

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, Karkskrona, Sweden
Type	CABLE AND PIPE PENETRATION (STANDARD FIRE TEST)
Description	Rectangular Penetrations for Electric and Fibre Optic Cables and Metal Pipes– Type: "S-Series" Steel Frames for applications in steel bulkheads and decks
Trade Name	S-Series
Specified Standard	IMO Res.MSC.61(67)-(FTP Code), Annex 1 Part 3 IMO MSC/Circ.1120 IMO Res. MSC.307 (88)-(2010 FTP Code) IMOMSC.1/Circ.1488

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Certificate Of Fire Approval

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 EMEA of any modification or changes to the equipment in order to obtain a valid Certificate.

The Design Appraisal Document and its supplementary Type Approval Terms and Conditions form 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.

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ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F150098-M3-05

The undernoted documents have been appraised for compliance with the relevant requirements of International Conventions.

This Design Appraisal Document forms part of the Certificate.

This certificate is a renewal of SAS F150098/M3

APPROVAL DOCUMENTATION

Tests in accordance with IMO Res. MSC.61(67) -(FTP Code) Annex 1 Part 3:

SP Laboratory, Boras, Sweden; Fire Test Reports No: P602999 and P603000 both dated 23 January 2007, PX05454 dated 30 September 2010. Research Institute of Marine Engineering (RIME), Tokyo, Japan; Fire Test Reports No: 09-344(E) dated 20 January 2009 and 09-346(E) dated 27 February 2009. Danish Institute of Fire and Security Technology, Hvidovre, Denmark; Fire Test Reports No: PGA10024 dated 21 December 2011 and PGA10025 dated 22 December 2011.

Tests in accordance with IMO Res. MSC.307 (88) -(2010 FTP Code) Annex 1, Part 3:

SP Technical Research Institute of Sweden, Fire Test Report Nos: 4P04959 dated 24 March 2015. Danish Institute of Fire and Security Technology, Hvidovre, Denmark; Fire Test Reports No: PGA10651 and PGA10652 both dated 3 July 2015, PGA10723A dated 4 February 2016 (penetrations A, B & C only), PGA11301A dated 22 November 2018 and PGA11302A dated 16 January 2019. Ship Design and Research Centre S.A. (Centrum Techniki Okrętowej S.A.), Gdansk, Poland; Fire test reports No: RS-17/B-177/E dated 26 May 2017, RS-18/B-293/E dated 13 September 2018, RS/18/B-484/E dated 10 December 2018 and RS-19/B-035/E dated 25 February 2019.

Manufacturer's drawings (For reference only; product installation and insulation arrangements to be in accordance with Conditions of Certification as described below. Additionally, where differences exist between the drawings and the Certificate, the information in the Certificate must be considered correct and applied):

S1038643 Rev C, S1041697 Rev D, S1540128 Rev A and S1038666 Rev D.

CONDITIONS OF CERTIFICATION

Cable Penetrations

1. For applications in A-60 Class steel bulkheads and decks with insulation arrangements generally as described in manufacturer's guidance drawings no: S1038643 Rev C and S1041697 Rev D. Final insulation arrangements onboard are to be approved by the final project authority on a case-by-case basis
2. For applications in A-0, A-15, A-30 Class steel bulkheads and decks, all penetrations tested only in A-60 Class divisions are to be fitted with the same or equivalent A-60 Class insulation arrangements as those used in the fire tests (including any insulation fitted on the penetration itself in the tests) for a minimum distance of 200mm around the penetration, on both sides in bulkheads and on the underside in decks and insulation should be extended to cover the full side(s) and the end face(s) of the steel frame, with an overlap of at least 20mm from the steel edges. The above mentioned A-60 Class insulation arrangements should be additional to any thermal or acoustic insulation, but may include any fire rated insulation (e.g. A-15, or A-30) already fitted on the bulkhead or deck and/or on the penetration itself, such that the total fire rating is A-60

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3. The following penetrations in Table 1 below were tested separately in A-0 Class divisions and therefore they may be accepted in A-0 Class divisions with as-tested arrangements as described below in lieu of the above requirements

Insulation arrangements for these transits is generally as described in Roxtec drawing: S1540128 Rev A

Table 1: Approved arrangements in A-0 Class steel bulkheads and decks (as applicable)

Penetration Size	Application (Bulkheads/Decks)	Position of Penetration in Division	Approximate Cable Fill Ratio	Minimum Insulation Arrangements Required for A-0 Divisions
S1x1to S8x1 ^(a)	Bulkheads	Symmetrical	(2010 FTP Code) 40% (electric and fibre optic cables)	Additional insulation not required on or around the penetration
S 1x1 to S 8x1	Decks	Symmetrical	(2010 FTP Code) 5% to 11.5% (electric cables)	Additional insulation not required on or around the penetration
S 1x1 to S8+8x3 ^(b)	Decks	Symmetrical	(2010 FTP Code) 40% (electric and fibre optic cables)	To be fitted with a 100mm diameter A-60 insulation collar around the penetration on the underside
S2x1 to S8+8x3 ^(b)	Decks	Non-symmetrically to the fire unexposed side (topside) of the deck	(2010 FTP Code) 40% (electric and fibre optic cables)	Additional insulation not required on or around the penetration

- a. S2x1 to S8x1 may be accepted with fibre optic cables in A-0 bulkheads. Maximum fibre optic cable diameter approved for S2x1 is 5mm and for S8x1 is 18mm
 - b. S2x1 to S8+8x3 may be accepted with fibre optic cables in A-0 decks. Maximum fibre optic cable diameter approved for S2x1 is 5mm and for S8+8x3 is 88mm
4. Minimum size of penetration approved for general applications ^(a) in A-60 Class steel bulkheads and decks: S 1x1
 5. Maximum size of penetration approved for general applications in steel bulkheads and decks: S 8x1 and multiples thereof to a maximum size equivalent to S 8+8x3 (for applications in A-60 bulkheads and decks) and up to S 8+8+8x10 (for applications in A-30 bulkheads only)
 6. Penetrations greater than S 8+8x3 and up to S 8+8x7 are approved for restricted applications ^(b) in A-60 Class steel decks only, with the penetration fitted non-symmetrically to the fire unexposed side (topside) of the steel deck in all cases
 7. Penetrations up to the size of S8x3 are approved for use in A-60 Class beam floors of minimum height 16" (404.4mm), consisting of 7 layers of (50mm, 120kg/m3) Rockwool Firebatt insulation or equivalent
 8. "S series" cable transits consist of: Roxtec mild steel frames 10mm thick, filled with 60mm thick RM, Standard or EMC types (ES, PE, BG, BGB), around the cables and welded/bolted to the steel bulkhead or deck. Roxtec RM FOC modules, comprising intumescent seal for sealing fibre optic cable conduits, may also be used in transits in conjunction with the RM Modules and derivations described above for sealing electric cables.
 9. Approval of cable transits restricted for use with the as-tested cable types of up to the maximum size tested in each transit in accordance with Paragraph 2.2.6.1 in the 2010 FTP Code, Appendix 2, A.IV - Cable Transits. The maximum cable size for any intermediate transits to be proportional to the transit size and may be determined by linear interpolation based on the internal cross-sectional area of the transits and acceptable to the final Project Authority

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10. Approved Frame types: S, SO, SF, SFO, SK, SR, SRC, r20 & r40 and BTB
- (a) General applications refer to installation arrangements where the penetrations are fitted either symmetrically or non-symmetrically on the fire exposed side or fire unexposed side of the bulkhead or deck
 - (b) Restricted applications refer to installation arrangements where the penetrations are fitted non-symmetrically on the insulated side of the bulkhead or topside of the deck in all cases

Pipe Penetrations

1. For applications in A-60 Class steel bulkheads and decks, with insulation arrangements generally as described in manufacturer's guidance drawings no: S1038666 Rev D. Final insulation arrangements onboard are to be approved by the relevant project authority on a case-by-case basis
2. For applications in A-0, A-15, A-30 Class steel bulkheads and decks, all penetrations tested only in A-60 Class divisions are to be fitted with the same or equivalent A-60 Class insulation arrangements as those used in the fire tests (including any insulation fitted on the penetration itself in the tests) for a minimum distance of 200mm around the penetration, on both sides in bulkheads and on the underside in decks and insulation should be extended to cover the full side(s) and the end face(s) of the steel frame, with an overlap of at least 20mm from the steel edges. The above mentioned A-60 Class insulation arrangements should be additional to any thermal or acoustic insulation, but may include any fire rated insulation (e.g. A-15, or A-30) already fitted on the bulkhead or deck and/or on the penetration itself, such that the total fire rating is A-60
3. Consists of: Roxtec mild steel frames 10mm thick, filled with 60mm thick RM modules around the pipes and welded/bolted to the steel bulkhead or deck. Penetrations with copper and bundle pipes are approved for general applications ^(a) and penetrations with steel pipes are approved for restricted applications ^(b) with the penetration fitted to the upper side of the deck or to the insulated side of the bulkhead
4. Minimum size of penetration for use with steel pipes approved for restricted applications in A-60 Class steel bulkheads and decks: S 1x1. Maximum steel pipe diameter tested: 50mm
5. Maximum size of steel pipe penetration approved for restricted applications in A-60 Class steel bulkheads and decks: S 8x1. Maximum steel pipe diameter tested: 50mm
6. Minimum size of copper pipe penetration approved for general applications in A-60 Class steel bulkheads and decks: S 2x1. Maximum copper pipe diameter tested: 28mm
7. Maximum size of copper pipe penetration approved for general applications in A-60 Class steel bulkheads and decks: S 8x2. Maximum copper pipe diameter tested: 54mm
8. Minimum size of bundle pipe penetration approved for general applications in A-60 Class steel bulkheads and decks: S 2x1. Maximum bundle pipe diameter tested: 20mm
9. Maximum size of bundle pipe penetration approved for general applications in A-60 Class steel bulkheads and decks: S 8x2. Maximum bundle pipe diameter tested: 50mm
10. Insulation arrangements for individual penetrations, including minimum insulation lengths for each type of pipe to be as per manufacturer's guidance drawings no: S1038666 Rev D. Final insulation arrangements onboard are to be approved by the relevant project authority on a case-by-case basis

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11. Approved Frame types: S, SO, SF, SFO, SK, SR, SRC, r20 & r40 and BTB
- (a) General applications refer to installation arrangements where the penetrations are fitted either symmetrically or non-symmetrically on the fire exposed side or fire unexposed side of the bulkhead or deck
 - (b) Restricted applications refer to installation arrangements where the penetrations are fitted non-symmetrically on the insulated side of the bulkhead or topside of the deck in all cases

NOTES (For information only; outside the scope of this certificate)

1. Penetrations described in the Notes below are not suitable for tank boundaries or similar applications where they can be subject to frequent immersion in fluids
2. Single frame "S Series" Cable and Pipe penetration seals, types: "S-2x1", "S 6x1" and "SRC-20 6x1" were subjected to a gas pressure test at 4 bar for a period of 30 minutes with no leakage and a hydrostatic pressure of 6 bar for a period of 30 minutes with no leakage as detailed in DNV Report No. MLM 020133 dated 26 February 2002. Such arrangements may be considered to prevent flooding or maintain gastight requirements on a ship approval basis
3. An indicative fire test was conducted on a type: "S BTB 8x1" cable penetration for 60 minutes, after cooling the specimens were subjected to a hydrostatic test of 2 bar, held for 30 minutes, without any reported leakage. All detailed in Roxtec Test Report No. 101108 for test conducted at their test facilities and all witnessed by DNV Surveyor and detailed in their survey report No. 40007014 dated 4 March 2011. The penetration device consisted of a back to back Roxtec "S" seal fitted to both ends of a 200mm long fully insulated steel sleeve with an approved A-60 insulation system as shown in drawing No: S1023416, Rev. A. These results may only be considered for applications onboard ships constructed before 1 January 2020
4. Single frame "S Series" Cable penetration seal, type: "S-8x1", was subjected to a gas pressure test at 4 bar for a period of 30 minutes with no leakage and a hydrostatic pressure of 6 bar for a period of 60 minutes with no leakage as detailed in DNV Report No. MLM 020106 dated 19 December 2001. Such arrangements may be considered to prevent flooding or maintain gastight requirements on a ship approval basis
5. Single frame "S Series" steel pipe penetration seals, type: "S-2x1" and "S-6x1" were subjected to a gas pressure test at 4 bar for a period of 30 minutes with no leakage and a hydrostatic pressure of 6 bar for a period of 60 minutes with no leakage as detailed in DNV Report No. MLM 020133 dated 26 February 2002. Such arrangements may be considered to prevent flooding or maintain gastight requirements on a ship approval basis
6. Single frame "S Series" steel pipe penetration seals, type: "S-8x1" were subjected to a gas pressure test at 4 bar for a period of 30 minutes with no leakage and a hydrostatic pressure of 6 bar for a period of 60 minutes with no leakage as detailed in DNV Report No. MLM 020400 dated 25 March 2002. Such arrangements may be considered to prevent flooding or maintain gastight requirements on a ship approval basis
7. Single frame "S Series" cable transit types: "S2-x1" and "S-8x1" with Roxtec FOC modules sealing fibre optic cable conduits installed with standard RM Modules, were subjected to a hydrostatic pressure of 3bar for 60minutes followed by helium gas pressure of 1bar for 30minutes without any reported leakage, as detailed in DNV Statement No: N141805F dated 27 February 2018. Such arrangements may be considered to prevent flooding or maintain gastight requirements on a ship approval basis

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Supplementary Type Approval Terms and Conditions

This certificate and Design Appraisal Document relates to type approval, it certifies that the prototype(s) of the product(s) referred to herein has/have been found to meet the applicable design criteria for the use specified herein, it does not mean or imply approval for any other use, nor approval of any products designed or manufactured otherwise than in strict conformity with the said prototype(s).