



PITT-CHAR[®] XP

Passive protection against hydrocarbon hazards



**PPG Protective &
Marine Coatings**

Bringing innovation to the surface.™



PITT-CHAR® XP

The flexible, single-product solution

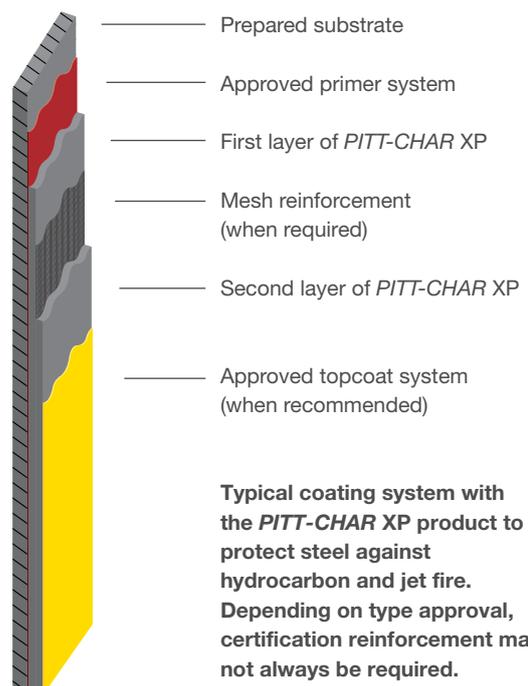
For over 30 years, the *PITT-CHAR* XP product has been delivering increased impact and vibration resistance, superior crack resistance in service and long-term performance in some of the world's toughest fire and cryogenic environments.

The *PITT-CHAR* XP product – The single-product solution for fire and cryogenic spill protection

- The *PITT-CHAR* XP product is the only patented flexible epoxy intumescent on the market
- A single coating solution that provides protection in extreme conditions against hydrocarbon hazards – explosions, impacts, fires, and cryogenic spills
- Two-component, 100% solids, flexible, epoxy intumescent fire protective coating
- Introduced in 1983, the *PITT-CHAR* XP product has more real-time history than any other epoxy intumescent coating available today with hundreds of projects successfully completed globally
- Specially formulated to protect onshore and offshore oil and gas processing facilities
- Highly efficient single layer for cryogenic spill protection – no expensive and brittle syntactic foam insulation required

Versatile application – durable protection

The illustration below shows the various layers used in the application of the *PITT-CHAR* XP product.





What makes the *PITT-CHAR XP* product unique?

The *PITT-CHAR XP* product is based on a patented, flexible, cross-linked epoxy resin that enhances the coating's performance over other conventional, rigid epoxy intumescent coatings, demonstrating superior protection and flexibility under severe circumstances. When blast-tested, the *PITT-CHAR XP* product exceeded the expectations, surviving over pressures greater than 4 bar (twice the normal project requirement) with no signs of cracking, delamination or disbondment. It also has one of the highest impact resistances in the hydrocarbon PFP industry.

Unlike rigid epoxy intumescent coatings, the *PITT-CHAR XP* product is tough and ductile with an elongation at break of approximately 20%.

The *PITT-CHAR XP* product is better able to withstand:

- Severe temperature changes
- Offsite application
- Slings and load out
- Transport by sea, rail or road
- Vibration
- Impact
- Explosions
- Steel deformations; elastic and plastic

Advantages of the the *PITT-CHAR XP* coating over rigid hydrocarbon PFP

Break Strain (% elongation) versus temperature

At temperatures down to -40°C (-40°F) this product is still five times more flexible than rigid epoxy systems.

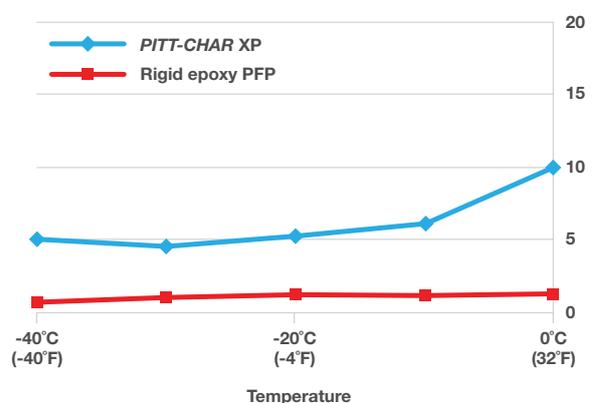


Figure 1: Break Strain (% elongation) versus temperature

PITT-CHAR XP – fire protection capabilities

The PITT-CHAR XP product has been extensively tested against the most up-to-date international fire test standards and has also been proven against large-scale, major accident hazards such as jet fires, explosions and impact. The product holds type approval certification with all the leading certifying bodies such as ABS, BV, DNV-GL, LR, UL.

It has been designed to withstand both the overpressure and the real life deflections that blast-impacted items will experience. The product's flexibility allows designers to utilize both elastic and plastic deformation of the structures without compromising the fire protection capabilities.

Comparison of fire test curves

The graph below shows the difference in temperatures depending on the type of fire. The PITT-CHAR XP product meets the most severe jet fire temperatures.

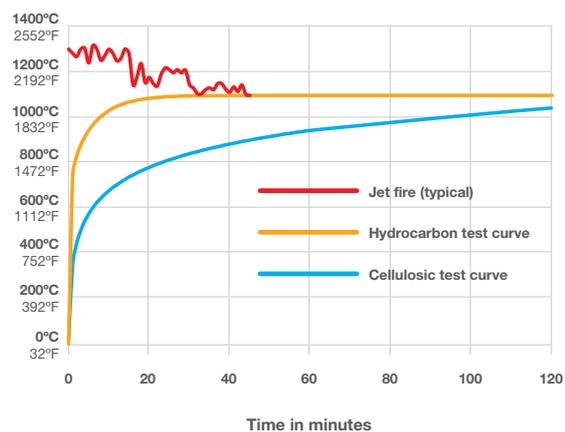


Figure 2: Difference of temperatures by fire type

Jet and torch fire testing

- Up to 180 minutes jet fire (ISO-22899-1)
- NFPA 58 torch fire and hose stream tested
- Excellent resistance to high heat flux and erosive fires
- Full-scale jet fire tested at British Gas's Spadeadam facility

Pool and diffuse hydrocarbon fire testing

- UL1709 environment and fire testing
 - XR612 design up to 5 hours
 - XR636 design up to 4 hours
 - Approved over carbon and galvanized steel
- ISO834 Hydrocarbon Fire
 - Structural beams and columns (120 minutes)
 - Fire separating divisions A-60, H-0, H-60, H-120

Explosion testing

- Able to withstand overpressures of >4 bar (>60 p.s.i.)
- Resistant to shockwave, drag forces,
- Capable of withstanding plastic and elastic deformations
- Resistant to impact damage from projectiles





PITT-CHAR XP – cryogenic spill capabilities in service

LNG operators, looking for efficient solutions to provide both cryogenic spill protection and fire protection have found that the *PITT-CHAR XP* product's excellent flexibility provides them with an optimal solution.

Even under conditions of rapid cooling, the *PITT-CHAR XP* product's single layer maintains its internal cohesion, providing a continuous film that insulates at extremely low and high temperatures at the same time.

The *PITT-CHAR XP* product exposure to liquid nitrogen pooling on a boxed steel panel

In these tests, the spill of a cryogenic liquid to a steel deck has been simulated. A steel panel, with walls to allow the liquid nitrogen used for the spill to pool, has been coated with the *PITT-CHAR XP* product. The average temperature measured on the backside of the panel after 120 minutes exposure was -18°C (-0.4°F).

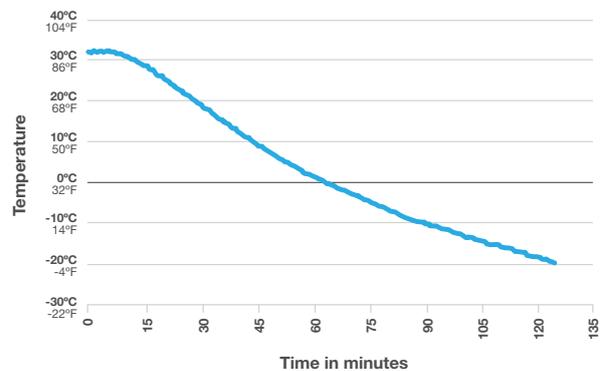


Figure 3: Liquid Nitrogen exposure of a boxed steel plate



Confidence in performance

The *PITT-CHAR XP* product passes cryogenic and hydrocarbon fire tests

Table-1: Cryogenic and hydrocarbon fire test

Test	Average steel temperature
75 minutes liquid nitrogen immersion at 196°C (-320°F)	-29°C (-20°F)
60 minutes fire test	0°C (32°F)
120 minutes fire test	67°C (153°F)
180 minutes fire test	140°C (284°F)

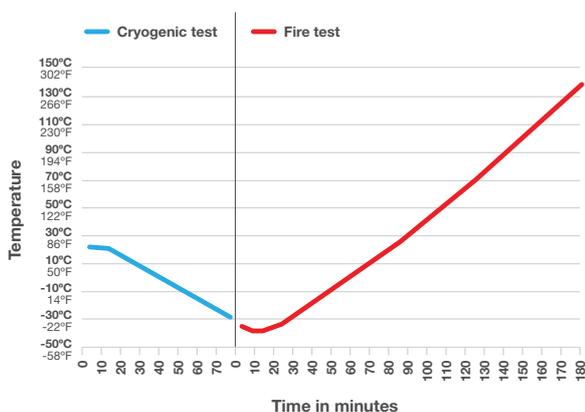


Figure 4: Cryogenic immersion followed by UL 1709 fire test (180 minutes)

Cryogenic spill exposure

- Tested with liquid nitrogen at -196°C (-320°F)
- Extensively tested (up to 60 minutes cryogenic exposure)
- Tested for full immersion, pooling and spray

Combined CSP and fire testing

- Full immersion CSP immediately followed by UL1709 test
- 180 minutes jet fire testing following 30 minutes full liquid nitrogen immersion
- Extensive spill testing at different thickness and duration to provide an optimized solution
- Demonstrates the single-content system is effective

Crack resistant

- Patented flexible resin technology resists cracking under severe cryogenic conditions
- Avoids use of heavily loaded glass bead syntactic systems that are expensive and prone to brittle cracking
- The *PITT-CHAR XP* coating resists damage from minor leaks at system startup

PITT-CHAR XP – full life-cycle benefits

Extensive track record

As a result of its unique flexibility, the *PITT-CHAR XP* product has been one of the worlds leading hydrocarbon passive fire protection products for over 30 years. It has an extensive record of outstanding performance on both offshore and onshore projects for a wide range of customers, including many national and international oil and gas majors.



Image: The *PITT-CHAR XP* coating intact with excellent adhesion and corrosion protection after 13 years in service offshore

Uniquely flexible

The *PITT-CHAR XP* product often exceeds global standards as its unique flexibility enables it to provide protection during a 4-bar over pressure explosion test when the standard requires only 1 bar. Under explosion conditions, this extremely robust product will protect the steel – even when there is significant steel deflection – whereas rigid epoxy systems will be prone to crack, exposing the steel substrate to the effects of any subsequent fire.



Image: The *PITT-CHAR XP* coating intact after 4-bar overpressure blast test

The *PITT CHAR XP* product satisfies the widespread global requirement for a flexible and resilient hydrocarbon PFP that can withstand movement, flexing, stress after application, cold temperatures, cracking and high pressure blasts that cause significant substrate deflections.

Avoid damage during transportation, erection, commissioning and operations

- Single system reduces application complexity and overcoating and cure time
- Faster turnaround of steel
- Smaller block-outs possible reducing site work
- Flexible, tough system ensures cracking and damage resistance
- Resists cracking during slinging and handling
- Prevents damage by other trades (pipe fitters, insulators, etc.)

Reduced long-term inspection and maintenance cost

- Excellent long-term environmental resistance – UL tested for industrial environments
- Over 30 years' successful track record
- Extended inspection window – can eliminate annual inspections and constant patching
- Future-proofs the facility against hazards such as jet fire and explosion not currently mandated in API guidance but identified by the Chemical Safety Board (CSB) reference as real threats



Contact us:

Asia Pacific

☎ +86-21-6025-2688

✉ ppgpmc.ap@ppg.com

Europe, Middle East and Africa

☎ +32-3-3606-311

✉ customers@ppg.com

ppgpmc.com

Latin America

☎ +57-1-8764242 ext. 201

✉ ppgpmcandean-ca@ppg.com

North America (US & Canada)

☎ +1-888-9PPGPMC

✉ PMCMarketing@ppg.com

© 2016 PPG Industries, all rights reserved.

962283-GLOB

Created February 2016

No rights can be derived from the content of this publication. Unless otherwise agreed upon in writing, all products and technical advice are subject to our terms of sale, available on our website ppgpmc.com. All rights reserved. The PPG logo, *Bringing innovation to the surface.*, and all other trademarks herein are property of the PPG group of companies.