

COMPOSITE REPAIR FOR PIPE REINFORCEMENT

According to ISO 24.817 & ASME PCC-2

DEFECT TYPES	Cracks
PIPE DETAILS	MDEA Regenerator column - 264" – MDEA / Acid Gas – max op. temperature 90°C - design pressure 1 bar
LOCATION	LIBYA
3X SOLUTION	REINFORCEKIT® 4D – High Temperature

OVERVIEW

The objective of the repair, carried out end of December 2019 by 3X ENGINEERING (3X) and its local distributor AL MAIDA, was to **reinforce 3 circumferential welds suffering from cracks, situated on a huge column.**

SCOPE OF WORK

According to ISO 24.817 and 3X repair calculations, 4 composite layers of **REINFORCEKIT® 4D HT+** (specifically dedicated to high temperature) were determined to reinforce the defects.

Scaffoldings and surface preparation were already managed before 3X team arrival. The surface preparation was made according to 3X requirements to get a good surface roughness and ensure a good bonding between the steel of the column and the composite of the repair. Upon arrival, 3X specialists checked the surface profile and the hygrometric conditions and cleaned the surface using acetone before starting the wrapping procedure (steps described below – the procedure is the same for the 3 welds to be reinforced).

- 1 **F3XS1** filler was applied on the weld to smooth the shape and improve the Kevlar® tape fitting on the column.
- 2 **R3XHT+** resin was applied on the surface to ensure the perfect impregnation of the Kevlar® tape.
- 3 Composite wrapping was completed using **Kevlar® tape impregnated with R3XHT+ resin** → 4 layers and 1270mm repair length for each defect. During the process, tape impregnation was checked on both sides to ensure the expected performance.
- 4 Finalization of the repair. A layer of **R3XHT+** was applied all over the repair to ensure good wetting and improve the visual aspect. **Reference plate** was installed on each repair for traceability purpose.

For each repair, samples of filler and resin were taken during application for quality control.

RESULTS

Hardness measurements were performed 3 days after job completion and concluded the good achievement of the repairs. This project was challenging because of the large column diameter and the time frame for completing the job. The column was successfully reinforced on the weakest areas and is now protected from leaking issues.

Scaffolding levels with welds



Fig. 1: Column overview with welds location



Fig. 2: F3XS1 application on weld



Fig. 3-4-5 : Wrapping in progress



Fig. 6: Wrapping completed (4 layers)