Hot cracking

Hot cracking is a welding defect that occurs with temperature highest than 1200ºC and it's due the presence of impurities with lower melting point than the bare metal. The cooling is bigger on the side of the weld and it's from there that grain grows (dendrite) oriented to the center of weld that's the last to became solid. On this stage, when grain find which other, occurs a formation of an impurity film, that promotes a reduction of melting point of the weld. Meanwhile, weld don't sustain the tensions due the material contractions during solidification process, originating the center line crack on the weld.

Factors

Temperature > 1200ºC

Carbon (C), sulphur (S), phosphorus (P)

Prevention modes

In a material level:
- material with some percentage of ferrite δ in the case of austenitic stainless steels
- control on sulphur and phosphorus contents
- manganese, chromium, molybdenum addition

Some typical values for contents or ratio contents

$\delta < \%\ < 8$ $S < 0.035$ $P < 0.035$ $\frac{Mn}{S} > 20$

In a process level:

- having a ratio of width and penetration normally greater than 1

-.allowing movements due the solidification