

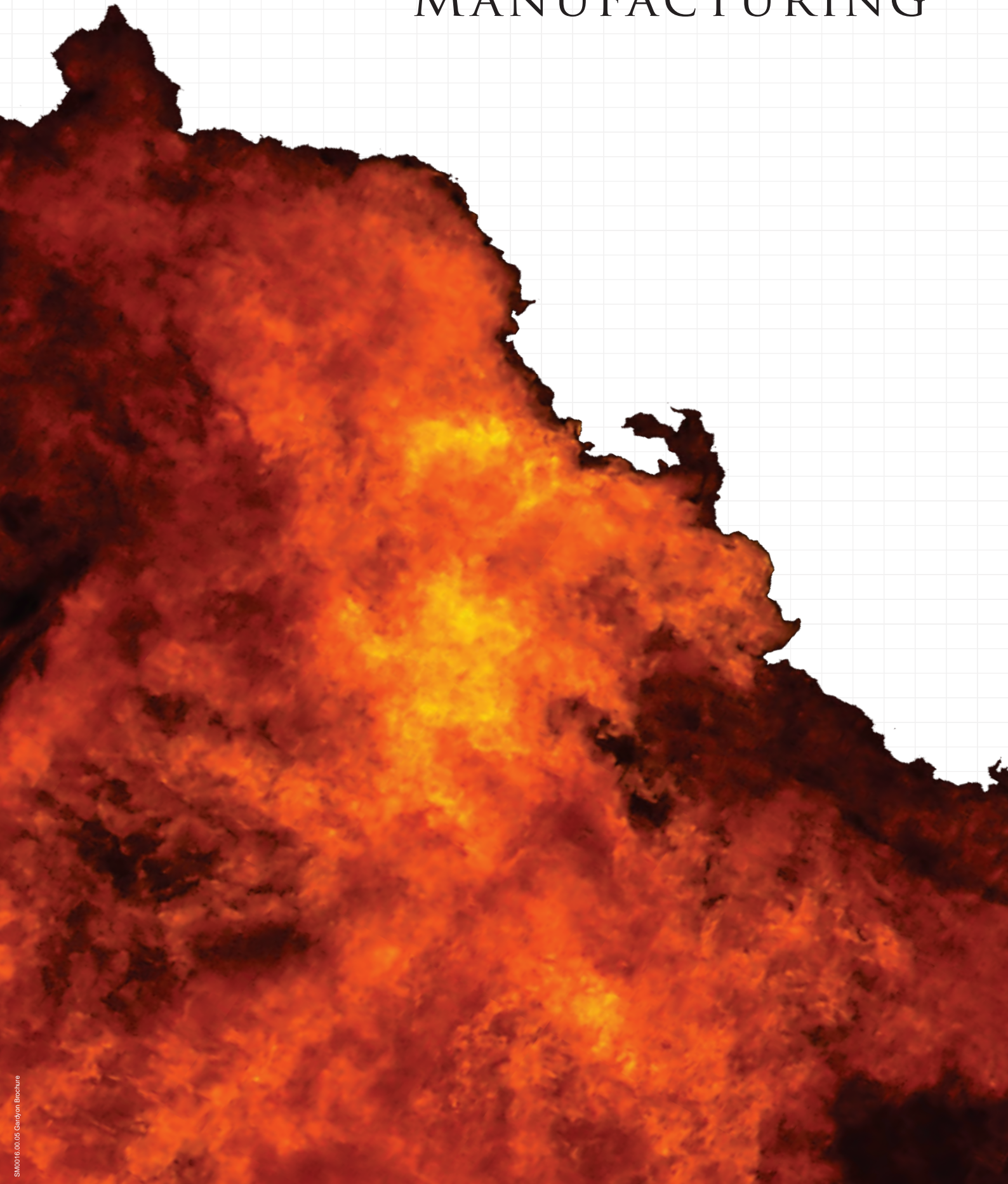


# **GARDYON**

A Global Protector of Oil & Gas Assets

Research & Development | Engineering & Design | Manufacturing  
Engineered Thermal Protection Solutions & Technologies

# RESEARCH & DEVELOPMENT ENGINEERING & DESIGN MANUFACTURING



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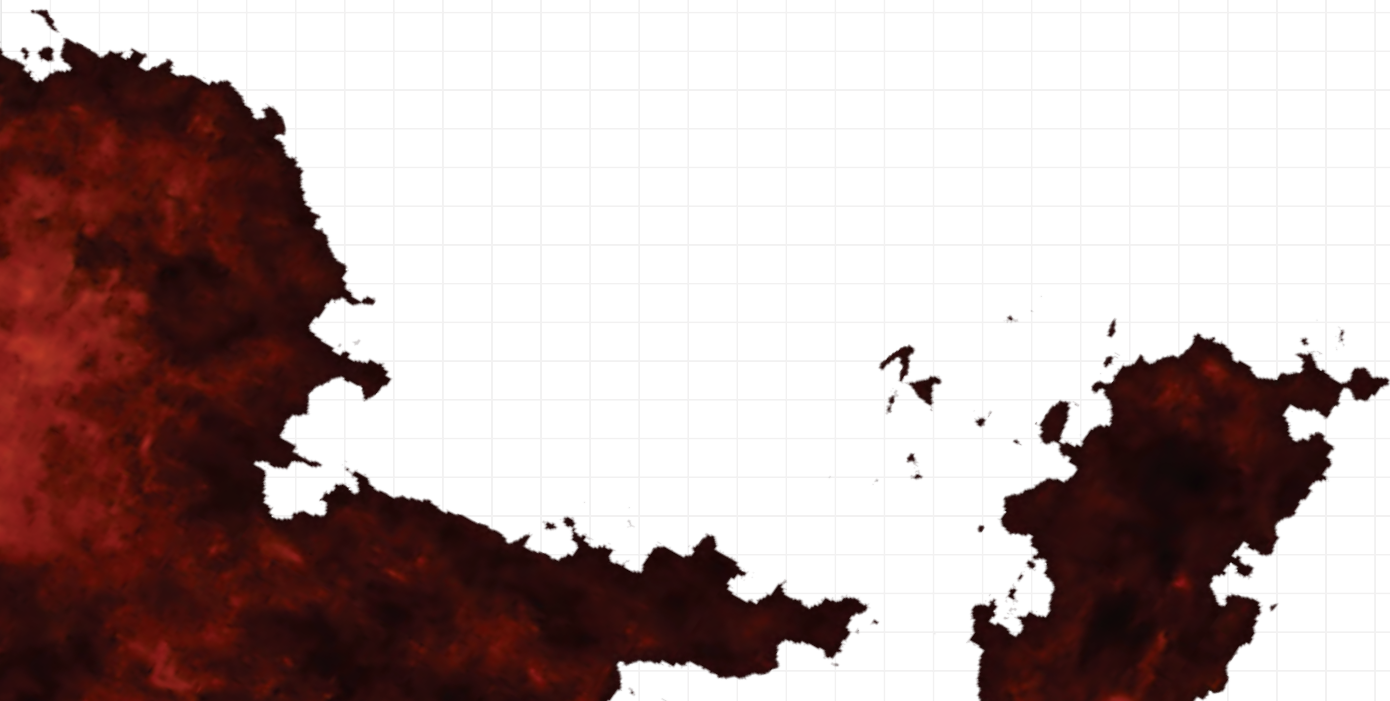
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A Global Protector of Oil & Gas Assets

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# BEYOND SAFETY

Ensuring Peace of Mind

“Partners choose to work with Gardyon because of their confidence in us. Our innovative solutions are only the means to an end, which is a peace of mind that we bring to the table.”

David M. Thomas  
CEO & Managing Director



**MOBILE INSTALLATIONS**



Safety and environmental preservation are the two prime concerns that every oil & gas company must address in our modern world. Safety aspects in the form of installation design, material usage and function are critical success factors in this industry, while disasters such as oil spills reaffirm the preservation of our environment as the other highest priority on any company's agenda.

A 21st century company incepted to tackle 21st century challenges, Gardyon envisions itself to be the global protector of onshore and offshore oil and gas assets. Innovation engineering in thermal science and technology lies at the very heart of Gardyon's creation. Gardyon operates on the tenet that the best solutions require an in-depth understanding of the market dynamics, trends and challenges.

Providing innovative engineering solutions that meet the specific needs of our clients serve as our fuel and catalyst.

At Gardyon, we place great emphasis on building long-term symbiotic relationships with our clients. This is because we understand that our clients' success is essential to that of our own. By partnering with Gardyon, our clients will achieve market dominance through breakthrough technology in thermal science. Gardyon is committed to pioneering solutions that outperform conventional systems in terms of efficiency and ultimately, profitability. By doing so, we seek to unlock new opportunities and potential for the businesses of our clients in the markets they operate.

Gardyon is inspired by the infinite possibilities of thermal science application in the global oil & gas and petrochemicals industry. Gardyon will challenge industry norms and standard practice every day by simply asking, "Why Not?". To this end, Gardyon has successfully developed its own, Lloyd's Register certified flexible jacket and epoxy intumescent casting fire protection systems which are used by world renowned companies in the oil and gas industry.

As a thought leader in the field, Gardyon will continue to transform the way oil and gas facilities around the world are safeguarded.





# BEYOND INNOVATION

## Our Technological Expertise



At Gardyon, every innovative idea is backed by a comprehensive execution plan from inception to commercialization. We believe that innovation and execution are not mutually exclusive, and our ability to get both of these elements right, makes us leaders in our own right. Our extensive experience in the development, design, manufacturing, installation and maintenance of fire protection and thermal systems ensures that every innovation idea is materialized to its full potential.



### RESEARCH & DEVELOPMENT

Gardyon has quickly established itself as the premier innovator and knowledge centre with respect to the design, manufacture and installation of all fire protection solutions. This position has been gained by extensive research of materials, their constituent components, and the development of systems to offer fire protection to a range of components, including but not limited to, structural divisions (bulkheads and decks), structural supporting sections, pressure vessels, valves, flanges, fixture and fittings etc.

However, for any organisation to be successful in directing its Research & Development (R & D) efforts, a holistic and in-depth knowledge and understanding is needed of all restraining parameters that are applicable to any of its designs. A simple solution addressing the basic design parameters, cost and say aesthetics, will simply not do even though they themselves are commendable objectives. Gardyon is acutely aware of its regulatory, environmental and ethical responsibilities, as all of Gardyon's designs and manufactured products are safety critical items which are protecting precious life itself as well as hugely expensive capital assets.

Clearly this is no ordinary R & D effort, but requires expertise far wider than merely developing products. Gardyon uniquely has an understanding and knowledge of the driving forces behind the use and application of fire protection systems. Addressing the regulatory, namely:

- Published national and international statutory regulations
- Classification Society rules and regulations
- Codes and guidance notes published by approval authorities
- Published national and international testing standards

Clearly to have a cursory knowledge of such documentation is a great advantage, but Gardyon can justifiably claim and demonstrate an in-depth understanding of all such publications and the history and evolution behind them. Furthermore, because of Gardyon's active support and participation of the activities of research and standards organisations, such as UK National Standards Body (BSI) and International Organization for Standardization (ISO), Gardyon is able to influence and anticipate future testing and regulatory requirements.

In addition to the regulatory requirements, there are specifications containing features that go into or beyond the next generation of exploration, extraction and process of oil and gas produced by the energy majors. Gardyon is aware and responsive to these additional challenges. Consequently, all development is progressed and evaluated at each milestone with all the parameter relevant to any design being fully considered and addressed.

Gardyon understands the need to innovate and develop safer and more efficient solutions. One of the most important developments has been to incorporate the ISO jet fire test standard in our comprehensive programme of testing and certification. Lloyd's Register under their Type Approval scheme have certified Gardyon's engineered pre-cast panel system, "Charcast®7", as well as Gardyon's flexible jacket system, "ISO-JF180". These systems represent engineered thermal solutions for both fire and blast protection.



## ENGINEERING & DESIGN

At Gardyon, we pride ourselves on our ability to convert innovative ideas into actual life- and asset-saving solutions. Assuring the designs have the necessary National Authority and Classification Society approvals, Gardyon conducts in-house detailed engineering & design to provide turnkey solutions.

No other company offers such a range of engineering skills – this allows our clients to have full confidence in entrusting their fire protection and insulation requirements from design to installation to a single-source service provider, regardless of geographical location. Every Gardyon engineered solution

is approved and certified as appropriate for weather and environmental protection, durability, fire performance, insulation performance, corrosion protection and aesthetics. These qualifications are further enhanced by the necessary National Authority and Classification Society approvals.



## MANUFACTURING

Gardyon's highly efficient manufacturing facilities are coupled closely to in-house design expertise, assuring that all products are right the first time, and on time. Our global material supply partners who support our manufacture also bring to the table decades of expertise and an in-depth background in this high-level technology. The seamless flow from research and development, to design and engineering,

to in-house manufacturing ensures that every Gardyon engineered solution is precision-crafted bringing the maximum value to the customer.

The high level of finish, which is enabled by our precision manufacturing capabilities, ensures that the system is instantly recognisable as another quality product from

Gardyon. It emphasizes Gardyon's commitment to detail, and provides clients with the peace of mind that Gardyon's products will continue to perform consistently at its peak - be it day one, or two decades later.



## BEYOND PERFORMANCE

Our Innovative Technologies & Solutions

### Charcast®7 Engineered Jet Fire Panel System

A Fire Protection System Designed, Tested, & Certified: Jet Fire | Rapid Rise Hydrocarbon | Cellulosic | Weatherability

Charcast®7 panels are engineered, designed and manufactured by Gardyon. In a global agreement with International Paint LLC, Gardyon is the exclusive manufacturer of Charcast®7.

This unique fire protection system can be installed quickly and simply over what is already there - bulkheads, underdecks, and structural members.

Charcast®7 is specifically designed for maximum thermal performance, light-weight and rapid 'dry-fit' installation. This engineered panelled (or pre-cast epoxy intumescent) material gives an alternative solution in areas where conventional spray or trowel fire protection application methods are not feasible or desirable.

Charcast®7 has undergone an extensive fire test programme including jet fire testing up to 4 hours in accordance, with what is now the industry de facto standard, namely, ISO 22899. Certification from Lloyd's Register is now in place, as well as ABS approval.

### FEATURES & BENEFITS

- Versatility – Applicable to onshore and offshore facilities
- State of the art technology – Specifically designed for maximum thermal performance, light-weight and rapid 'dry-fit' installation
- Extensive testing includes:
  - Jet fire ISO 22899
  - UL 1709
  - IMO Resolution A.753(18) (Plastic Pipe Protection – level 1)
    - IMO Resolution MSC.307(88)-HC Time Temperature, BS 476 and ISO 834
  - NFPA 58 (hose stream)
  - Lloyd's Register certification issued
- Research & development – Unique offering of engineering & design for individual applications
- Efficient to install – Panel system provides fire protection in "ready-made" form with faster & less onerous installation, eliminating the need for grit blasting, priming, and liquid-applied materials which require restrictive worksite conditions and expertise
- Can be installed quickly and simply over what is already there - bulkheads, underdecks, and structural members, and can be done in virtually any climate & weather condition, day or night
- Allowance for future inspection & maintenance
- High durability & weatherability – Proven field functionality with decades of use in harsh offshore environments
- Long term reliability & environmentally suitable
- Installation & operational life cycle value added

### APPLICATIONS

#### DIVISIONS

- Walls
- Bulkheads
- Decks
- Deckheads

#### STRUCTURAL STEEL SECTIONS

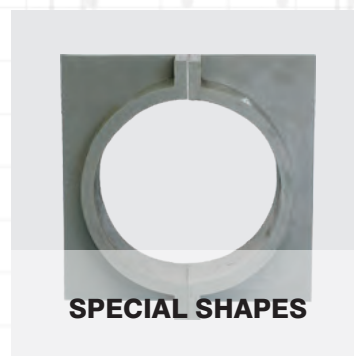
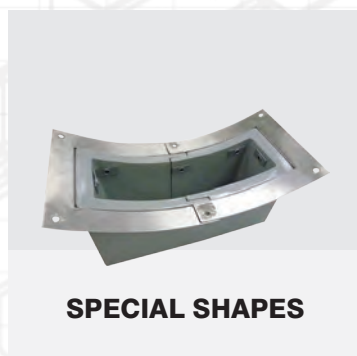
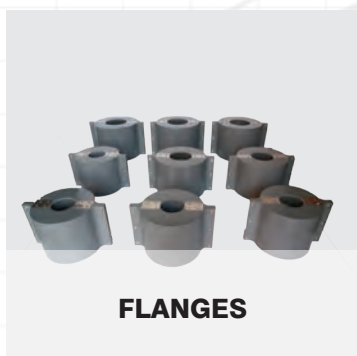
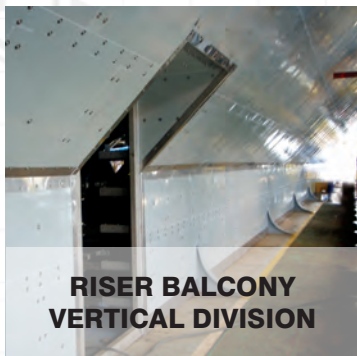
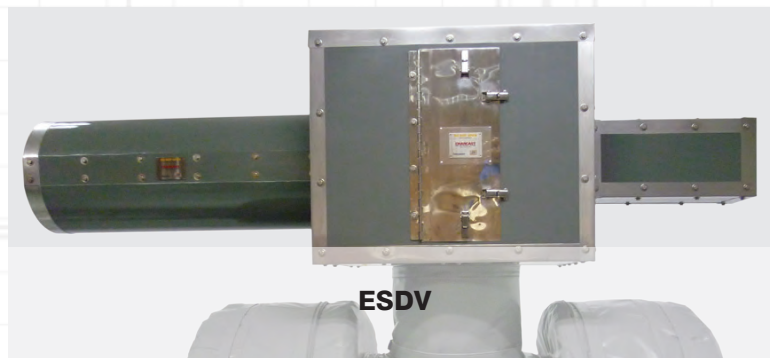
- Columns
- Beams
- Girders
- Sections: "I", "H" and Hollows & Tubulars

#### EQUIPMENT & FITTINGS

- |               |              |
|---------------|--------------|
| ■ Vessels     | ■ Flanges    |
| ■ Valves      | ■ Pipings    |
| ■ Actuators   | ■ GRE Spools |
| ■ Cable trays |              |



## SOLUTION HIGHLIGHTS



## PROJECT HIGHLIGHTS



### NORTH AMERICA (USA)

## Bullet Tank Fire Protection Upgrade Project



**REMOVABLE INSPECTION POINT COVERS**



**REMOVABLE MANWAY ACCESS HATCH COVERS**

### System Requirements: Jet Fire 2 hrs + Provisions for Removable Fire Protection Inspection Panels for Vessels

In 2011, a fire protection study was completed at a US Major Gas Plant. Based on the report's fire protection criteria recommendation to reduce the risk of loss of containment (prolonged flame impingement on Propane bullet Tanks leading to BLEVE), Gardyon's Charcast®7 fire protection system was specially chosen by the client to provide unique removable inspection covers for three Propane vessels: (1) NGL Product Surge Drum – 53' long x 12' Dia., (2) NGL Product Surge Drum – 53' long x 12' Dia., and (3) Propane Refrigerant Accumulator – 48' long x 9' Dia. The Charcast®7 Removable Inspection Covers were engineered and designed specifically for the given scope of work including provisions to ensure inspection locations are accessible via inspection ports and manway access. The fire protection materials provided are fully certified and meet the required Jet Fire performance levels.





## INDIA

# Installation of Accommodation Modules & Blocks



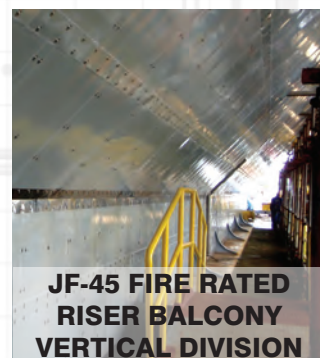
**System Requirements: Jet Fire 30 mins + Hydrocarbon Fire 60 mins + Blast 0.2 Barg**

Engineering was conducted by an internationally recognized engineering house under contract by the client. Charcast®7 was chosen to provide adequate protection to the Living Quarters of the Offshore Process Platform from any potential jet fires from the process area for a practically reasonable time period. The epoxy intumescent materials have been used and established as the norm for provision of fire protection needs. A number of new test methods and standards have been developed by the need to test and evaluate these materials' capabilities in jet fire environments. The Charcast®7 materials are the most extensively tested and third party certified materials which have been used in offshore Installations.



## SOUTH AMERICA (OFFSHORE BRAZIL)

# Riser Balcony Vertical Division



**System Requirements: Jet Fire 45 mins**

The innovative Charcast®7 system as engineered by Gardyon, with its features and benefits of being a modular dry-fit demountable fire protection system, was finally chosen as an alternative to conventional methods. Fully tested and certified to international standards, Gardyon's subsidiary company, Thermal Limitec was awarded the contract to engineer and supply the JF-45 rated engineered firewall protection system located on the FPSO main deck riser porch for an approximate length of 80 metres, separating the riser balcony from the ESDV platform.





# BEYOND PERFORMANCE

## Our Innovative Technologies & Solutions

### ISO-JF180 Engineered Jet Fire Flexible Jacket System

A Fire Protection System Designed, Tested, & Certified: Jet Fire | Rapid Rise Hydrocarbon | Cellulosic | Weatherability

The Gardyon ISO-JF180 Jet Fire Jacket System is a premier fire protection solution that is manufactured using a combination of quality materials, reinforced with a fine gauge stainless steel mesh which ensures a highly flexible and adaptable system. This flexibility enables efficient installation in areas where access is difficult or where the shapes of the protected item make conventional systems impossible to install. It is also designed for ease of handling and is totally demountable and reusable. The system can withstand the harsh environmental conditions experienced by offshore installations located in any part of the world.

In addition, the stainless mesh system ensures that the day to day knocks are absorbed without detriment to the integrity of the system's mechanical strength.

The Gardyon ISO-JF180 Jet Fire Jacket System can be designed to withstand any fire scenario envisaged by the safety case or demeaned required by a regulatory authority because the jacket system has been tested to the most onerous of fire test standards, namely, ISO Jet Fire test standard 22899 and certified by Lloyd's Register.

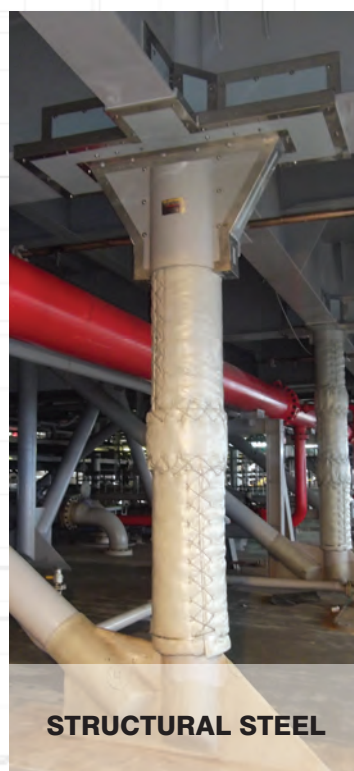
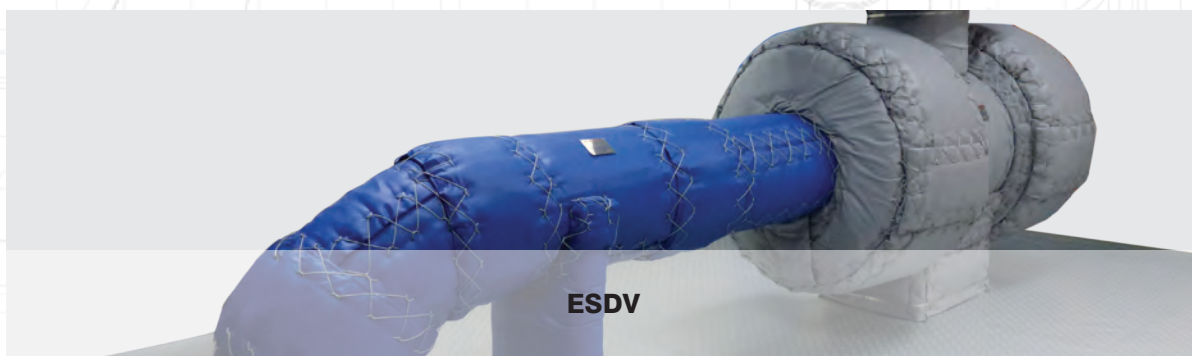
#### FEATURES & BENEFITS

- Uses a combination of quality materials, reinforced with a fine gauge stainless steel mesh to ensure flexibility and adaptability
- Meets strict fire resistance standards:
  - Can be designed to withstand any fire scenario
  - Meets requirements of regulatory authorities
  - Certified by Lloyd's Register to:
    - Jet Fire ISO 22899
    - Pool Fire UL 1709
 } for up to 3 hours
  - Blast Pressure 2.5 Bar
- Ability to withstand harsh environmental conditions
- Mechanically durable – Durable design and high mechanical strength withstands day-to-day knocks and handling
- Design enables efficient installation - Simple to install, easy disassembly & re-assembly
- Accommodates difficult to access locations
- Accommodates irregular shapes where traditional systems are not suitable
- Tailor made with full technical support
- Track record
- Specific design to the fire type, duration, limiting unexposed temperature
- Inspection hatches, etc can be incorporated

#### APPLICATIONS

- Piping – services, risers, hydrants etc.
- Flanged joints
- Valves & actuators
- Junction boxes & control cabinets
- Structural steelwork
- Cable trays
- Conduits
- Riser balconies
- Pipe supports
- Vessels & tanks
- Manways
- Inspection hatches

## SOLUTION HIGHLIGHTS







### PROJECT HIGHLIGHTS



## AFRICA (CONGO) Flare Tower Structure

### System Requirements: Jet Fire 60 mins

The Flare Tower Structure had been protected against a possible jet fire scenario with an epoxy type intumescent fire protection system. However, due to increased production resulting in higher flare temperatures, the intumescent fire protection had hardened and cracked over the years thus allowing water to penetrate beneath the fire protection system creating a high risk of corrosion under insulation. A decision was taken by the client to remove this system, refurbish the Flare Tower structure and apply a light weight removable fire protection system.

In February 2012, Gardyon's ISO-JF180 Jet Fire Flexible Jacket System was specially chosen by the client for this application due to its high resistance against jet fires and also its ability to withstand the long term harsh offshore environment.

The Jacket System was designed to withstand a 60 minute jet fire and included all secondary steel work and major supports from ground level up to an elevation of 37 metres.







## EQUATORIAL GUINEA

### Pipings, Valves, Flanges, Pipe Supports, etc.



**System Requirements: Jet Fire 60 mins + Static Blast Overpressure of 0.56 barg + Dynamic Blast Pressure of 0.3 barg**

Gardyon's ISO-JF180 Jet Fire Jacket System was the premier fire protection solution used for the given scope of work. The scope of work for the ISO-JF180 Jet Fire Jacket System was provided on the Piping, Pipe Supports, Reducers, Elbows, Tees, Valves (including shut-down valves, double block bleed valves, diaphragm bleed valves and ball valves), Flanges (including hub Grayloc connectors, clamp and seal rings at riser connections), Dresser Couplings, and Firewater Line Valves.



## SOUTH AMERICA (OFFSHORE BRAZIL)

### Process Modules, Supports, Risers, Shutdown Valves



**System Requirements: Jet Fire 60 mins + Hydrocarbon Fire Level 1 (60 mins) + Pool Fire 120**

Gardyon's J60 & H120 Flexible Engineered Fire Protection Enclosure Removable Jacket System was provided on the Tubular Module Structural Supports, Process Piping (including 12" gas import lines, 10" oil import lines, 10" production lines, 6" gas lift lines), Riser Supports, Flanges (including hub connectors with clamp and swing rings at riser connections) & Valves (including shut-down valves FB SDV, and ball valves with blind flanges).

# BEYOND SERVICE

## Our People



At Gardyon, building long-term symbiotic relationships with our clients is imperative. This is because we recognise that our clients' success is fundamental to that of our own. Our commitment towards building strong relationships with our stakeholders enables us to understand their needs accurately and allows us to consistently deliver innovations that are value maximizing to them.

Our employees are visionaries and entrepreneurs. Looking beyond current industry practice and standards, we constantly challenge the limits of engineering by asking ourselves, "Why Not?" Our forward-looking team is driven by the opportunity to shape the way oil & gas facilities of tomorrow are protected. Most importantly, commercial success underlies the fundamental reason for our existence. The enterprising nature of our people ensures that innovations are purposefully applied into commercial applications that create market dominance for our customers.

Our team is made up of people from diverse engineering backgrounds and experience, many of which are distinguished individuals in their fields. They possess intimate knowledge and extensive experience with global statutory regulations as well as international fire testing standards. By putting together the brightest minds in the field, Gardyon will continue to break the frontiers of thermal science and technology.



## PAUL MATHER, Chief Technology Officer

"Gardyon's strength lies in its talented group of technologists, engineers and marketing specialists, each with their own unique skill sets and experience but collectively representing a **single professional entity** unlike any currently in the fire protection and insulation industries. The synergies between our people enable Gardyon to develop a wide range of fire protection and insulation solutions. From our research and development capabilities, to our in-depth knowledge of regulatory and testing standards, Gardyon has proven itself to be a dynamic and ambitious organization, offering customers a complete service solution with a global reach.

With my extensive experience that spans more than 30 years working with the premier Classification Society, Lloyd's Register and the oil and gas sector's predominant fire protection material manufacturer, International Paint, I will play a pro-active role in Gardyon's **holistic approach** towards the treatment of fire and explosion hazards, pioneering solutions that will ensure survivability and protection of assets exposed to those hazards. Together with my team at Gardyon, we will continue to make significant developments, not just for the company but for the oil & gas industry as a whole."



## PHIL DUNN, Director of Engineering Sales

"In the effervescent oil and gas industry, it is imperative to constantly understand and fulfil our customers' needs. As such, this is one of the pertinent factors that has put Gardyon in the forefront as a leader in the world of thermal protection solutions and technologies. Our **commitment to detail** in providing the most innovative and profitable solutions against fire and blast hazards, give our clients and partners a confidence and reassurance that they are receiving the 'best of the best'.

Equipped with more than 30 years of experience specialising in the field of fire protection products and sales development, it is truly exciting to be on this journey with Gardyon, where service and products exceed expectations. When embarking on any project, securing our customers' trust and ensuring all their needs are satisfied are crucial. By constantly listening, understanding and communicating with our clients and partners, we will continue to build upon and **develop deeper and more meaningful relationships** beyond just customer and supplier."





# BEYOND BORDERS

# A Global Protector of Oil & Gas Assets





**SINGAPORE**

Legends:  **Gardyon Offices**

 **Project Achievements**



[www.gardyon.com](http://www.gardyon.com)