

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	Mech-Tool Engineering Ltd.
Address	Mech-Tool House Whessoe Road Darlington Co.Durham, DL3 0QT United Kingdom (UK)
Type	STRUCTURAL STEEL JET FIRE PROTECTION SYSTEM
Equipment Description	Fire Resisting Flexible Enclosure System – Type: "Safewrap" for Jet Fire Exposures.
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	24 June 2011	Expiry date	8 November 2015
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Certificate No.	SAS F100392/M1
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Signed



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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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DESIGN APPRAISAL DOCUMENT

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ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F100392/M1

This Design Appraisal Document forms part of the Certificate.

APPROVAL DOCUMENTATION

GL Noble Denton, Spadeadam Test Site, MoD R5, Cumbria, United Kingdom, Fire Test Report No: 10138, dated 26th July 2010 and No: 10895 dated 04 April 2011

Manufacturer's Drawing Nos: 70001-LR-0001-01 Rev 1, 70001-LR-0002-01 Rev 2, 70001-LR-0003-01 Rev 1, 70001-LR-0004-01 Rev 1, 70001-LR-0005-01 Rev 1, 70001-LR-0006-01 Rev 1, 70001-LR-0007-01 Rev 1 and 70001-LR-0008-01 Rev 2.

CONDITIONS OF CERTIFICATION

1. 'Safewrap' Flexible jacket insulation system to consist of : two layers of ceramic fibre insulation (25mm thick, 128kg/m³), with a layer of aluminium foil covering and one layer of ceramic fibre insulation (25mm thick, 128kg/m³), with a layer of stainless steel wire gauze (grade AISI 316L , 0.22mm diameter, 0.412mm opening), which has a minimum 75mm overlap folded around the edge, covered with an outer and inner layer of weather proof silicone coated glass cloth barrier (520g/m²); total thickness 65mm. All to be secured with stainless steel banding and latches at a maximum spacing of 200mm.
2. Suitable approved insulation is to be applied to any other part of the protected fire exposed surfaces not covered by the 'Safewrap' 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 150mm should be provided between the two systems.
3. The 'Safewrap' Jacket Fire Protection System is suitable for planar applications and cylindrical vessels, pipes and tubular sections including corners and edge features. The acceptance of the protection system to be based on the fire performance of the as-tested arrangements as detailed below.
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.

TUBULAR STEEL WORK JET FIRE TEST

Description of the test specimen:

219.1mm diameter steel pipe (12.7mm wall thickness) with a Hp/A Factor of 85 (where Hp is the exposed perimeter and A is the cross-sectional area of the protected item) was covered with Safewrap insulation jacket make up and design as shown in the Mech-Tool Engineering Ltd drawings 70001-LR-0001-01 Rev 1 and 70001-LR-0002-01 Rev 2. All secured with stainless steel banding (SS316, 12.7mm wide) and latches at a maximum spacing of 200mm.

The outer layer had a longitudinal joint with a minimum 100mm overlap, with the open edge and latches facing the jet-fire and with a circumferential butt joint located 500mm off centre. The butt joint was protected with a 600mm muff panel (of the same material as the jacket) centred on the joint.

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TEST RESULTS FOR THE TUBULAR TEST

Integrity: 120 minutes

Insulation: the following maximum temperatures were recorded

Thermocouple No. 19	after 30 minutes exposure	218.9°C
Thermocouple No. 06	after 60 minutes exposure	270.5°C
Thermocouple No. 01	after 90 minutes exposure	352.1°C
Thermocouple No. 01	after 120 minutes exposure	436.5°C

Ambient Temperature: 9.2°C

PLANAR STEEL WORK JET FIRE TEST

Description of the test specimen:

10mm thick steel panel specimen incorporating a 270mm wide x 270mm high x 250mm deep raised steel box section; all covered with 'Safewrap' Insulation Jacket, make up and design as shown in Mech-Tool Engineering Ltd drawings no: 70001-LR-0003-01 Rev 1, 70001-LR-0004-01 Rev 1, 70001-LR-0005-01 Rev 1, 70001-LR-0006-01 Rev 1, 70001-LR-0007-01 Rev 1 and 70001-LR-0008-01 Rev 2.

The 'Safewrap' insulation applied to the steel panels were 65mm thick and incorporated a vertical butt joint. The joint was protected using a 350mm wide cover strip of the same specification as the jacket system, secured to the main blanket system using stainless steel banding (SS316, 12.7mm wide) and latches at 150mm maximum vertical centres. The bands extending from each pin were overlapped and secured using two grub screw mechanisms.

The 'Safewrap' jacket system fitted around the raised box section comprised of the main blanket section, inner wrap spacer, outer wrap section, a top section and a continuous lid section; all secured using stainless steel banding (SS316, 12.7mm wide) and latches at a maximum spacing of 200mm. The stainless steel banding was secured to the blanket sections using fixing pins and washers; adjacent sections of steel banding were secured using screw drive fasteners and grub screw mechanisms.

TEST RESULTS FOR THE PLANAR TEST

Integrity: 122 minutes

Insulation: the maximum temperature rise recorded on the panel and in the raised box are identified below

Ambient Temperature: 7.6°C

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Panel

Thermocouple No. 01	after 30 minutes exposure	162.9°C
Thermocouple No. 01	after 60 minutes exposure	213.1°C
Thermocouple No. 01	after 90 minutes exposure	220.8°C
Thermocouple No. 01	after 120 minutes exposure	229.0°C

Box

Thermocouple No. 10	after 30 minutes exposure	25.7°C
Thermocouple No. 10	after 60 minutes exposure	58.4°C
Thermocouple No. 20	after 90 minutes exposure	100.5°C
Thermocouple No. 19	after 120 minutes exposure	164.9°C

NOTE

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.

SCOPE

Although the test has been designed to reproduce conditions similar to those found in large-scale jet fires resulting from realistic releases of hydrocarbons, it cannot guarantee a specific degree of protection from the myriad of possible jet fires. The Jet Fire Resistance Test, or indeed large-scale demonstrations, cannot therefore be used to confer a universal fire resistance rating for a specified time in the way that a standard furnace test confers a hydrocarbon rating. Hence this test does not give a rating analogous to the "H" rating derived from the hydrocarbon fire resistance test as detailed in ISO 834. This test is not intended to replace the hydrocarbon fire resistance test but is seen as a complementary test.

Although the method specified has been designed to simulate some of the conditions which occur in an actual jet fire, it cannot reproduce them all exactly. 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 which are pertinent to an assessment of the fire hazard for a particular end use.

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PLACE OF PRODUCTION

Mech-Tool Engineering Limited
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Whessoe Road
Darlington
Co. Durham, DL3 0QT
United Kingdom




Saji Abraham
Surveyor
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).