

## CORROSION IN REFINERY INDUSTRY FAILURE ATLAS

**CASE HISTORY**    n° 6            Date            April 2012

**Process : Atmospheric distillation**  
**Equipment: piping**

**DATE OF INCIDENT AND/OR INFORMATION:** July 2007

**NATURE OF THE INCIDENT :**

- A small leak was observed at the weld HAZ of a tee 12 "on a transfer line of an atmospheric distillation. Controls show a significant loss in thickness across the tee (thickness observed of 2.9 to 4.7 mm, for original nominal 9.5). A box is placed temporarily in the weld.
- The other 3 tees, that includes the line, are controlled unit in service. Two show no significant loss, while the third shows a reduction of similar thickness to the tee that is leaking.
- Supply of 2 new tees, and items necessary to repair, are launched in an emergency.
- A week later, the second tee, with loss of thickness, begins to leak in one place. The unit is stopped for inspection and repair.

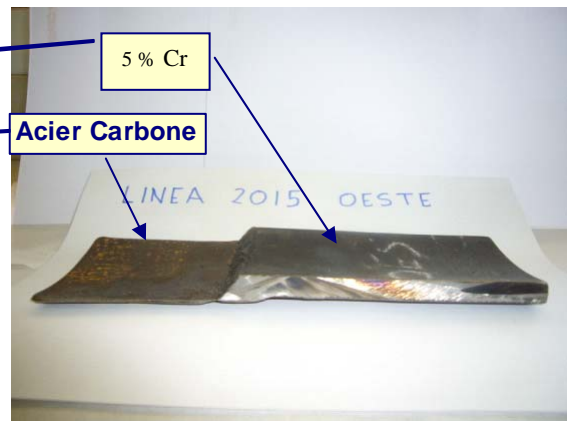
**CONSEQUENCES :**

No fire or explosion is observed but the unit has to be stopped for inspection and repair.

**MATERIAL COMPOSITION and REFERENCES**

Carbon steel and low alloyed 5%Cr steel

**PICTURES AND SCHEMES :**



**ASPECT :**

**MEDIA AND OPERATING CONDITIONS:** atmospheric distillation : 2 bars and 350°C

**TIME TO DETERIORATION :** 40 years



## **CORROSION IN REFINERY INDUSTRY FAILURE ATLAS**

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**ANSWER**

**TYPE OF CORROSION :** Sulfidation

**API 571 CLASSIFICATION:** 4.4.2

**CAUSES :**

Chemical analysis shows the two tees are made in carbon steel unlike the marking symbols mentioning 5% Cr steel;

This error on the steel grade is the origin of corrosion leading to failure more than 40 years after commissioning.

**REMEDY :**

- Replacement of 2 tees and adjacent components in the proper metallurgy : 5% Cr steel
- Controls thickness on all the components of transfer lines 4.
- Control of all components and welded joints: the results showed that only 2 tees that are corroded and that they do not comply to the material specification.
- PMI is recommended

**PUBLICATION - TECHNICAL REPORT:**

**BIBLIOGRAPHIC REFERENCES :**