

DiamondWrap® HTA™ 12" – 42" Flare Line Repair in Bahrain

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BAHRAIN

Pipe Details

Customer: Crude Oil Refinery

Location: Bahrain

Pipe Diameter: 12", 24", 36", 42"

Design Pressure: 50 psig

Design Temperature: 300°F

Pipe Defect: Internal Corrosion with 50% Wall Loss for long lengths of pipe

Summary

A refinery in Bahrain discovered internal thinning of up to 50% on five flare lines, varying in length and diameter. Unable to remove the pipe from service without significant cost detriment, cut out and replacement was not an option. Additionally, clamps would add too much weight and too much cost to the line for the lengths of pipe that were experiencing thinning. As a result, the refinery's engineers turned to Citadel's DiamondWrap® for a proposed engineered composite repair.

Citadel Technologies' team of engineers designed repairs for each diameter and repair length according to ASME PCC-2 Article 4.1, and recommended a DiamondWrap® HTA™ repair solution to the refinery. Only 2 layers of DiamondWrap® were required to repair the internal thinning at the given pressures. Repairs were designed for tees, straight runs, elbows, and reducers. Many of these geometries would be prohibitive of using clamps.

A team of trained and certified installers installed 2 layers of carbon fiber over the specified repair area, according to the calculations prepared by the Citadel Technologies engineer. Here is a chart of the repair lengths that were achieved on each diameter of pipe within the system.



Diameter	Total Repair Length
12" LPG	350 ft
12" 2 Poly	300 ft
24" GCU	100 ft
36" RHL	20 ft
42" FCCU	125 ft

Below are photos of the completed repairs:



This refinery was able to stay in full operation throughout the repair with no need to shut down or reduce capacity. Citadel Technologies

successfully designed and implemented these repairs to get the customer through to their next turnaround to prevent an unscheduled outage due to the imminent leaks from the thinning flare line. Citadel Technologies is still a trusted partner in corrosion repair to this refinery.

There are nearly 3,000 trained Clock Spring installers around the world who are qualified to provide repairs with Clock Spring products. Clock Spring regularly offers [training classes](#) for installers and can custom design training for individual company needs