



### **MmeCa09-023**

#### **Comparison between metallographic etchants for electric arc welding joints duplex stainless steels.**

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Etching is a fundamental stage of sample preparation for metallography. The process consists of controlled corrosion of the surface to highlight the microstructural features in the sample. Arc welding promotes the fusion of part of the material and inputs high amounts of thermal energy on the base materials, generating at least three microstructural zones: the molten pool, the base material and the heat-affected zone. This work evaluated contrasts presented in AISI 2205/2304 welding joints after three purely chemical etchants (Kalling 2, Villela and modified Vander Arend) and three electrolytic etchants (KOH 5%, oxalic acid 10% and saturated ammonium persulfate). The etching process was carried out until some damage, like general corrosion or pitting, was produced. The etched samples were examined by optical and scanning electron microscopy to compare the results. Kalling 2 and Villela etch promoted good contrast between ferrite and austenite in the molten pool and the base material, but not good contrast in HAZ. Modified Arend demonstrated to be slow, but produced good contrast in the three zones and did not remove secondary phases or inclusions. Electrolytic oxalic etch promoted good contrast on the base material but also presented pitting all over the sample. Electrolytic KOH does not produce good contrast in the optical microscopy but eases the BSE-SEM imaging. Electrolytic saturated ammonium persulfate produces good contrast in the three zones, but it dissolves the ferrite close to the precipitations or inclusions.