

**DON'T WAIT
UNTIL IT'S TOO LATE.**

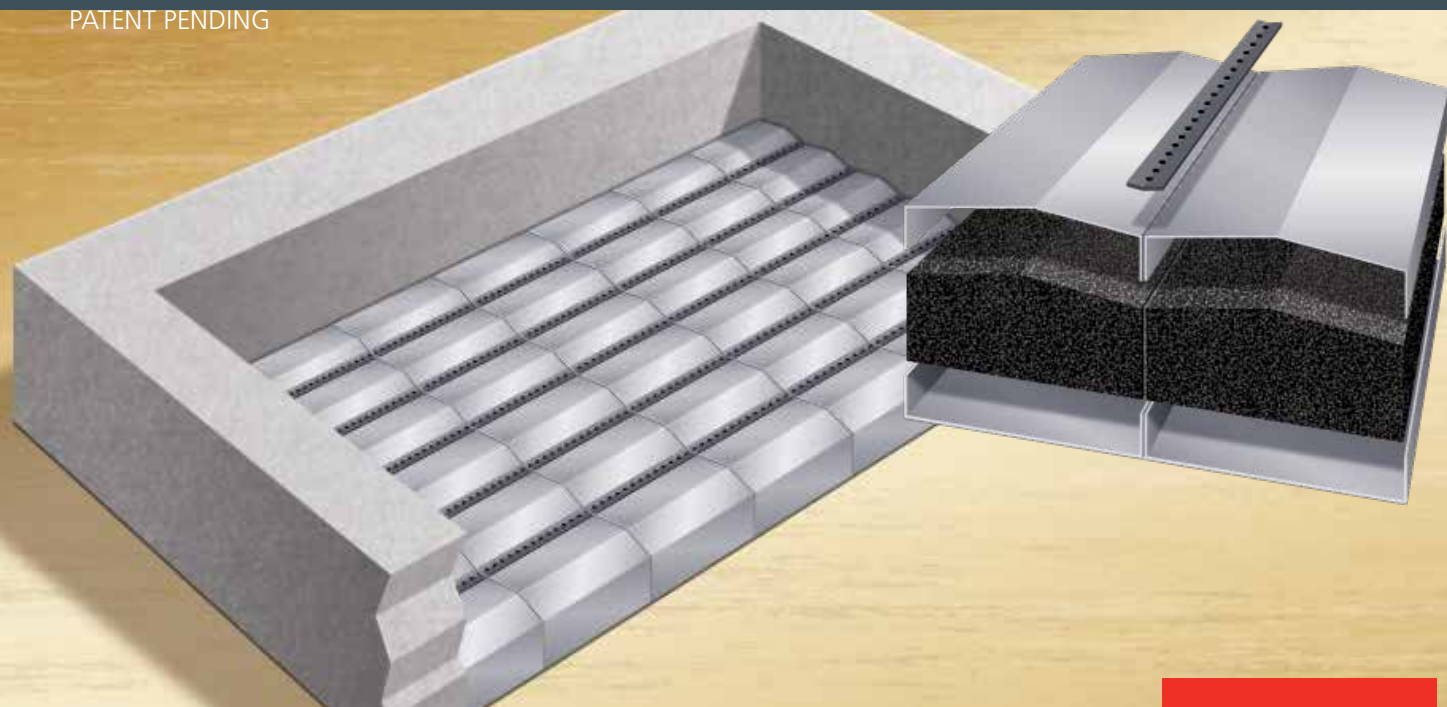
FOAMGLAS[®]

Pittsburgh Corning



**FOAMGLAS[®] PFS[™]
POOL FIRE SUPPRESSANT · GENERATION 2**

PATENT PENDING



FOAMGLAS® PFS™ GENERATION 2

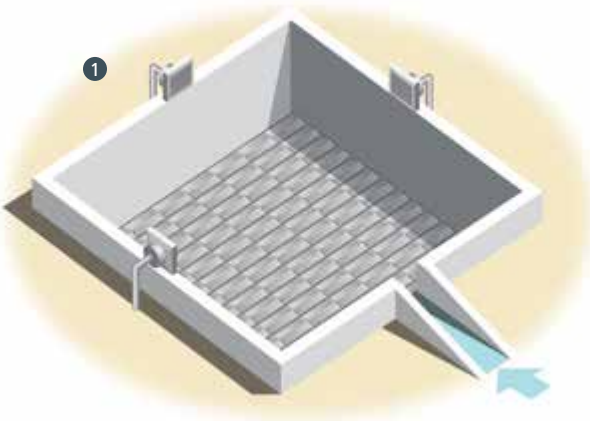
FOR POOL FIRE SUPPRESSION

Industrial fire safety is more important now than ever before. Production demands require oil and gas facilities to run continuously without fear of costly safety issues. Many companies are also assigning a greater priority to communicating their successful safety records both internally and externally.

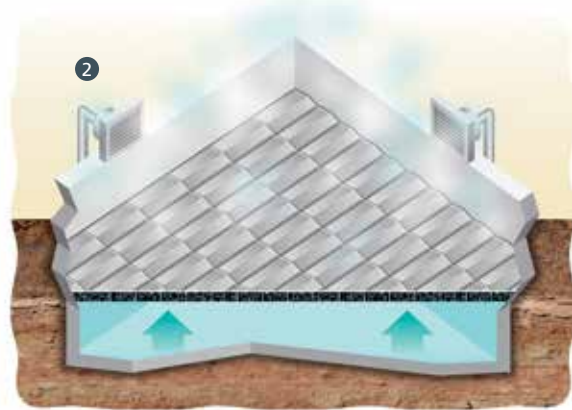
After widespread adoption of the Generation 1 system, Pittsburgh Corning Corporation introduced the FOAMGLAS® PFS™ Generation 2 pool fire suppression to address

requirements for extended resistance to weathering and poor climatic conditions, as well as improve the working surface to ease snow removal. This system complements any safety program by delivering a reliable, low cost, low-maintenance passive solution for the reduction of thermal radiation and flame height in contained liquid natural gas (LNG) fires. FOAMGLAS® PFS™ system is easy to install and can provide immediate mitigation of the thermal flux, rate of combustion, view and overall size of an LNG pool fire.

HOW IT WORKS.



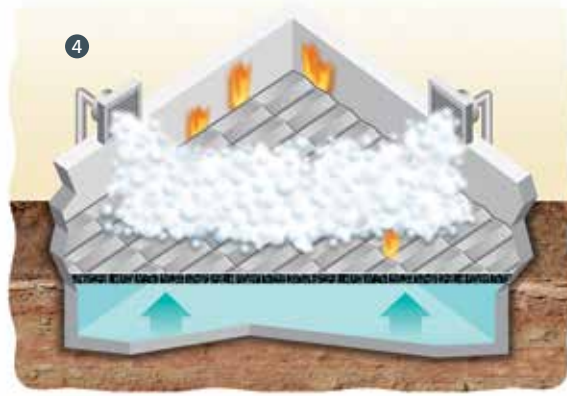
The FOAMGLAS® PFS™ system is a passive system that remains in place to assist in providing immediate and automatic control of LNG pool fires without deployment delays.



Because FOAMGLAS® PFS™ system is highly buoyant, the pool fire suppressant modules rise immediately to the surface of the LNG to provide an insulating cap that can aid in reducing vaporization.



In the event of ignition, the FOAMGLAS® PFS™ modules quickly limit thermal radiation and flame height.



The system works in conjunction with fire fighting foams.



EASY TO INSTALL

FOAMGLAS® PFS modules are constructed of a clad insulation core which are bridged together to uniformly cover an impounding sump or other containment area. These units are easily installed on site and do not require any specialized skills or equipment to install or maintain. The product is packed on standard pallets so no special shipping or handling is required.

IMMEDIATE CONTROL AND PROVEN RESULTS WITH CELLULAR GLASS SYSTEMS

Vapor and Fire Control Testing commissioned by TOTAL and conducted under the supervision of Resource Protection International at the Centro Jovellanos concluded that FOAMGLAS® PFS® was effective at in reducing radiant heat flux and controlling fire from LNG and LPG pool fires.

In scale tests conducted by Shell Research Ltd, a depth of 200 mm (8 inches) of FOAMGLAS® PFS™ cubes, assisted in providing an immediate and automatic control of the fire at a level comparable with that provided of 1-2 meters (3.3-6.6 ft.) of high-expansion foam.

Results of large scale experiments performed at the Emergency Services Training Institute of Texas A&M University have shown that the view factor of an LNG pool fire suppressed by FOAMGLAS® PFS™ system is comparatively lower than that of high expansion foam, providing real protection from thermal radiation for exposed equipment or personnel. With maximum flame height significantly reduced at a steady state, the thermal radiation is limited to the visible fire within the much lower temperature range of 200°C to 500°C (392°F to 932°F).

Field extinguishing trials conducted were successful in demonstrating the system's performance. These trials, performed on an LNG test pit of 100 square feet, showed that firefighters equipped with a single 20 lb. dry chemical extinguisher were able to directly approach the edge of the containment pit and extinguish the flames within seconds with only a partial charge.

Liquefied Natural Gas pool fires are considered one of the main hazards of LNG facilities. Suppression methods for potential fires are designed to reduce hazards such as radiant heat and flame height. Based on past research, high expansion foam was regarded as the primary technology in suppressing LNG pool fires. More recently, Pittsburgh Corning introduced the FOAMGLAS® PFS™ pool fire suppression system to assist in providing immediate and automatic control of LNG pool fires. The FOAMGLAS® PFS™ pool fire suppression system has been tested too show that both radiant heat and flames were significantly reduced when used as a passive system prior to a gas leak when compared to traditional foam suppression systems used as the only method to attenuate pool fires. In order to protect a facility from fire and smoke, the use of glass makes perfect technical sense.

UNIQUE PHYSICAL PROPERTIES

The FOAMGLAS® PFS™ system contains specially formulated low-density cellular glass that has a combination of physical properties not found in traditional fire suppressant foams. Made of cellular glass, the material is both extremely buoyant and nonflammable. The pool fire suppressant module system is non-corrosive and resistant to water and vermin. It is also fiber-free, and has a high compressive strength. The FOAMGLAS® PFS™ system works in conjunction with fire fighting foams. Damaged or post incident waste materials can be disposed of as standard refuse, and can be compacted for reduced waste volume.



Closed-cell structure of FOAMGLAS® cellular glass.

FOAMGLAS® PFS™ POOL FIRE SUPPRESSANT GENERATION 2

Pittsburgh Corning introduced the FOAMGLAS® PFS™ Pool fire Suppressant system to complement any safety program by delivering a reliable, low-cost, low-maintenance passive protective solution for the reduction of thermal radiation and flame height in contained liquid natural gas (LNG) fires. The FOAMGLAS® PFS™ system is easy to install and can provide immediate mitigation of the thermal flux, rate of combustion, view, and overall size of an LNG pool fire.

BENEFITS

- Easy to install
- Continuous Protection & Immediate Control
- Passive & Reliable
- Low Cost
- Low Maintenance
- Long term resistance to weathering and poor climatic conditions
- Customized design to match the containment area
- May reduce mandated exclusion zone for your facility

PROJECT REFERENCES¹:

PORI LNG
YAMAL LNG
NATIONAL PETROLEUM CORP - BARBADOS
SINGAPORE LNG
ELENGY - FRANCE
LNG MIAMI
LYSEKIL LNG
BINTULU MLNG
FERUS NATURAL GAS FUELS
APA GROUP - AUSTRALIA
SAMSUNG - KOREA
TOTAL PETROCHEMICALS - FRANCE
ADGAS - UAE
EG LNG
BOC - AUSTRALIA
ISLE OF GRAIN LNG
RISAVIKA LNG
CLEAN ENERGY HIGH DESERT LNG
GASREC LIQUID BIOMETHANE - UK
FREEPORT LNG
YEMEN LNG
PANIGAGLIA LNG

FIRE CREDENTIALS FOR FOAMGLAS® INSULATION

Der Norske Verita Type Approval
Lloyd's Register
USGG Approval for Non-combustible Inspections

Material Tests:
EN ISO 1182 (Class A1)
ASTM E136 (noncombustible)
ASTM E 84 - Flame-spread (0) Smoke Development (0)

Application Tests¹:
FOAMGLAS® Insulation on LNG. MKOPSC.
Texas A&M University.

Fire & Vapor Control Testing. Resource Protection International. Centro Jovellanos.

Extinguishing Trials at Brayton Fire Training Filed.

A Novel Method for Controlling Pool Fires.
Fire Technology Journal. Shell Research Limited. Thornton Research Centre.

REGULATORY OVERVIEW

- National Fire Protection Association 59A, Standard for the Production, Storage, and Handling of LNG, has contributed to the conditional withholding and final denial of regulatory approval for several LNG projects by the Federal Energy Regulatory Committee.
- Requirements for exclusion zones can impact overall site layout and design - with direct impact on land acquisition and construction costs for facility owners.
- Mandated exclusion zones for LNG facilities include parameters for both vapor dispersion and thermal radiation (radiant thermal flux).
- NFPA 59A allows for the use of passive fire mitigation techniques in the calculation of radiant heat distances, subject to the approval of the agency having jurisdiction.

¹Includes generation 1 systems

The logo for FOAMGLAS, featuring the word "FOAMGLAS" in a bold, black, sans-serif font with a registered trademark symbol (®) to the upper right. The text is set against a white background within a grey rectangular box.The Pittsburgh Corning logo, consisting of the words "Pittsburgh Corning" in a black, sans-serif font. Above the text is a horizontal bar that is red on the left and grey on the right.

Pittsburgh Corning Corporation

**Global Industry Headquarters
800 Presque Isle Drive
Pittsburgh, PA 15239 USA**

For web-based Sales and Technical Service inquiries,
please visit www.foamglas.com

To contact by phone or email:
Industrial & Commercial Sales

Americas

+1 724 327 6100
+1 800 545 5001

Asia-Pacific

Singapore: +65 9635 9184
China: +86 (0) 21 6140 8002
Japan: +81 50 7554 0248

Europe, Middle East & Africa

+32 13 661 721

Technical Services

Americas & Asia Pacific

+1 800 327 6126
Foamglastechnical@pghcorning.com

Europe, Middle East & Africa

+32 13 611 468
Industrytechnical@foamglas.com

The information contained herein is accurate and reliable to the best of our knowledge. But, because Pittsburgh Corning Corporation has no control over installation workmanship, accessory materials or conditions of application, NO EXPRESSED OR IMPLIED WARRANTY OF ANY KIND, INCLUDING THOSE OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS MADE as to the performance of an installation containing Pittsburgh Corning products. In no event shall Pittsburgh Corning be liable for any damages arising because of product failure, whether incidental, special, consequential or punitive, regardless of the theory of liability upon which any such damages are claimed. Pittsburgh Corning Corporation provides written warranties for many of its products, and such warranties take precedence over the statements contained herein.