm, in order to prevent the heat transmission along the Sleeve-it pipe penetrations to the aluminium structural core
5. Aluminium bulkheads and decks in all cases must be insulated with an approved system to prevent the core temperature exceeding 200°C and all Roxtec Sleeve-it pipe penetrations fitted to such divisions must also be insulated with either the same system or an approved A-60 system
6. The Roxtec Sleeve-it pipe penetrations for bulkhead and deck applications comprise of self-adhesive intumescent strips secured within a 0.7mm thick x 65mm deep stainless steel casing of various outer diameters and fitted around the plastic pipes; the casing may also be made of 0.7mm thick mild steel for plastic pipe sizes up to 200mm outside diameter. The intumescent strips are to be suitably secured inside the steel casing such that they cannot easily detach from the casing without the use of special tools. The penetrations may be of a flanged or lugged type that are welded or bolted to the steel divisions respectively. Roxtec Sleeve-it penetrations may be fitted with a bead of fire rated Sleeve-it silicone sealant to seal the annular space around the fire collar and deck or bulkhead. The specifications for the intumescent materials used with Roxtec Sleeve-it pipe penetrations for different applications are as identified in table 4. Installation of Roxtec Sleeve-it penetrations to be as described in Installation manual references ASS2012001301 version C and ASS2012001201 version D
7. The positions of the Roxtec Sleeve-it pipe penetrations and the maximum rating achievable for different types and diameter of the pipes when penetrating bulkheads are given in Table 2



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Table 2: Tested arrangements in A-60 Class Steel bulkheads

Pipe Material	Maximum Pipe Nominal Diameter	Maximum Rating achievable	Position of Roxtec Sleeve-it pipe penetrations when fitted in steel bulkheads
ABS (Acrylonitrile butadiene styrene)	114mm	A-60	Fire exposed side or unexposed side
Polyethylene (PE) ^(a)	225mm ^(a)	A-60	Fire exposed side or unexposed side ^(b)
Polybutylene (PB) ^(a)	Up to 160mm ^(a)	A-60	Fire exposed side or unexposed side ^(b)
George Fischer "Fusel Sea Drain" Flame retardant Polypropylene, PPR	169mm ^(a)	A-60	Fire exposed side or unexposed side
Polypropylene (PP) ^(a)	Up to 110mm	A-60	Fire exposed side or unexposed side ^(b)
uPVC ^(a)	160mm ^(a)	A-60	Fire exposed side or unexposed side ^(b)
Multi-Layer Pipe (Polyethylene (PE)/Aluminium/ Polyethylene (PE))	32mm	A-60	Fire exposed side or unexposed side ^(b)
Multipipe (PE) with Armaflex lagging	75mm	A-60	Fire exposed side or unexposed side ^(b)
'Bevex Coated Python' Multipipe (PE) with Armaflex lagging	100mm	A-30	Fire exposed side or unexposed side ^(b)
PVC Coated Steel Spiral pipe	40mm	A-30	Fire exposed side or unexposed side
George Fischer Polyethylene pipe (PE)	315mm ^(d)	A-60 ^(c)	Fire exposed side or unexposed side ^(c)
Sleeve-it Combination Pipe Penetration, (Type: "SLV75M") ^(b) Polyvinyl Chloride (PVC) / Polyvinyl Chloride (PVC) / Polypropylene(PP)	20mm (PVC)/ 21.5mm (PVC)/ DN 41 (PP)	A-60	Fire exposed side or unexposed side
Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene)	200mm	A-30	Fire unexposed side
Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene)	200mm	A-60	Fire exposed side
Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene)	40mm	A-30	Fire unexposed side
Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene)	40mm	A-60	Fire exposed side
George Fischer CPVC (Chlorinated Polyvinyl chloride)	322mm	A-60	Fire exposed side; to be used in conjunction with 400mm OD x130mm deep Sleeve-It Penetration with 2 sets of 10 off x 2.5mm thick x 60mm wide Intumex L)



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Table 2: Tested arrangements in A-60 Class Steel bulkheads (continued)

George Fischer CPVC (Chlorinated Polyvinyl chloride)	322mm	A-60	Fire unexposed side; to be used in conjunction with 400mm OD x130mm deep Sleeve-It Penetration with 2 sets of 10 off x 2.5mm thick x 60mm wide Intumex L. In addition, 25mm thick, 100kg/m ³ approved insulation is to be fitted to fully cover the sides and end face of the penetration on the fire unexposed side
George Fischer CPVC (Chlorinated Polyvinyl chloride)	270mm	A-30	Fire exposed side
George Fischer CPVC (Chlorinated Polyvinyl chloride)	270mm	A-60	Fire unexposed side, with an additional 25mm thick 100kg/m ³ insulation collar, fully covering the sides and end face of the penetration on the fire unexposed side
George Fischer CPVC (Chlorinated Polyvinyl chloride)	12	A-30	Fire Unexposed side
George Fischer CPVC (Chlorinated Polyvinyl chloride)	12	A-60	Fire exposed side or unexposed side
Polyvinyl Chloride (PVC)	200	A-60	Fire exposed side or unexposed side
George Fischer Polypropylene	160	A-30	Fire unexposed side and unexposed side
George Fischer Sea Drain Plus (Polyvinylidene Fluoride (PVDF)	169	A-30	Fire exposed side or unexposed side
JRG Sanipex Multi-Layer Pipe ^{(e), (f)} PE/ALU/PE	16mm x 1.2mm	A-30	Fire exposed side (for refrigerated services only, see notes e and f)
JRG Sanipex Multi-Layer Pipe ^{(e), (f)} PE/ALU/PE	16mm x 1.2mm	A-60	Fire unexposed side (for refrigerated services only, see notes e and f)
JRG Sanipex Multi-Layer Pipe ^{(e), (g), (h)} PE/ALU/PE	63mm x 4.5mm	A-60	Fire exposed side or unexposed side (for refrigerated services only, see notes e, g and h)
JRG Sanipex MT® PE-X / AI / PE-X ⁽ⁱ⁾	16mm x 2.25mm	A-60	Restricted to fire unexposed side (insulated side of the bulkhead) in all cases, with an additional 100mm diameter A-60 insulation collar fitted around the penetration
JRG Sanipex MT® PE-X / AI / PE-X ⁽ⁱ⁾	63mm x 4.5mm	A-60	Fire exposed side or unexposed side, with an additional 150mm diameter A-60 insulation collar fitted around the penetration and pipe insulated with approved insulation (30mm, 100 kg/m ³ density) for minimum length 400mm, when measured from the bulkhead insulation or penetration insulation collar, as applicable
Aquatechnik Multi-calor PE/ALU/PE ⁽ⁱ⁾	16 x 2	A-60	Fire exposed side
Aquatechnik Multi-calor PE/ALU/PE ⁽ⁱ⁾	16 x 2	A-60	Fire unexposed side, with an additional 100mm diameter A-60 insulation collar fitted around the penetration



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Table 2: Tested arrangements in A-60 Class Steel bulkheads (continued)

Aquatechnik Multi-calor PE/ALU/PE ^(a)	63 x 4.5	A-60	Fire exposed side or unexposed side, with an additional 150mm diameter A-60 insulation collar fitted around the penetration and pipe insulated with approved insulation (30mm, 100 kg/m ³ density) for minimum length 400mm, when measured from the bulkhead insulation or penetration insulation collar, as applicable
GF Alupex PE/ALU/PE ^(a)	16 x 2.25	A-60	Fire exposed side
GF Alupex PE/ALU/PE ^(a)	16 x 2.25	A-60	Fire unexposed side, with an additional 100mm diameter A-60 insulation collar fitted around the penetration
GF Alupex PE/ALU/PE ^(a)	63 x 4.5	A-60	Fire exposed side or unexposed side, with an additional 150mm diameter A-60 insulation collar fitted around the penetration and pipe insulated with approved insulation (30mm, 100 kg/m ³ density) for minimum length 400mm, when measured from the bulkhead insulation or penetration insulation collar, as applicable
COES Blue Power Polypropylene, PPR ^(a)	32 x 3	A-60	Fire exposed side
COES Blue Power Polypropylene, PPR ^(a)	32 x 3	A-60	Fire unexposed side, with an additional 150mm diameter A-60 insulation collar fitted around the penetration
COES Blue Power Polypropylene, PPR ^(a)	110 x 8	A-60	Fire exposed side
COES Blue Power Polypropylene, PPR ^(a)	110 x 8	A-60	Fire unexposed side, with an additional 150mm diameter A-60 insulation collar fitted around the penetration
TECE Multi-Layer Pipe PE-Xc/ALU/PE	16mm x 2mm	A-60	Fire exposed side and Fire unexposed side
TECE Multi-Layer Pipe PE-Xc/ALU/PE	63mm x 6mm	A-60	Fire exposed side, with 100mm diameter (100 kg/m ³) mineral wool or an equivalent type approved A-60 insulation fitted around the pipe on the fire unexposed side for minimum distance of 290mm, when measured from the bulkhead steel plate.
TECE Multi-Layer Pipe PE-Xc/ALU/PE	63mm x 6mm	A-60	Fire unexposed side; with 150mm diameter (100 kg/m ³) mineral wool or an equivalent type approved A-60 insulation fitted around the pipe and penetration on the fire unexposed side for minimum distance of 290mm, when measured from the bulkhead steel plate.

- (a) The maximum pipe diameter allowed for aluminium bulkhead applications is 125mm
- (b) Sleeve-it pipe penetrations must be fitted on both the fire exposed and unexposed sides of the aluminium bulkheads in all cases
- (c) For applications in A-60 bulkheads, Roxtec Sleeve-it pipe penetrations for 226mm to 315mm diameter George Fischer Polyethylene (PE) pipes must be fitted with an additional 200mm diameter insulation collar around the pipe or the Roxtec Sleeve-it pipe penetration on both sides of the bulkhead
- (d) Minimum size of Roxtec Sleeve-it penetrations for PE pipes 226mm to 315mm diameter: 385mm x 125mm deep x 1mm thick
- (e) Pipes insulated with Kaiflex thermal insulation are restricted for refrigerated services (refrigeration systems and chilled water piping for air conditioning) only. Kaiflex thermal insulation to be separately approved for low flame spread characteristics in accordance with IMO FTP Code Annex 1, Part 5



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- (f) For refrigerated services, 16mm OD x 1.2mm pipe to be used with 0.7mm thick x 75mm OD x 65mm deep Sleeve-it pipe penetration with 3 layers of Intumex L intumescent (2.5mmx60mmwide) on the fire exposed side or on the fire unexposed side, with Kaiflex thermal insulation (25mm thick) fitted along the pipe for the full length in both cases
 - (g) For refrigerated services, 63mm OD x 4.5mm pipe to be used with either 0.7mm thick x 135mm OD x 60mm deep Sleeve-it pipe penetration with 4 layers of Intumex L (2.5mmx60mmwide) on the fire exposed side with Kaiflex thermal insulation (25mm thick) fitted along the pipe for the full length OR with 0.7mm thick x 75mm OD x 60mm deep Sleeve-it pipe penetration with 3 layers of Intumex L (2.5mmx60mmwide) on the fire exposed side with Kaiflex thermal insulation (25mm thick) fitted along the pipe for minimum 200mm on both the fire exposed and unexposed sides
 - (h) For refrigerated services, 63mm OD x 4.5mm pipe to be used with either 0.7mm thick x 135mm OD x 60mm deep Sleeve-it pipe penetration with 3 layers of Intumex L (2.5mmx60mmwide) on the fire unexposed side with Kaiflex thermal insulation (25mm thick) fitted along the pipe for minimum 200mm on the fire unexposed side only OR with 0.7mm thick x 75mm OD x 60mm deep Sleeve-it pipe penetration with 3 layers of Intumex L (2.5mmx60mmwide) on the fire unexposed side with Kaiflex thermal insulation (25mm thick) fitted along the pipe for the full length
 - (i) Pipe penetration insulation arrangements for JRG Sanipex MT® PE-X / AI / PE-X, Aquatechnik Multi-calor PE/ALU/PE and GF Alupex PE/ALU/PE pipes (pipe diameters 16mm to 63mm) and COES BluePower Polypropylene, PPR (pipe diameters 32mm to 110mm) are generally as described in Roxtec Drawings S1513949B, S1508062D, S1512673B and S1508063D respectively.
8. The maximum rating achievable for different types and diameter of pipes when penetrating steel decks are given Table 3

Table 3: Tested arrangements in A-60 Class Steel Decks

Pipe Material/Reference	Max. Pipe Nominal Diameter (in mm)	Max. Rating	Position of Roxtec Sleeve-it pipe penetrations when fitted in steel decks
Polyethylene (PE) ^(b)	320 ^(a)	A-60	Fire exposed side (insulated side) ^(b)
Polyethylene (PE) ^(c)	225 ^(c)	A-60	Fire exposed side (insulated side) or unexposed side ^(d)
Polybutylene (PB) ^(c)	125 ^(c)	A-60	Fire exposed side (insulated side) or unexposed side ^(d)
Polybutylene (PB)	225mm	A-60	Fire exposed underside (insulated side) ^(b)



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Table 3: Tested arrangements in A-60 Class Steel Decks (continued)

Wavin SI-Tech Silent Soil Polypropylene (PPr) pipe	50	A-60	Fire exposed side (insulated side) ^(b)
Wavin SI-Tech Silent Soil Polypropylene (PPr) pipe	110	A-60	Fire exposed side (insulated side) ^(b)
Polypropylene (PPr) ^(c)	169 ^(c) /110	A-60	Fire exposed side (insulated side) for 169mm dia pipe or unexposed side for 110mm dia pipe ^(d)
uPVC	160	A-60	Fire exposed side (insulated side) or fire unexposed side ^(d)
ABS ^(b)	110	A-60	Fire exposed side (insulated side) ^(b)
George Fischer Multi-Layer Pipe [Polyethylene (PE)/Aluminium/Polyethylene (PE)]	32	A-60	Fire exposed side (insulated side) ^(d) or Fire unexposed side
Multi-pipe (PE) with Armaflex lagging	75	A-60	Fire exposed side (insulated side) or fire unexposed side ^(d)
S&Q Multi-pipe penetration plate ^(b)	75 (uPVC) 25 (PB)	A-60	Fire exposed side (insulated side) ^(b)
Sleev-it Combination Pipe Penetration, (Type: "SLV75M") ^(b) Polypropylene(PP)/ Polyvinyl Chloride (PVC) / Polypropylene(PP)	48 (PP)/ 25.4(PVC)/ 22(PP)	A-60	Fire unexposed side (insulated side) ^(b)
Sleev-it Combination Pipe Penetration ^(b) , (Type: "SLV75M") "I-Fit" Polyethylene-Aluminium- Polyethylene [PE-AL-PE]/ Polyvinyl Chloride (PVC)/ Polypropylene(PP)	50 "I-Fit" (PE/AL/PE)/ 25.4 PVC 22 PP	A-60	Fire exposed side (insulated side) ^(b)
Sleev-it Meyer Werft Cabin Collar, Type: Sleeve-it-MW-MAR-25M-D (95mm long x 44mm dia x 3.5mm thick steel sleeve and 64mm dia x 3mm thick welded steel flange)	25 O.D, Viega Sanfix Fosta pipe (PE/AL/PE)	A-60	Fire exposed side (insulated side) ^(b) ^(e)
Poloplast POLO KAL NG ^(b) (PP-C / PP-TV / PP-C) (Polypropylene)	200	A-30	Fire exposed side (insulated side) ^(b)
Poloplast POLO KAL NG ^(b) (PP-C / PP-TV / PP-C) (Polypropylene)	40	A-30	Fire exposed side (insulated side) ^(b)
Poloplast POLO KAL NG ^(b) (PP-C / PP-TV / PP-C) (Polypropylene)	40	A-60	Fire unexposed side ^(b)
Poloplast POLO KAL NG ^(b) (PP-C / PP-TV / PP-C) (Polypropylene) in POLO KAL NG DECK COLLAR	75	A-60	Fire unexposed side ^(b)



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Table 3: Tested arrangements in A-60 Class Steel Decks (continued)

George Fischer CPVC (Chlorinated ^(b) Polyvinyl chloride)	322	A-30	Fire exposed side (insulated side) ^(b) ; to be used in in conjunction with 400mm OD x130mm deep Sleeve-It Penetration with 2 sets of 10 off x 2.5mm thick x 60mm wide Intumex L. In addition, 25mm thick, 100kg/m ³ approved insulation is to be fitted to fully cover the sides and end face of the penetration on the fire exposed side.
George Fischer CPVC (Chlorinated Polyvinyl chloride) ^(b)	322	A-60	Fire unexposed side ^(b) ; to be used in conjunction with 400mm OD x130mm deep Sleeve-It Penetration with 2 sets of 10 off x 2.5mm thick x 60mm wide Intumex L. In addition 600mm x 600mm x 40mm thick 100kg/m ³ approved insulation is to be fitted to fully cover the end face of the insulation on the fire exposed side (underside)
George Fischer CPVC (Chlorinated Polyvinyl chloride) ^(b)	270	A-30	Fire exposed side (insulated side) ^(b) ; to be used with a 355mm diameter x 120mm deep x 1mm thick Sleeve-It Penetration with 2 sets of 10 off x 2.5mm thick x 60mm wide Intumex L. In addition 25mm thick, 100kg/m ³ density approved insulation is to be fitted to fully cover the sides and end face of the penetration on the fire exposed side
George Fischer CPVC (Chlorinated Polyvinyl chloride) ^(b)	270	A-60	Fire exposed side (insulated side) ^(b) ; to be used with a 355mm diameter x 120mm deep x 1mm thick Sleeve-It Penetration with 2 sets of 10 off x 2.5mm thick x 60mm wide Intumex L. In addition 600mm x 600mm x 40mm thick 100kg/m ³ approved insulation is to be fitted to fully cover the end face of the insulation on the fire exposed side (underside)
George Fischer CPVC (Chlorinated Polyvinyl chloride) ^(b)	20	A-30	Fire exposed side (insulated side) ^(b)
George Fischer CPVC (Chlorinated Polyvinyl chloride) ^(b)	20	A-60	Fire exposed side (insulated side) ^(b)
George Fischer Sea Drain Fuseal Plus [Polyvinylidene Fluoride (PVDF)] ^(b)	169	A-30	Fire exposed side (insulated side) ^(b)
George Fischer Sea Drain Fuseal Plus [Polyvinylidene Fluoride (PVDF)] ^(b)	169	A-60	Fire unexposed side ^(b)



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Table 3: Tested arrangements in A-60 Class Steel Decks (continued)

George Fischer Sea Drain Fuseal Plus [Polyvinylidene Fluoride (PVDF)] ^(b)	40	A-30	Fire exposed side (insulated side) ^(b)
George Fischer Sea Drain Fuseal Plus [Polyvinylidene Fluoride (PVDF)] ^(b)	40	A-60	Fire unexposed side ^(b)
Davis Polypro Tube NP6(Homo) ^(b) (Polypropylene)	225	A-30	Fire exposed side (insulated side) ^(b)
George Fischer Polybutylene ^(b)	200	A-30	Fire exposed side ^(b)
George Fischer Multi-Layer Pipe [Polyethylene (PE)/ Aluminium/ Polyethylene (PE)] ^(b)	63	A-60	Fire exposed side (insulated side) or Fire unexposed side ^{(b) (f)}
'Bevex Coated Python' Multipipe (PE) with Armaflex lagging ^(b)	100	A-30	Fire exposed side (insulated side) ^(b)
'Bevex Coated Python' Multipipe (PE) with Armaflex lagging ^(b)	100	A-60	Fire unexposed side ^(b)
JRG Sanipex MT® PE-X / AI / PE-X ⁽ⁱ⁾	16 x 2.25	A-60	Fire exposed side (insulated side) or Fire unexposed side
JRG Sanipex MT® PE-X / AI / PE-X ⁽ⁱ⁾	63 x 4.5	A-60	Fire exposed side or unexposed side, with an additional 150mm diameter A-60 insulation collar fitted around the pipe on the underside of the deck
Aquatechnik Multi-calor PE/ALU/PE ⁽ⁱ⁾	16 x 2	A-60	Fire exposed side (insulated side) or Fire unexposed side
Aquatechnik Multi-calor PE/ALU/PE ⁽ⁱ⁾	63 x 4.5	A-60	Fire exposed side (insulated side) or Fire unexposed side
Aquatechnik Multi-calor PE/ALU/PE ⁽ⁱ⁾	16 x 2	A-60	Fire exposed side (insulated side) or Fire unexposed side (for refrigerated services only, see note g)
Aquatechnik Multi-calor PE/ALU/PE ⁽ⁱ⁾	63 x 4.5	A-60	Fire exposed side (insulated side) or Fire unexposed side (for refrigerated services only, see note g)
GF Alupex PE/ALU/PE ⁽ⁱ⁾	16 x 2.25	A-60	Fire exposed side (insulated side) or Fire unexposed side
GF Alupex PE/ALU/PE ⁽ⁱ⁾	63 x 4.5	A-60	Fire exposed side (insulated side) or Fire unexposed side, with an additional 150mm diameter A-60 insulation collar fitted around the penetration or pipe (as applicable) on the underside of the deck
COES Blue Power Polypropylene, PPR ⁽ⁱ⁾	32 x 3	A-60	Fire exposed side (insulated side) or Fire unexposed side
COES Blue Power Polypropylene, PPR ⁽ⁱ⁾	110 x 8	A-60	Fire exposed side (insulated side) or Fire unexposed side



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Table 3: Tested arrangements in A-60 Class Steel Decks

TECE Multi-Layer Pipe PE-Xc/ALU/PE ^(b)	16mm x 2mm	A-60	Fire exposed underside (insulated side) or Fire unexposed side
TECE Multi-Layer Pipe PE-Xc/ALU/PE ^(b)	63mm x 6mm	A-60	Fire exposed underside (insulated side) or Fire unexposed side

(a) Minimum size of Sleeve-it pipe penetrations for PE pipes 226mm to 320mm diameter: 322mm (inner dia) x 122mm deep x 1mm thick

(b) For applications in steel decks only

(c) The maximum pipe diameter allowed for aluminium deck applications is 125mm

(d) Roxtec Sleeve-it pipe penetrations must be fitted to the fire exposed side (underside) of the aluminium decks in all cases

(e) The Viega coupling and the plastic pipe on the fire unexposed side (topside) of the deck to be wrapped with 15mm thick Armaflex Class 'O' insulation, for a minimum height of 180mm from the top of the deck

(f) The "KaiflexR ST19X060" closed cell elastomeric insulation used in conjunction with these penetrations is to be separately approved for specific services

(g) Pipes insulated with Kaiflex thermal insulation are restricted for refrigerated services (refrigeration systems and chilled water piping for air conditioning) only. Kaiflex thermal insulation to be separately approved for low flame spread characteristics in accordance with IMO FTP Code Annex 1, Part 5.

(i) Pipe penetration insulation arrangements for JRG Sanipex MT® PE-X / AI / PE-X, Aquatechnik Multi-calor PE/ALU/PE and GF Alupex PE/ALU/PE pipes (pipe diameters 16mm to 63mm) and COES BluePower Polypropylene, PPR (pipe diameters 32mm to 110mm) are generally as described in Roxtec Drawings S1513949B, S1508062D, S1512673B and S1508063D respectively.

9. The intumescent material to be used in the Sleeve-it Pipe Penetrations are as described in table 4

Table 4: Specifications for the intumescent materials

Maximum Diameter of ABS, PE, PPr, PB, uPVC Pipes, as applicable	No: of sets of intumescent to be used inside the penetration	Type of Intumescent Material	Thickness and Width of Intumescent layer	No: of Layers	Colour Code
16mm	1	TRP 345	1.8mm, 60mm	2	Black
20mm to 50mm	1	TRP 345	1.8mm, 60mm	3	Black
63mm	1	TRP 345	1.8mm, 60mm	4	Black
63mm	1	Intumex	2.5mm, 60mm	3	Dark Grey
75mm to 90mm	1	Intumex	2.5mm, 60mm	4	Dark Grey
110mm to 125mm	1	Intumex	2.5mm, 60mm	5	Dark Grey
160mm	1	Intumex	2.5mm, 60mm	6	Dark Grey



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Table 4: Specifications for the intumescent materials (continued)

225mm	1	Intumex	2.5mm, 60mm	8	Dark Grey
320mm	1	Intumex	2.5mm, 120mm	10	Dark Grey
Multi-layer Pipe, 32mm dia.	1	TRP 345	1.8mm, 60mm	3	Black
Sleev-it Combination Pipe Penetrations	1	Intumex	2.5mm, 60mm	4	Dark Grey
		Type: "Maflowrap moulding compound 1190" may also be used in these penetrations			
PVC Coated Steel Spiral pipe, 40mm	1	TRP 345	1.8mm, 60mm	3	Black
COES Blue Power Polypropylene, PPR, 125mm	1	Intumex	2.5mm, 60mm	5	Dark Grey
Sleev-it Meyer Werft Cabin Collar, Sleeve-it-MW-MAR-25M-D, with 25mm Viega Sanfix Fosta pipe	1	TRP 345	1.8mm, 60mm	2	Black
George Fischer CPVC (Chlorinated Polyvinyl chloride) above 20mm to 322mm dia	2	Intumex	2.5mm thick x 60mm wide Intumex L	10	Dark Grey

10. A modified arrangement of the Roxtec Sleeve-it pipe penetration called a "Sleev-it transition collar from steel to plastic pipe" may be used to connect a plastic pipe and a steel pipe passing through the steel bulkheads. The transition collar must be completely covered with A-60 insulation and secured to the steel pipe using a "Sleev-it Ring Clamp". Additionally, the steel pipe must be fitted with A-60 insulation for a minimum distance of 450mm from each side of the bulkhead. The details of the tested arrangements of the "Sleev-it transition collar from steel to plastic pipe" for steel bulkhead applications are as described in table 5

Table 5: Tested arrangements for "Sleev-it transition collar from steel to plastic pipe" in A-60 Steel Bulkheads

Type of plastic, tested diameter	Steel pipe diameter	Maximum Rating	Type of Sleeve-it transition collar tested	Position of Sleeve-it transition collar	Type of intumescent, Thickness x Width, No: of layers
"Blue power" Flame retardant PPr pipe, 50mm	50mm	A-60	Sleeve type, 65mm dia, 110mm deep	Fire Exposed side or Non-fire exposed side	TRP 345, 1.8mm x 60mm, 3 layers
"Sea Drain" Polypropylene PPr, 90mm	75mm	A-60	Sleeve type, 110mm dia, 110mm deep	Fire Exposed side or Non-fire exposed side	Intumex, 2.5mm x 60mm, 4 layers

11. The "Sleev-it transition collar from steel to plastic pipe" may be used on the fire exposed side (underside) of steel decks to join a plastic pipe either directly to a stainless steel scupper pot or to a steel pipe or a plastic pipe passing through the stainless steel scupper pot. The scupper pot must be completely covered with A-60 insulation and the Sleeve-it transition collar secured to the steel pipe or to the stainless steel scupper pot using a "Sleev-it Ring Clamp". The details of the tested arrangements of the "Sleev-it transition collar from steel to plastic pipe" for steel deck applications are as described in table 6



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Table 6: Tested arrangements for "Sleeve-it transition collar from steel to plastic pipe" in A-60 Steel Decks

Pipe above the deck/Scupper/ tested diameter	Pipe below the deck, tested diameter	Max. Rating	Type of Sleeve-it transition collar tested	Position of Sleeve-it transition collar	Type of intumescent, Thickness x Width, No: of layers
"Blue power" Flame retardant PPr pipe 75mm dia, through fully insulated "Fincantieri" stainless steel scupper; Ref: 584584-5SS (128mm dia x 170mm deep)	"George Fischer Seadrain" PPr pipe, 90mm	A-60	Sleeve type, 90mm dia, 110mm deep	Fire exposed side	Intumex, 2.5mmx 60mm, 3 layers
Fully insulated "Fincantieri" Stainless steel scupper; Ref: 584584-5ES (160mm dia x 265mm deep)	"Blue power" Flame retardant PPr pipe, 75mm	A-60	Box type, "SLV 75M-75T", (240mm W x 185mmH x110mm D)	Fire exposed side	Intumex, 2.5mmx 60mm, 3 layers
Fully insulated "Fincantieri" Stainless steel scupper; Ref: 584582-SS (128mm dia x 170mm deep)	"Blue power" Flame retardant PPr pipe, 50mm	A-60	Sleeve type, 50mm dia, 110mm deep	Fire exposed side	TRP 345, 1.8mm x 60mm, 3 layers
Stainless steel pipe, 50mm dia through fully insulated "Fincantieri" Stainless steel scupper; Ref: 584582-ES (128mm dia x 210mm deep)	"George Fischer Seadrain" PPr pipe, 48mm	A-60	Box type, "SLV 50M-50T" (205mm Wx160mm H x 80mm D)	Fire exposed side	TRP 345, 1.8mm x 60mm, 3 layers
Fully insulated "Fincantieri" Stainless steel elbow scupper" (160mm dia x 190mm deep x 3mm thick),	Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene), 75mm	A-60	Sleeve type, 100mm dia, 135mm deep	Fire exposed side	Intumex, 2.5mmx 60mm, 3 layers
Fully insulated "Fincantieri" Stainless steel straight scupper" (130mm dia x 190mm deep x 3mm thick)	Poloplast POLO KAL NG (PP-C / PP-TV / PP-C) (Polypropylene), 50mm	A-60	Sleeve type, 65mm dia, 135mm deep	Fire exposed side	TRP 345, 1.8mm x 60mm, 3 layers

12. Production items are to be manufactured in accordance with a quality control system which shall be maintained to ensure that items are of the same standard as the approved prototype



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NOTES

- Two pipes; 160mm dia. PB and 16mm uPVC fitted with Sleeve-it pipe penetrations and Sleeve-it intumescent sealant, were subjected to a hydrostatic test and an air pressure test of 1 bar and 0.02 bar respectively and no leakage was reported after 30 minutes, as detailed in the DNV Test Report No.LDN-08-045 dated 31 January 2008. In all cases, the intumescent sealant was applied to seal the penetration on both sides of the penetration and the test pressures were applied from either side.
- Two pipes; 110mm dia. uPVC and 16mm PE fitted with Sleeve-it pipe penetrations, type: "Sleeve-it Plate collars" comprising Sleeve-it EPDM rubber seals, type: "SLV EDPM Grommet", were subjected to a hydrostatic test and an air pressure test at 3.5 bar and 1 bar respectively and no leakage was reported after 30 minutes, as detailed in Lloyd's Register Test Witness Certificate No: SOU 0901586/1 dated 08 January 2010. The "Sleeve-it Plate collars" may be fitted on any one side of the division
- The above penetration systems are not to be used for penetrating tank boundaries
- When requested to be used in watertight bulkheads on passenger ships and Special Purpose Ships (SPS), the above penetration systems should be verified for compliance with the requirements given in SOLAS Chapter II-1 Reg.13.2.3 (2009 issue). The above penetration systems have not been approved according to this paragraph
- Stainless steel scupper pots that are of equivalent specification as the type approved specimens mentioned in table 6 above, may be accepted for specific applications in ships on a case-by-case basis, subject to the condition that they are fully protected with an approved A-60 Class insulation system in all cases
- Roxtec Sleeve-it penetrations may also be accepted for applications in B-15 Class divisions

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