



Bilfinger Industrier Norge AS

## LAMBDA F FLEX JETFIRE JACKET (HD)

FLEXIBLE JACKET  
FIREPROOFING TECHNOLOGY

### Passive Fire Protection – Bilfinger Lambda Products

Lambda is the brand name used on all insulation products marketed by Bilfinger Oil & Gas. All products are designed and documented to be used in high risk environments within the oil & gas industry, nuclear power plants and process industry. The products have been developed and tested as a consequence of the rigorous requirements oil & gas industry, meeting NORSOK and ISO standards.

All Lambda products are highly recognized among professional engineers as "state of the art" insulation systems. Each product is tailor-made and pre-fabricated to fit the exact valve, flange or equipment to be protected.

In addition to meeting functional requirements, all products are designed for quick and easy removal and re-installation with a minimum use of personnel and tooling. Bilfinger Lambda is continuously and proactively recognizing customer demands and developing solutions to meet these requirements

### Lambda F Flex Jacket

Lambda F Flex Jacket is a flexible system designed to protect vessels, pipelines, valves, flanges, actuators, control lines and boxes. It is fully tested to meet the most rigorous on- and offshore specifications for oil and gas installations.

Our Fire Jacket system is built up by a core of insulation material and stainless steel foil, enclosed by a custom-built silicone fabric. The pieces are joined with Velcro in the overlap and the system is secured with stainless steel bands, ensuring the integrity of the insulation properties.

The system has been tested successfully for blast overpressure at 1.2 bar, pool fire with a heat load of 200 kW/m<sup>2</sup> and jet fire with heat load up to 350 kW/m<sup>2</sup> (1350°C).

Most of the installations on the NCS have our Fire Jackets as part of their topside PFP system. We have also made deliveries to international projects like Kashagan (Kazakhstan), South Pars (Iran), Inpex Ichtys (Australia), Shah Deniz 2 (Azerbaijan) and Nuclear Power Plants in Scandinavia.

Fabrics used in all our flexible jacket systems have been tested for weather resistance in cooperation with DNV GL, and can also be equipped with a drain plug as required for top-side installations according to the NORSOK Standard. All seams are sewn with Kevlar reinforced stainless steel thread and sealed with silicone, to avoid water ingress.

In addition to meeting functional requirements, all Lambda products are designed for quick and easy removal and re-installation with a minimum use of personnel and tooling.

### Key Product Benefits

- Extreme performance
  - Slim building
  - Low installed weight
  - High Impact resistance
  - No Water absorption
- HSE: No toxic ingredients, no ceramic fibres
- Maintenance free – tough silicone fabric exterior, stitched with Kevlar reinforced stainless steel thread
- Easy to install, remove, inspect, and re-install
- Pre-fabricated solution → low installation cost.
- Low Life Cycle Cost
- Slim building – from 8mm insulation thickness for fire-rated to 30mm for HD jet-fire rated
- Tested according to
  - IMO Res. A.754(18)
  - OTI 95 634
  - Extended OTI 95 634
  - Norsok R-004 and IACS UR S.14.2.3
  - ISO 15665:2003 Acoustic B1
- Tested for blast overpressure to 1200 millibar (1.2 bar)



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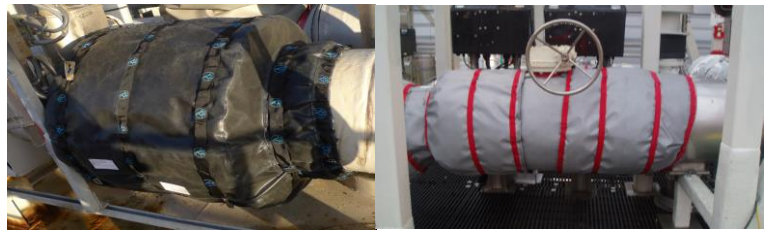
## Design and Test results

The Bilfinger Lambda F Flex Jackets have been extensively tested at independent laboratories. The following tests have been carried out:

- Hydrocarbon fire to IMO Res. A.754(18), ISO 834-Part 3 / NS-EN 1363 Part 2
- Jet-fire 250 kW/m<sup>2</sup> to OTI 95 634, as well as
- Jet-fire 350 kW/m<sup>2</sup> to Extended OTI 95 634
- Explosion tests have been conducted by Gexcon, The system has been successfully tested for blast overpressure at 1200 millibar (1.2 bar)
- Weatherproofing test has been completed to 3x10<sup>5</sup> PA, according to Norsok R-004 and IACS UR S.14.2.3
- Acoustic test according to ISO 15665:2003 B1

The standard Jacket is produced with two layers of silicone cloth, insulated with 8-15mm Micotherm, with a layer of stainless steel 316 foil to provide protection against jet-fire erosion. The Heavy Duty (HD) Jacket has a similar design, with 30mm Microtherm insulation.

The Lambda F Flex Jackets are installed with a Velcro fastening strip, and tightly secured by steel bands. The steel bands are fitted through a fabric sleeves to protect the jacket fabric from damage.



Completed Tests	Results	Test standard	Test Institue	Certification
Hydrocarbon fire - ability to withstand constant 1200°C	Up to 120 minutes	IMO Res. A.754(18)	RISE Fire Research AS (Sintef)	Testreport
Jetfire - 250kW/m <sup>2</sup> - equivalent to 0.3kg Propane / second	Up to 120 minutes	OTI 95 634	RISE Fire Research AS (Sintef)	Testreport
Jetfire - 350kW/m <sup>2</sup> - ability to withstand 1350°C jetfire	Up to 60 minutes	Extended OTI 95 634	RISE Fire Research AS (Sintef)	Testreport
Explosion Tests	Up to 1.2 bar	Explosion Tests	Gexcon AS	Testreport
Acoustic Tests	C1	ISO 15665:2003	Peutz Laboratories	Testreport
Weatherproofing Test	Passed	Norsok R-004 and IACS UR 2.14.2.3	Internal	Testreport (DNV-GL)

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