

UNIFRAX APPLICATION STORY



Product Solution: Fiberfrax® Anchor-Loc® LTZ
and Fiberfrax® Durablanket® LT
Industry: Chemical & Petroleum Industry (CPI)
Application: Ethylene Cracking Furnace
Location: Desert Climate

JUNE 2021

Business Challenge

When designing the insulation lining for an ethylene cracking furnace, it is of the utmost importance that it complies with the codes and standards as outlined by the American Petroleum Institute (API). These standards are put in place to ensure that the insulation lining is capable of providing sufficient thermal performance and service life. Petrochemical heaters will operate for long periods of time before any major shutdowns for maintenance. So any unforeseen insulation lining failures that cause a shutdown can be very costly to the end user.

The API standards established can pose challenging application specifications that often result in the need for super insulating materials to comply with code. A microporous (super insulator) back-up material is typically the solution. This solution comes at an extremely heightened cost in comparison to traditional refractory ceramic fiber (RCF) lining solutions.

Application

Unifrax was asked to propose a Fiberwall insulation solution for several Ethylene Cracking Furnaces. Each furnace section needed to satisfy a 75°C (167°F) cold face requirement per API Standard 560 (Fired Heaters for General Refinery Services). The application conditions consisted of a 46°C (115°F) ambient temperature (hot sunny day in a desert), 2.5 m/s (8 ft/s) wind speed, and 0.9 emissivity. A preliminary heat flow analysis made it clear that the cold face temperature requirement would be very difficult to achieve under these harsh conditions.

An engineered solution with conventional and competitive RCF materials proved impossible with the hot face temperatures and lining thickness constraints present in each section. The assumed way to satisfy the cold face requirement was with the use of a microporous back-up board. Incorporating microporous board becomes exceptionally labor intensive and expensive.

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“A REFRACTORY CERAMIC FIBER LINING SOLUTION THAT WILL FINALLY ELIMINATE THE NEED FOR MICROPOROUS”



Solution

The customer had hit a road block; not able to achieve the cold face temperature requirement with a traditional RCF lining (RCF modules and back-up blanket). The customer also did not want to go down the very expensive and labor intensive route associated with the microporous back-up option (RCF modules with microporous back-up board).

What to do now?

Answer – Evaluate Unifrax’s latest innovation in RCF blanket insulation.

Fiberfrax LT & LTZ provide a step change improvement in thermal performance over conventional RCF blanket products offered worldwide. They have less shot and more fiber pound for pound, offer improved handling for safer, quicker and easier installation, as well as increased durability and tensile strength that allows them to perform for longer, even in the most extreme conditions. Most importantly, **Fiberfrax LT & LTZ** products have thermal conductivity values much lower than traditional RCF products, making them an elite thermal performer. They are available in both module and blanket form.

A proposed **Fiberfrax LT & LTZ** Fiberwall insulation lining was analyzed using our Unifrax Heat Flow Program. The heat flow summaries for the radiant walls of the Ethylene Cracking Furnace are shown in the diagram to the right for all three Fiberwall insulation lining options.

Result – No need for microporous.

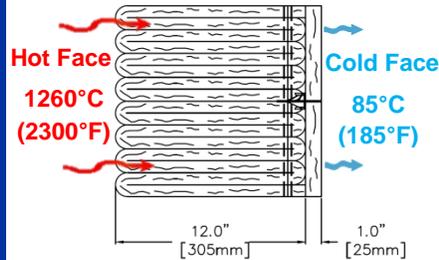
The superior thermal performance of the **Fiberfrax LT & LTZ** products (Option 3) was able to satisfy the tough to meet cold face requirement.

Heat Flow Summary

Total Lining Thickness: 330mm (13")
Hot Face Temperature: 1260°C (2300°F)
Ambient Temperature: 46°C (115°F)
Wind Speed: 2.5 m/s (8 ft/s)
Emissivity: 0.9
Cold Face Requirement: 75°C (167°F)

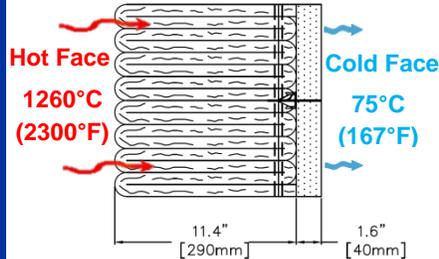
Option 1 – Traditional RCF Lining

Lining Construction: 305mm (12") thick Thread-Loc₃ 2600 modules, 192 kg/m³ (12pcf) dense with 25mm (1") thick Durablanket S, 128 kg/m³ (8pcf) dense as back-up material.



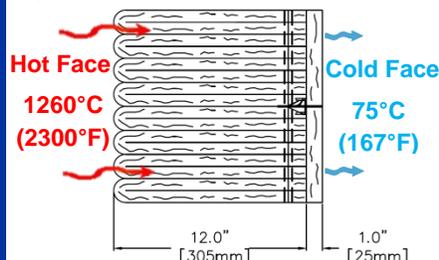
Option 2 – Microporous Back-up Lining

Lining Construction: 290mm (11.4") thick Thread-Loc₃ 2600 modules, 192 kg/m³ (12pcf) dense with 40mm (1.6") thick Excelfrax 1800 Board (Microporous) as back-up material.



Option 3 – Fiberfrax LT & LTZ Lining

Lining Construction: 305mm (12") thick Thread-Loc LTZ modules, 192 kg/m³ (12pcf) dense with 25mm (1") thick Durablanket LT, 128 kg/m³ (8pcf) dense as back-up material.



Customer Advantages

• ELIMINATE NEED FOR MICROPOROUS INSULATION = SIGNIFICANT COST SAVINGS

- ✓ Save a lot of money on raw materials
- ✓ Save time & money by avoiding extremely labor intensive microporous installation

• SATISFY TOUGH TO MEET COLD FACE REQUIREMENT WITH RCF LINING

- ✓ Comply with worldwide API standards
- ✓ Overall insulation lining thickness in compliance with project design constraints

• QUICK AND EASY INSTALLATION

- ✓ Fast installation rate of Fiberwall lining
- ✓ No special skills or procedures required with the installation of modules and back-up blanket

About Unifrax

Unifrax is a global leader in high performance specialty products used by many industries in a diverse group of industrial applications. Our products provide substantial improvement in thermal performance, save thousands of dollars in energy costs and can help reduce your operations environmental footprint.

Contact Us

To learn more about Unifrax Thermal Management Solutions, contact your Unifrax sales representative or the Unifrax Application Engineering Group in your region:

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