Chartek®
Trusted Epoxy Passive Fire Protection
Setting the Standards for Passive Fire Protection in the Oil and Gas Industry
Chartek is Renowned for Providing High Quality, Reliable Fire Protection for the Oil and Gas Industry

Providing dependable intumescent epoxy passive fire protection solutions for over 35 years

Born in the 1970s from NASA’s Apollo space program Chartek was the world’s first epoxy intumescent passive fire protection material.

Chartek technology became a perfect fit with the needs of the oil industry as the cement based materials used at the time were found to lack the durability required to survive the effects of harsh offshore environments.

Formulated to provide long term corrosion and fire protection, Chartek is the most used epoxy passive fire protection in the oil and gas industry; the first choice for all the world’s oil majors.

Part of AkzoNobel, the world’s largest coatings company, we can supply our high quality Chartek products and services to projects anywhere in the world.
Why Do You Need Chartek Fire Protection?

Why fire protect?

Fire Protection is a moral and legal requirement to ensure the safety of people at work. If appropriate fire safety provisions are not made, including epoxy passive fire protection, the economic and social effects of a fire could be catastrophic.

Fire protection is important for:

- Personnel Protection – giving people time to escape or shelter from the effects of the fire
- Asset Protection – minimizing damage to the steel structure before fire services arrive

How do Chartek epoxy passive fire protection materials work?

Chartek epoxy passive fire protection materials swell or ‘intumesce’ in a fire providing an insulating durable char layer that slows the temperature rise of the steel substrate.

What happens in a hydrocarbon fire?

Unprotected steel experiences a rapid temperature rise.

Chartek materials help to protect steel from reaching its “critical core temperature” within a certain time period.

This critical core temperature is the temperature when steel starts to lose its load bearing capacity and can depend on the grade of steel used and its load bearing requirement.
The Chartek Product Range

Since the introduction of Chartek in the 1970s the Chartek product range has evolved to offer trusted solutions for hydrocarbon fires right across the oil and gas industry.

<table>
<thead>
<tr>
<th>Material</th>
<th>Chartek 7</th>
<th>Chartek 8</th>
<th>Chartek 1709</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Oil &amp; Gas Market</td>
<td>Offshore &amp; Onshore</td>
<td>Offshore</td>
<td>Onshore</td>
</tr>
<tr>
<td>Jet Fire Protection</td>
<td>3 hours</td>
<td>2 hours</td>
<td>4 hours</td>
</tr>
<tr>
<td>Pool Fire Protection</td>
<td>3 hours</td>
<td>2 hours</td>
<td>4 hours</td>
</tr>
<tr>
<td>Blast Resistance</td>
<td>4 bar (no cracking or disbondment)</td>
<td>4 bar (no cracking or disbondment)</td>
<td>4 bar (no cracking or disbondment)</td>
</tr>
<tr>
<td>Overpressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mesh Requirements</td>
<td>Mesh required except when web size is less than 9/8” (250mm)</td>
<td>Mesh free for 1 hour pool fires</td>
<td>Mesh free for 1 hour pool fires then mesh only on flange tips</td>
</tr>
<tr>
<td>Key Certification</td>
<td>ISO22899 Jet fire</td>
<td>BS476 / ISO834 Hydrocarbon curve</td>
<td>UL1709 Hydrocarbon Pool fire</td>
</tr>
<tr>
<td>VOC</td>
<td>0 lb/gal (0 g/L)</td>
<td>0 lb/gal (0 g/L)</td>
<td>0 lb/gal (0 g/L)</td>
</tr>
</tbody>
</table>

The Chartek brand has an un-equalled track record of protecting oil and gas installations against explosion, hydrocarbon pool and jet fires. Chartek products can be found on the world’s offshore platforms, FPSOs, refineries, petrochemical plants, LNG terminals and LPG storage facilities in environments as diverse as the North Sea, the Tropics and Antarctica.

Chartek products can be used to protect the following safety critical items:

- Structural steelwork
- Fire and blast divisions (firewalls, under-decks, bulkheads, etc)
- Process pipework and supports
- Vessels (walls and saddles/skirts)
- Accommodation modules
- Jetties
- Temporary refuge areas
- Flare towers
- Heli-decks
- Risers
- Actuators
- Emergency shut-down valves
- Control rooms
Epoxy Passive Fire Protection
Second to None

Extensive Certification to the Most Up-to-date Fire Standards

Chartek is the most extensively 3rd party qualified epoxy intumescent material available today.

The following list of external agencies provides an example of our qualifications:

- BAM
- American Bureau of Shipping
- Det Norske Veritas
- NORSOK
- Lloyd’s Register of Shipping
- Bureau Veritas
- Underwriters Laboratories
- GASAFE
- GOST

ISO22899

Jet fires are extremely turbulent and destructive and so great care must be taken when writing jet fire protection specifications. ISO22899 is the first and only internationally recognized jet fire standard used by classification societies. The ISO22899 standard gives a way to assess epoxy passive fire protection jet fire resistance at different critical core temperatures and data assessment has shown lower critical core temperatures require more protection for the same jet fire duration. The type approval should state the critical core temperature for which the certificate is valid so that it is clear under what conditions the thicknesses have been determined. This is the only way to ensure that specifications are correct for the required jet fire duration.

Chartek 7 has ISO22899 type approvals for up to 3 hour jet fire durations for different critical core temperatures from class societies such as Lloyds Register and DNV.
CHARTEK APPLICATION LOCATIONS

Chartek Around the World

Recognized for productivity benefits by all the world’s major fabricators and shipyards
- Atlântico Sul
- COOEC
- DSME
- Dubai Drydocks
- HHI
- Aker Kvaerner
- McDermotts
- Koppel
- Keppel
- SHI

Trusted by all the world’s oil majors
- BP
- Shell
- Total
- ExxonMobil
- ENI
- Chevron
- Petrobras
- Statoil
- ConocoPhillips
- CNOC

Over 80% of the world’s FPSOs protected with Chartek

Project Name: Adriatic LNG Terminal, Italy
Project Year: 2009
Owner: ExxonMobil
Yard: Dragados, Spain

Project Name: Buzzard, UK
Project Year: 2009
Owner: Nexen
Yard: Heerema, UK

Project Name: Frade FPSO, Brazil
Project Year: 2008
Owner: Chevron
Yard: Dubai Drydocks, Dubai

Project Name: P-56, Brazil
Project Year: 2010
Owner: Petrobras
Yard: Keppel, Singapore

Project Name: Perdido SPAR, Gulf of Mexico
Project Year: 2009
Owner: Shell
Yard: Keppit, USA

© Terminale GNL Adriatico Srl

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Project Name: P-56, Brazil
Project Year: 2010
Owner: Petrobras
Yard: Keppel, Singapore

Project Name: Perdido SPAR, Gulf of Mexico
Project Year: 2009
Owner: Shell
Yard: Keppit, USA
Proof of performance after 20 years in service

Millions of square feet of steel protected by Chartek technology

Tens of millions of pounds of Chartek applied worldwide
Industry standards mandate that the owner is to have a plan in place for Passive Fire Protection inspection and repair

Our Interplan system is a condition based survey program carried out by our specialist team of surveyors. The system provides a documented and site specific fire protection condition survey, designed to provide the maintenance engineer with all the information required to understand:

**What needs to be repaired?**
We can provide you with a condition survey and specific surface areas needing attention

**How to repair it?**
Our customized surface preparation and coating repair specifications address differing situations and locations

**In which order?**
You will get a detailed year on year prioritized maintenance schedule to help you budget

**Corrosion Under Fire Proofing**

Common types of passive fire protection like concrete based products are known to crack and disbond leading to corrosion under fire proofing (CUF). CUF causes the underlying steel substrate to corrode and lose its structural integrity.

If left untreated concrete cracking and disbondment can lead to:
- Dangerous fall drop hazards that can cause serious injury to innocent employees.
- A drop in fire protection performance.

Chartek’s robust epoxy technology is extremely impervious to water ingress, is damage resistant and is virtually maintenance free providing long term corrosion protection. So once Chartek has been installed, you can benefit from low product life cycle costs compared to other conventional fire protection products.

**Maintenance and Repair**

With our surface tolerant epoxy primers, such as Interseal 670HS, we can provide Chartek solutions to replace failed passive fire protection without the need for dry blasting.

Demountable pre-cast Chartek solutions can also be installed when frequent inspection is required.
No Need for Topcoats to Guarantee Corrosion Protection

Virtually maintenance free giving real life cycle cost savings

Chartek technology is in full compliance with both the ageing and fire protection requirements documented in ISO20340 and NORSOK M501 Edition 6 System 5A

Given that for most of its life epoxy passive fire protection acts as an anti-corrosive system it is important that it has excellent long term durability and anti-corrosion protection properties.

Chartek meets, arguably, the most demanding accelerated corrosion standard used in the oil and gas industry today:

**ISO20340** “Performance requirements for protective paint systems for offshore and related structures.”

The ISO20340 standard:

- Is used by NORSOK M501 Edition 6 System 5A to pre-qualify passive fire protection systems
- Assesses epoxy passive fire protection systems after exposure to 25 weeks of QUV/condensation, continuous salt spray and -4°F (-20°C) freeze cycles

The NORSOK M501 Edition 6 System 5A pre-qualification requirements recognize that the epoxy passive fire protection coating system itself must remain mechanically robust and able to provide both optimum corrosion protection and fire performance. For this reason the standard expects the epoxy passive fire protection coating system to pass System 5A without a topcoat. This means that the epoxy passive fire protection coating system:

- Must have a minimum adhesion pull off value greater than 3MPa which is also more than 50% of its original unexposed value
- Must exhibit a corrosion creep value less than 1/8" (3mm) when using a zinc primer
- Must have low water absorption (Chartek is consistently less than 1% by weight after test completion)
- After exposure testing must demonstrate that the temperature does not rise greater than 10% with respect to a control

The ISO20340 accelerated corrosion test requires 25 repeated cycles

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV/Condensation ISO 11507</td>
<td>Salt Spray ISO 9227</td>
<td>Low Temp Exposure at -4(±1) °F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After ISO20340 exposure

Chartek shows low corrosion creep (<1/8" or 3mm)  
Another commercially available epoxy passive fire protection product showing extensive corrosion creep
A Range of Insulation Options

A range of insulation options allow Chartek’s outstanding properties to be employed in some of the most demanding environments in the oil and gas industry.

Chartek can be used in combination with cellular glass or PIR foams to allow it to fire protect steel structures that have low and high surface temperatures. This allows Chartek to fire protect vessels holding cryogenic liquids like LPG or LNG and pipes carrying hot liquids.

**Exposure to cryogenic liquids, sprays and gases, particularly as a result of LNG release, can cause the following:**

- Sudden cool down of affected structures with potential for cracking resulting from steel embrittlement
- Flash fires or explosions if gas clouds are ignited

Using our epoxy syntactic product Interthem 7050 in systems with Chartek topcoats we can offer market leading, tailored, enhanced cryogenic spill protection (CSP) solutions to provide 60 minutes protection against different types of cryogenic liquid release with combined blast and fire performance.
Chartek’s product characteristics enhance productivity schedules...

- Suitable for spray, trowel or pre-cast application techniques
- Simple and efficient contour application to complex shapes
- Rapid hardness development allows specified thickness to be quickly applied
- Tough, durable and resistant to impact and vibration damage
- Low installed weight

...and make it cost effective for offsite and modular construction projects compared to cementitious materials.

<table>
<thead>
<tr>
<th>Chartek</th>
<th>Cementitious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block outs (total area left to coat onsite)</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>Damaged area on arrival</td>
<td>Minimal</td>
</tr>
<tr>
<td>Transport Costs</td>
<td>Low</td>
</tr>
<tr>
<td>Scaffolding Costs</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Low Onsite Costs</strong></td>
<td><strong>High Onsite Costs</strong></td>
</tr>
</tbody>
</table>

Chartek also benefits from simple meshing requirements. Our patented HK-1 flexible mesh provides:

- Rolled in quick installation
- Easy cut to shape
- No need for metal pins
Bespoke Project Testing

Our state-of-the-art 10 million US$ R&D facility allows us to carry out bespoke testing to satisfy our customers’ individual project needs. The facility contains:

- Screening furnaces
- Full scale furnaces
- Dedicated application facilities
- Environmentally controlled conditioning areas

The Chartek brand is not just about product performance, it is also about the associated services and support we provide to complement our fire protection offer.

Experienced on-site technical support teams around the world

We have a network of dedicated Chartek technical service representatives with:

- Many years of experience in supporting Chartek projects around the world
- Full understanding of yard practices and operating conditions

Ensuring passive fire protection is applied correctly is vital to ensure long term fire and durability expectations are met. This is why, since the early days of Chartek fireproofing we only use qualified application companies trained in all aspects of Chartek installation.

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Fire Engineering

Right from the very beginning of your project our industry leading structural and fire engineering specialist team can work with you to review the passive fire protection requirements for your asset, providing:

- State-of-the-art computer modeling for structural response in a fire
- Bespoke structural member heat transfer modelling
- Optimized passive fire protection specifications
With a comprehensive range of primers and topcoats we can provide you with one point of contact for all your protective coating and fire protection needs.

- Consistent product performance
- Products are manufactured and stocked globally
- All products are made to ISO9001 and ISO14001 quality standards

“The key factors we considered with regards to specifying the right coating and fire protection systems were worldwide availability, the provision of technical support, quality control during application and relevant offshore references such as NORSOK approval. Choosing Chartek as the Passive Fire Protection product to be used throughout the project and being able to utilize protective coatings from the same manufacturer who provided excellent technical support during engineering and design phase was a great benefit.”

Rolf Schwerdtfeger,
Senior Construction Engineer, Linde AG

Global Manufacture and Availability
Chartek®
The Original and Most Widely Requested Total Asset Fire Protection Package