

## COMPOSITE REPAIR FOR PIPE REINFORCEMENT

According to ISO 24.817 & ASME PCC-2

DEFECT TYPE	<b>Pipe subjected to compressive stress</b>
PIPE DETAILS	<b>30" pipe – Operating temperature 45°C - Pressure 600 psi</b>
LOCATION	<b>COLOMBIA</b>
3X SOLUTION	<b>REINFORCEKIT® 4D – EC</b>

### OVERVIEW

The objective of the job, carried out in 2018 in Colombia by CPSEVICES (3X ENGINEERING (3X) distributor), was to **reinforce and protect a 30" pipe subjected to compressive stress** in order to verify if the pipe integrity remains preserved once loads are applied.

### SCOPE OF WORK

Each reinforcement is designed specifically according to the characteristics of the pipe, the operating conditions and the size of the defect. In accordance with ASME PCC-2 standard and 3X repair calculations, 4 layers of **REINFORCEKIT® 4D-EC** were determined to reinforce the pipe.

1/ Before the repair, qualified staff of CPSEVICES inspected and delimited the area to be reinforced.

2/ Surface preparation was carried out by an external contractor using manual-mechanical tools to obtain a good surface roughness (between 60 and 100 µm) and thus guarantee the bonding between the steel pipe and the composite.

3/ The surface was cleaned with ethanol and the hygrometric conditions were checked before wrapping process.

4/ Wrapping composite reinforcement covering the delimited area was completed using **Kevlar® tape impregnated with R3X1060 resin** (4 layers with a specific repair length according to the characteristics of the loads to which the 30" pipe would be subjected).

5/ Once wrapping completed, the inner diameter was measured in order to detect any final deformation.

6/ Finally, two external loads (1.75 tons each one) were applied to check the resistance of the pipe.

### RESULTS

The pipe reinforced with **REINFORCEKIT® 4D-EC** was subjected to 3.5 tons of external loads without presenting any type of damage or deformation. The lifetime of this composite reinforcement is 20 years.



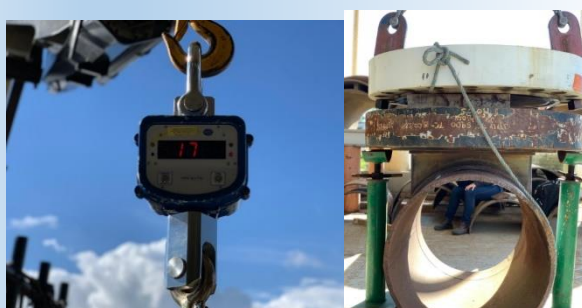
Figure 1: Pipe to be reinforced



Figure 2: Wrapping completed



Figures 3-4: Measurement of inner diameter and initial loading



Figures 5-6: 3,5 tons of loads applied on reinforced pipe