Lloyd's Register

CERTIFICATE OF FIRE APPROVAL

This is to certify that

The product(s) detailed below will be accepted for compliance with the applicable Lloyd's Register Rules and Regulations for use on offshore installations classed with Lloyd's Register, and for use on offshore installations when authorised by contracting governments to issue the relevant certificates, licences, permits etc.

Manufacturer	Advanced Insulation Limited
Address	Quedgeley West Business Park Bristol Road, Hardwicke Gloucester, GL2 4PA United Kingdom (UK)
Type	**STRUCTURAL STEEL JET FIRE PROTECTION SYSTEM**
Equipment Description	Structural Steelwork protected with "Contraflex J180 EMC" composite jacket system for jet fires up to 180 minutes
Specified Standard	International Standard ISO 22899-1 "Determination of the Resistance to Jet Fires of Passive Fire Protection Materials, Part 1: General Requirements

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	6 April 2017	Expiry date	5 April 2022
Certificate No.	SAS F170073/M1	Signed	
Sheet No	1 of 4	Name	K. Taylor 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.

Lloyd's Register EMEA
71 Fenchurch Street, London, EC3M 4BS
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Document number
SAS F170073/M1

Issue number
1

DESIGN APPRAISAL DOCUMENT

Date	Quote this reference on all future communications
6 April 2017	SOUTSO/SFS/TA/KT/WP28292148

ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F170073/M1

This Design Appraisal Document forms part of the Certificate.

APPROVAL DOCUMENTATION

DNV-GL, Spadeadam Test Site, Cumbria, United Kingdom, Fire Test Report No. 1137VDY3-3, Rev. 1, dated 01 December 2016

Lloyd's Register Jet Fire Test Witness Certificate No. SOU1601307/A1, dated 19 January 2017

CONDITIONS OF CERTIFICATION

1. Applications to be based on a jet fire test performed on a 34.3mm jacketed panel insulation system: "Contraflex J180 EMC" structural steel jet fire protection system. See the 'Jet Fire Test Results' Section of this document for a detailed description of the systems configuration
2. The "Contraflex J180 EMC" jet fire protection system is suitable for applications on: load bearing structural steelwork not exceeding an Hp/A factor of $100m^{-1}$ (Where 'Hp' is the outside circumference and 'A' is the cross-sectional area); and non-load bearing steel divisions and structure with no specified temperature criteria
3. Suitably approved insulation is to be applied to any other part of the protected fire exposed surfaces not covered by this "Contraflex J180 EMC" jet fire protection system, in all cases. In particular, attention is to be paid to means of securing jacket boundaries and the prevention of heat bridging; an overlap of at least 100mm should be provided between the two systems
4. Applications in each case to be approved by Lloyd's Register at the design stage
5. 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

NOTES

1. The "Contraflex J180 EMC" structural steel jet fire protection system may be assigned a **Jet Fire Classification** based on ISO 22899-1: 2007(E), Section 15 (Jet Fire/Structural Steel/Critical Core Temperature/Minutes), depending on type of application, particular construction make-up of the insulation system and maximum core temperatures specified, in accordance with ISO 22899-1:2007(E) Section 15.4 Critical Temperature Rise as follows:

   - JF/Structural Steel/65/30
   - JF/Structural Steel/165/90
   - JF/Structural Steel/215/150
   - JF/Structural Steel/130/60
   - JF/Structural Steel/195/120
   - JF/Structural Steel/230/180

2. The "Classifications" listed above depend on the particular application, maximum core temperature required, in accordance with ISO 22899-1:2007(E), Section 15.4, the Critical Temperature Rise for load bearing steel structures is normally 400°C
3. No additional hydrocarbon fire tests were submitted by the manufacturer to demonstrate the relationship between hydrocarbon and jet fire test results, to enable variations in time/temperature criteria, jacket thickness or Hp/A values to be assessed

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TEST RESULTS FOR JET FIRE TESTED SPECIMEN
Test Results for Insulated Panel Section with a Web Section Feature

Test Description: A jet fire planar test was performed in accordance with ISO 22899-1:2007

Integrity: 180 minutes (protection remained intact for duration of test)

Insulation: The following maximum temperature rises were recorded on the specimen:

Thermocouple No. 04	after 30 minutes of exposure 64.8°C
Thermocouple No. 01	after 60 minutes of exposure 129.1°C
Thermocouple No. 01	after 90 minutes of exposure 166.2°C
Thermocouple No. 01	after 120 minutes of exposure 195.2°C
Thermocouple No. 01	after 150 minutes of exposure 215.7°C
Thermocouple No. 01	after 180 minutes of exposure 229.2°C

Classification: **"JF/ Structural Steel/230/180"** (assessed from maximum temperature of a panel specimen in jet fire test)

Description of Test Specimen: A 180 minute jet fire exposure test performed on a planar steel substrate, fitted with a "Contraflex J180 EMC" structural steel jet fire protection system. The test specimen comprised of: steel backplate 10mm thick fitted with a "Contraflex J180 EMC" jacketing system (34.3mm total nominal thickness) but with a 100mm vertical overlap joint to the right of the web section, secured by 304 stainless steel quilting pins at 75mm centres, fitted through the Alkaline Earth Silicate Wool, wire mesh, and E-Glass cloth. Quilting pins were a maximum of 50mm from edge boundaries. The "Contraflex J180 EMC" jacketing system consisted of 2 layers of 10mm 3M Interam E5A-4 Endothermic Mat, 1 layer of 0.5mm thick silicon coated E-Glass cloth, 1 layer of 13mm thick aluminium coated Alkaline Earth Silicate Wool (128kg/m³ Density), 1 layer of 0.3mm thick 304 stainless steel wire mesh (Wire Weaving, 566 micrometers Mesh Opening, 280 micrometers Wide Diameter), and 1 layer of 0.5mm thick Silicon coated E-Glass cloth

SCOPE

The test described in the procedure ISO 22899: Part 1 is one in which some of the properties of passive fire protection materials can be determined and is designed to give an indication of how passive fire protection materials will perform in a jet fire. The dimensions of the test specimen may be smaller than typical items of structure and plant and the release of gas may be substantially less than that which might occur in a credible event. However, individual thermal and mechanical loads imparted to the passive fire protection material, from the jet fire defined in the procedure described in ISO 22899: Part 1, have been shown to be similar to those by large-scale jet fires resulting from high pressure releases of natural gas

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Although the test method has been designed to simulate some of the conditions that occur in an actual jet fire, it cannot reproduce them all exactly and the thermal and mechanical loads do not necessarily coincide. The results of this test do not guarantee safety but may be used as elements of a fire risk assessment for structures or plant. This should also take into account all the other factors that are pertinent to an assessment of the fire hazard for a particular end use. This test is not intended to replace the hydrocarbon fire resistance test (ISO/TR 834-3/EN 1363-2 or equivalent) but is seen as a complimentary test

PLACES OF PRODUCTION

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Dubai
United Arab Emirates

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Keith Taylor
Senior Specialist
Aberdeen Technical Support Office
Marine & Offshore Lloyd's Register

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).