ContraFlame

An Advanced Insulation Product

JF120

offshore lightweight fire protection
and insulation system

Advanced
INSULATION CONTRACTING

better products for
challenging situations

ContraFlame® JF120 :
Multi-functional Composite Insulation System

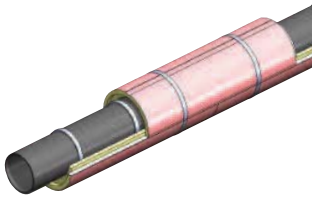
ContraFlame® JF120 is the latest version of our well proven fire protection and insulation system. This new version is significantly lighter and its thermal conductivity is now comparable with cellular glass or dry Rockwool.

ContraFlame® JF120 is a multifunctional composite system based on unique phenolic syntactic foam and phenolic glass reinforced laminate which combined provide :

+ Jet fire passive fire protection to 120 minutes
+ Hydrocarbon pool fire passive fire protection
+ Thermal Insulation
+ Closed cell structure
+ Tolerance to elevated temperatures (185°C)
+ Tolerance to very low temperatures (-196°C)
+ Robust energy absorbing structure
+ Excellent water resistance
+ Very low smoke and fumes in fire conditions
+ Will not propagate flame
+ Ambient curing

ContraFlame® passive fire protection system is backed by more than ten years of research, testing and field experience. It is a truly passive system not relying on any chemical or physical changes when exposed to fire. As a result, the material has a much wider tolerance to service temperatures than other conventional passive fire protection materials.

ContraFlame® JF120 :
Half Shells



Key Features

+ Closed cell structure, Pre-cast Insulation/Passive Fire Protection (PFP) for pipe work (size 1" - 36") including bends, tees, reducers
+ Rapid, dry installation
+ Demountable and reusable
+ J120 Jet fire approved, blast resistance
+ Superior insulation properties (0.05 Wm^{-1} K^{-1})
+ Wide tolerance to elevated and low service temperatures[1] (+185°C to -196°C)
+ Designed to accommodate heat tracing on pipe work

Material

ContraFlame® a multifunctional composite systems based on unique phenolic syntactic foam and phenolic glass reinforced laminate.

Construction

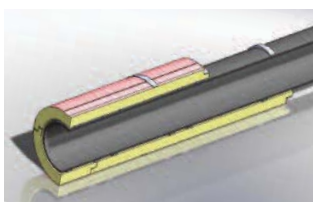
+ Pre cast half / tri shell sections with overall thickness of 50mm, comprising of 46mm C50 phenolic foam and 4mm of glass reinforced laminate. Typically supplied in 1 metre lengths
+ Sections assembled in staggered pattern in order to offset joints, sections are sealed with fire rated silicone mastic.
+ The complete assembly is clad with Venture tape® a weather-proof membrane and secured with 316 Stainless steel bands at 250mm centres

Typical Application

+ Flare Stacks
+ Risers
+ Insulated Pipe works size 1" - 36" with or without heat tracing
+ Pipe work which requires regular inspection
+ Pipe work requiring heat conservation / personal protection

Design Criteria

+ Pipe work run within high risk area requiring Passive Fire Protection (PFP) to J120 or similar
+ Pipe work which requires blast protection
+ Pipe work which requires durable impact resistance insulation
+ Pipe work which operates at high service temperature
+ Pipe work which operates in environments which are subject to cycles of low / high temperature fluctuations
+ Personnel protection



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ContraFlame® :
JF120 - 200 Riser Protection System

Key Features

+ Integrated Insulation and Passive Fire Protection to J120
+ High integrity corrosion protection with joint less corrosion barrier suitable for splash and tidal zone
+ Long term resistance to wave action and debris impact
+ Durable Construction to withstand service and environmental conditions
+ Field joint application can be done on site or offshore
+ Ambient Cure, no specialised curing procedures or equipment
+ Low Heat Transfer Coefficient (U-Value) = 0.91 $Wm^{-2}K^{-1}$ at 96mm
+ Wide tolerance to elevated & low service temperatures (+185°C to -196°C)
+ Truly passive fire protection, material does not undergo any chemical change in the course of the fire
+ ContraFlame JF120-200 meets Total Specification GS SAF 337
+ ContraFlame® JF120-200 system carries jet fire certification for use on process equipment, risers and pipework
+ Maximum temperature rise after 2 hour tubular jet fire = 64°C
+ Lloyds certification SAS F060240
+ Tested on riser system with Hp/A up to $161m^{-1}$

Material

ContraFlame® a multifunctional composite systems based on unique phenolic syntactic foam and phenolic glass reinforced laminate.

Construction

ContraFlame® Tie Coat applied to blasted & corrosion coated substrate.

Primary layer of C50-400 is applied at a thickness of 75mm, and is designed to give the best level of thermal insulation performance. The density is $400kgm^{-3}$ and k value is circa $0.08Wm^{-1}K^{-1}$.

The secondary layer of C50-700 is applied directly over the primary layer at a thickness of 15mm and is designed to give enhanced resistance to jet fire erosion and low water absorption performance. The density of this layer is 700 kgm^{-3} and the k-value is circa $Wm^{-1}K^{-1}$.

The combination of these layers together with the Duplex steel pipe and 6mm topskin laminate results in an overall system U-Value of 0.91 $Wm^{-2}k^{-1}$ at 96mm total thickness.

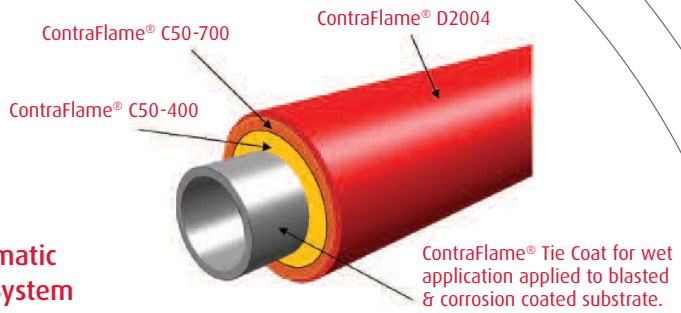
Typical Application

+ Risers
+ Pipework which requires heat conservation and passive fire protection

Design Criteria

+ Offshore risers routing flammable products to and from a facility from below the Lowest Astronomical Tide (LAT)
+ Specification that requires a maximum back face temperature rise of 200°C after 2 hours jet fire

System schematic - JF120-200 System



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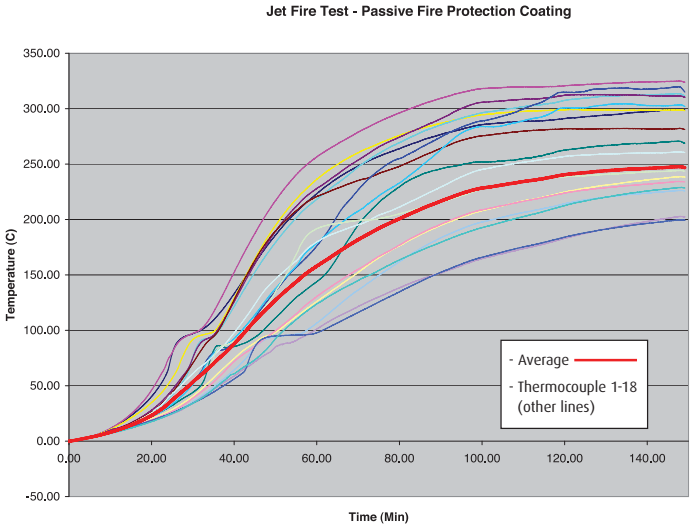
ContraFlame® JF120 system provides robust jet fire protection for two hours.

Jet Fire Resistance

This represents the most demanding condition by simulating a closed vessel application. The test specimens in both cases also included a repair joint through the full thickness of the ContraFlame® JF120 system enabling certification of a system repair as well as the 'as new' condition.



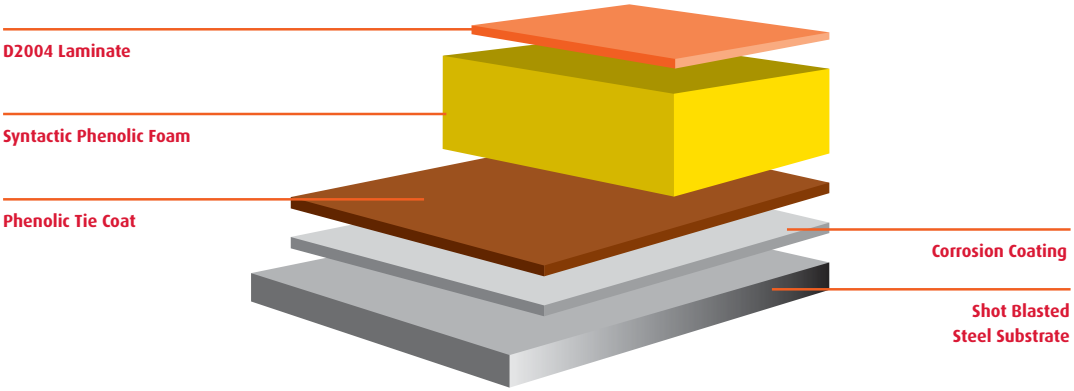
The very low temperature rise associated with ContraFlame® JF120 system makes possible operating temperatures as high as 185°C whilst still assuring safe substrate temperature during the jet fire.

After the test, the ContraFlame® JF120 system was found to be substantially intact with the remaining char being at least 70% of the original system thickness. The D2004 topcoat remained as a protective skin over 95% of the surface of the test piece.

Advantages of ContraFlame® JF120

+ Totally passive fire protection system
+ Thermal insulation for heat or cold conservation and / or personnel protection
+ Jointless corrosion barrier suitable for hostile environments
+ Extremely robust energy absorbing system
+ No metallic cladding system required
+ Water and vapour resistant
+ No structural supports required
+ Ambient curing
+ Simple application method
+ Low maintenance
+ Easily repairable at ambient or elevated process temperatures
+ Heat conservation performance not susceptible to impact damage
+ Easily removable for inspection and repair
+ Fire performance not affected by water
+ Low smoke and fumes in fire conditions
+ Wide service temperature range from -196°C to 185°C
+ Tolerance to extreme thermal shocks
+ Acoustic insulation

ContraFlame® JF120 is globally supported by our experienced technical and field support teams.



Application

Each part of the ContraFlame® JF120 system is supplied as cold curing, in two part packs. The entire system is applied using simple trowel and roller techniques.
The full ContraFlame® JF120 system consists of:

1. Shot-blast steel primed with a high performance two coat corrosion coating. ContraFlame® JF120 cannot be applied to thermally sprayed aluminium or any metal based corrosion coating systems.
2. ContraFlame® Tie Coat which provides a tacky interlayer to hold the syntactic foam and gives good bond integrity.
3. ContraFlame® C50 is normally applied in a single layer of 30mm.
4. ContraFlame® D2004, a phenolic composite top skin, nominally 3-5mm.
5. Decorative finish coat, e.g. single pack acrylic or epoxy.

Approved corrosion coating	2 pack epoxy phenolic[1]
Tie Coat Thickness	150-300µm
Top Coat Type / Thickness	ContraFlame® D2004 GRP / 3-5mm
Density[2] (cured)	C50 - 270-330 Kgm^{-3} D2004 - 1300kgm^{-3}
Maximum & minimum Operating Temp[3]	185°C to -196°C
Thermal Conductivity @ 25°C	C50 - 0.05 $Wm^{-1}K^{-1}$ D2004 - 0.2$Wm^{-1}K^{-1}$
Specific Heat Capacity	1.5 $Jg^{-1}°C^{-1}$
Expansion Coefficient	C50 - 20.7 x 10^{-6} D2004 - 23.96 x 10^{-6}
Young's Modulus	C50 - 465 MPa D2004 - MPa
Tensile Strain to Failure	C50 - 1% D2004 - 1.65%
Tensile Strength	C50 - 5.15 MPa D2004 - 61.6 MPa
Shear Strength / Modulus	C50 - 0.76 MPa / 121 MPa
Compressive Strength (system)	18.3 MPa
Water Absorption	<1% by weight
Jet Fire Resistance[4]	J120
Blast Overpressure Resistance	4.2 Bar (unaffected)
Smoke Generation NES 711	8.71
Toxicity Index NES 713	1.41
Spread of Flame BS476 Pt7	Class 1
Limiting Oxygen Index	72%

[1] Please consult us prior to the application.
[2] Density may vary pending site conditions and application configuration.
[3] Can design bespoke systems for use at much higher temperatures.
[4] Thickness dependent.