

## COLD CRACKING

### DEFINITION:

Cold cracking, or hydrogen assisted cracking, is shown by the apparition of cracks, immediately or after a few minutes, sometimes even hours, after the welding is finished. These cracks can appear in the weld or in the heat affected zone (HAZ).

### CAUSES:

Are needed the following factors:

Hydrogen present in the weld material or in the HAZ.

Susceptible microstructure (martensite).

Mechanical stresses (thermal or residual stresses).

### MATERIALS:

Carbon steel or low alloy steel.

Some high alloy steel (for example 12% Cr).

### RANK OF TEMPERATURES:

Between  $-60^{\circ}$  and  $150^{\circ}$  C.

### DETECTION:

In carbon steel and those steels with a low content in manganese or microalloyed, cracks are very small (H micro cracks) and often those cracks regroup. In high strength steels, cracks are generally bigger being able to cross the weld in transverse direction. The crack is observed radiologically as a black, fine and regular crack.

### SOLUTION:

In order to prevent cold cracking the content in  $H_2$  should be reduced, preheat or postwarm the piece to prevent the apparition of fragile microstructures and to decrease the residual stresses.

