

Composites Extend Service Life of Corroded Flare Line

PIPE DETAIL

42-inch (1,067-mm) gas pipeline had suffered from corrosion over a length of 100 ft (30.5 m)

113° F (45° C) ambient environment

Pipe on supports 26.2 ft (8 m) above ground level

SUMMARY

- Internal corrosion caused a leak in a 42-inch (1,067-mm) flare line carrying aggressive gases at a Middle East refinery
- The damaged line had to be accessed using scaffolding, with repairs carried out in temperatures exceeding 45° C (113° F)
- DiamondWrap® with HTA epoxy, a carbon fiber system, restored the line to safety
- With the oversight of a ClockSpring|NRI supervisor, 24 trained and certified technicians from local distributor MCSC WLL completed the repair in 51 days
- No hot work was required for the repair
- The installation was executed without taking the line out of service, saving considerable cost and inconvenience to the refinery owner

When internal corrosion caused a leak in a 42-inch (1,067-mm) flare line carrying aggressive gases at a refinery in the Middle East, the owner began looking for a composite solution that would be suitable for a demanding ambient environment of 45° C (113° F). Corrosion had damaged 100 ft (30.5 m) of line, and a fast resolution was needed to restore integrity.

Having worked with ClockSpring|NRI in the past, the owner turned to the company again, requesting a high-temperature carbon fiber epoxy-based solution. The intent was to use the composite to restore the damaged pipeline to its original integrity and to extend its functional working life.

Engineers evaluated the damage and developed a repair using DiamondWrap® with HTA epoxy. The system



A team of 24 trained and certified installers worked from scaffolding erected around the elevated line to execute the repair. (Photo courtesy of ClockSpring|NRI)

uses a bidirectional weave of carbon fiber and a 100% solids epoxy that form a composite system that is stronger than steel.



A closeup of the repaired line shows how the carbon fiber was wrapped around the line. The repair team covered the surface of the damaged area with two layers of carbon fiber affixed with HTA epoxy. (Photo courtesy of ClockSpring|NRI)

The structural system forms a pipe around a pipe, with each successive wrap increasing the pressure rating. The bidirectional weave allows for strength in both the hoop and axial directions, minimizing creep and ensuring that there is no reduction in strength over time. The high corrosion resistance of this composite system made it the perfect solution for this repair.

Deploying a ClockSpring|NRI supervisor and a team of 24 trained and certified technicians provided by local distributor MCSC WLL, the project got under way.

A scaffold was erected to allow the team access to the damaged pipe, which was on supports 8 meters (26.2 ft) above the ground. Working from the scaffold, the team prepared the line and began wrapping the damaged area, covering the entire surface with two layers of carbon fiber affixed with HTA epoxy over a 51-day period. Despite being installed in a



very hot environment where temperatures exceeded 45° C (113° F), the composite system cured perfectly, restoring the line to safe operations, meeting the project schedule without introducing hot work or other additional hazards to the work site and with no negative environmental consequences.

Despite being installed in a very hot environment where temperatures exceeded 45° C (113° F), the composite system cured perfectly, restoring the line to safe operations without introducing hot work and with no negative environmental consequences. (Photo courtesy of ClockSpring|NRI)

The facility remained in operation throughout the repair, allowing this solution to be carried out at approximately 20% of the cost of shutting down the line.