

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 Plc
Address	Rigestate, Station Road Berkeley Gloucestershire, GL13 9RL United Kingdom (UK)
Type	STRUCTURAL STEEL JET FIRE PROTECTION SYSTEM
Description	Structural Tubular Steel Sections, Cylindrical Vessels or Pipework protected with Type: "ContraFlame® JF 120-200" jet fire protection system, Classification: JF/Pipes/200/120
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 16 December 2011 Expiry date 15 December 2016

Certificate No. SAS F110443

Signed

Sheet No 1 of 4

Name

M. Farrier
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, its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this clause as the 'Lloyd's Register Group'. The Lloyd's Register Group assumes no responsibility and shall not be liable to any person for any loss, damage or expense caused by reliance on the information or advice in this document or howsoever provided, unless that person has signed a contract with the relevant Lloyd's Register Group entity for the provision of this information or advice and in that case any responsibility or liability is exclusively on the terms and conditions set out in that contract.

DESIGN APPRAISAL DOCUMENT

Date 16 December 2011	Quote this reference on all future communications LDSO/SFS/TA/MF
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ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F110443

This Design Appraisal Document forms part of the Certificate.

APPROVAL DOCUMENTATION

GL Noble Denton, Spadeadam Test Site, Cumbria, United Kingdom, Fire Test Report No: 11453, Issue 2, dated 17 July 2011

Manufacturer's Technical Data Sheet No: TDS JF120-200 01, Issue No: 01 dated 11 November 2011

Manufacturer's Application Procedure Document No: AP01.02 JF120-200, Issue No: 05 dated 22 June 2011

Lloyd's Register Certificate No. SOU 0600257/1 - for preparation inspection of test specimen.

CONDITIONS OF CERTIFICATION

1. Applications to be based on a 120 minute jet fire exposure test performed on a 219.1mm O.D, 6.3mm thick steel Tubular Section (Hp/A:165), coated with the "ContraFlame® JF120-200" system (Manufacturer's Technical Data Sheet No: TDS JF120-200 01, Issue No: 01 dated 11 November 2011), with a total nominal thickness 96mm.
2. Suitable for applications on tubular steel sections, pipes or cylindrical vessels of up to 500mm diameter, but not with corners or edge features and not exceeding an Hp/A factor of 165. (Where 'Hp' is the outside circumference and 'A' is the cross-sectional area)
3. The integrity performance criterion is assessed from the test results below (Table 1)
4. Minimum reinforcement material overlap: 150mm
5. Insulation to be applied to the fire exposed side in all cases.
6. For use in external locations only, where personnel are not normally present.
7. Use in internal locations may be considered for limited applications in modular spaces not normally manned.
8. Applications in each case to be approved by Lloyd's Register at the design stage. The preparation of the substrate, preparation of the coating system and onboard application to be as per Manufacturer's Application Procedure Document No: AP01.02 JF120-200, Issue No: 05 dated 22 June 2011 and to the satisfaction of the attending surveyor.
9. 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. Additional indicative hydrocarbon fire tests were conducted by the manufacturer to demonstrate the effects on performance of a high temperature substrate of 98 °C, as detailed in Lloyd's Register's witness Certificate No. SOU 0600314, dated 8 August 2006. However, these results have not been incorporated into this certificate.
2. The "ContraFlame® JF 120-200" Jet Fire Protection System may be assigned the Classification: "JF/Pipes/200/120" or similar notation depending on applications and maximum core temperatures, in accordance with ISO 22899-1:2007(E) Section 15.4 Critical Temperature Rise.

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TABLE 1 - TEST RESULTS FOR INSULATED TUBULAR SECTION (96mm thick)

Integrity:	121 minutes (Varying amounts of material from the outermost layer was seen to detach from the specimen from 30 minutes of the test; by the end of the test period of 121 minutes, the outermost layer had perished exposing the inner layer)
Insulation:	The following maximum temperature rises were recorded on the specimen:
	Thermocouple No. 19 after 30 minutes of exposure 1.2 °C
	Thermocouple No. 19 after 60 minutes of exposure 7.3 °C
	Thermocouple No. 13 after 90 minutes of exposure 24.9 °C
	Thermocouple No. 9 after 120 minutes of exposure 69.3 °C

DESCRIPTION OF TEST SPECIMEN

The tubular test specimen consisted of a 219.1mm O.D, 6.3mm thick, 3.0m long steel Tubular Section (Hp/A of 165), coated with the "ContraFlame ® JF120-200" system (Manufacturer's Technical Data Sheet No: TDS JF120-200 01, Issue No: 01 dated 11 November 2011). The tubular was protected with: 75mm of "C50-400" syntactic phenolic foam, 15mm of "C50-700" syntactic phenolic foam and 6mm of JF120-200 topcoat "D2004 GRP" system, (total nominal thickness 96mm). Minimum reinforcement material overlap: 150mm. No pipe flanges or visible joints were included in the test specimen.

Note: Although the overall diameter of the test specimen (including insulation) exceeded the test specimen design criteria in ISO 22899-1, Section 6.8, 350mm maximum outside diameter and this specimen was 411mm outside diameter, we considered the test results were consistent with previous jet fire tests of lower thickness and the same materials.

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.

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 complementary test.

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ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F110443

PLACE OF PRODUCTION

Advanced Insulation Systems
Quedgeley West Business Park
Bristol Road
Gloucester
Gloucestershire GL2 4PA
United Kingdom (UK)

Martin Farrier
Lead Specialist
Statutory Fire & Safety
London Design Support Office
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).