

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	FireSeal AB
Address	Esbogatan 14, 164 74 Kista, Sweden
Type	PIPE PENETRATION (BLAST TEST + HYDROCARBON FIRE TEST)
Description	Pipe Penetration Types: 'Flex Blanket System'
Trade Name	'Flex Blanket System'
Specified Standard	Blast overpressure testing (reference Gexcon-21-F101310-RA-1) IMO Res. MSC.307(88) (2010 FTP Code) Annex 1 Part 3 with a modified hydrocarbon fire curve as per NMD regulations issued June 1 1999.

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 Canada Limited 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.

DESIGN APPRAISAL DOCUMENT

ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. LR21450083SF

The undernoted documents have been appraised for compliance with the relevant requirements of International Conventions, and this Design Appraisal Document forms part of the Certificate.

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TEST REPORTS

Blast Test report

Gexcon AS, Bergen Norway test report reference Gexcon-21-F101310-RA-1 dated 14th June 2021.

Fire Test report

Research Institute of Sweden (RISE), Boras Sweden, test report reference 0100410-149040 dated 9th July 2021.

Construction Drawings

Installation sheet_Flex Blanket System FS-TP2109-02 dated 8th September 2021 and Fire Sealing 07-007-51-1001.101 rev F1 dated 21st July 2021.

Test Overview

Specimens of pipe penetrations in an H-120 bulkhead (tested in Interdam Generation II blast wall) protected by Fireseal flex blanket system were subjected to a blast overpressure, the same specimens then underwent an H-class fire test.

CONDITIONS OF CERTIFICATION

1. When used in conjunction with suitably insulated blast resistant H-120 bulkheads:
2. System consists of a 3mm thick steel sleeve 250mm in length insulated on one sides of the bulkhead with layers of Firemaster Marine Plus Blanket. For full installation details please reference drawings referenced above.
3. Table 1 below gives the test summary for each specimen.

Pipe Size o.d (mm)	Sleeve size o.d. (mm)	Seal Length (mm)	Peak Overpressure (barg)	Primary Pressure Pulse Duration (ms)	Fire Rating post blast test
21.3	60.3	250	1.2-1.3	89-90	H-60
114	168.3	250	1.2-1.3	89-90	H-60
273	375	250	1.2-1.3	89-90	H-120

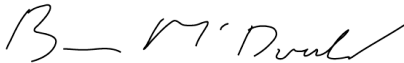
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3. Production items are to be manufactured in accordance with a quality control system which shall be maintained to ensure that items are of the same standard as the approved prototype.
4. The certificate holder is solely responsible for the products supplied under this Certificate and to ensure that their products, whether manufactured by themselves or their licensee manufacturers, if agreed by Lloyd's Register, are fully compliant with the relevant statutory regulations and Lloyd's Register Class rules as applicable and designed, manufactured and installed to the same quality and specifications as the prototype tested, including components that are designed and manufactured by third parties.
5. The test laboratory is solely responsible for all tests performed within the scope of this certificate and to ensure that the testing is conducted in full compliance with the relevant test standard, approved operational procedures, statutory regulations and Lloyd's Register requirements as applicable and to meet client objectives as per contractual agreements.

PLACE OF PRODUCTION

Fireseal AB
Esbogaten 14,
164 74 Kista
Sweden



Bruce McDonald
TSC Manager - Americas, Marine
Lloyd's Register Americas
Lloyd's Register EMEA

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).