PITTING CORROSION IN SUPERMARTENSITIC STAINLESS STEEL WELDED USING THE ELECTROCHEMICAL CELL-PEN

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In this study, evaluates the pitting corrosion on four supermartensitic stainless steels-SMSS (12.50Cr, 5.3Ni, 2.1Mo, 0.02C, 0.3Mn, 0.3Si, 0.001S and 0.005P = basic composition, all amounts in weight %), microalloyed: a) 0.2Nb (SMSS+Nb) and b) 0.13Ti (SMSS+Ti), and a high content of c) 6.23Ni (SMSS+Ni) d) 0.017P (SMSS+P), in the welded and weldless conditions [1, 2]. All of them were cut then welded by Gas Tungsten Arc Welding technique. The corrosion tests using the *electrochemical cell-pen (ec-pe)* by potentiodynamic polarization (Autolab -PGSTAT20), within NaCl (3.0%) in 1 mV s^{-1}, at 25 °C. The four steels weldless have similar pitting potential values (~0.33 V), as shown in Fig. 1 (a). In the materials welded, SMSS microalloyed shows an little increase the pitting potential values (~0.35V), and unchanged behavior of the polarization curves (significative) when compared to materials weldless, as shown in Fig. 1 (b). Steels welded with high content of Ni and P, showed lower pitting potential values in approx. 35% (see values into Fig. 1). Finally, SMSS microalloyed steels welded showed to improve of pitting corrosion values than that steels containing high amounts of nickel and phosphorus. The ec-pen technique was effective and reliable, and can be used in situ even in industrial plants or where is necessary, due to its ease of application and miniaturization, which facilitates the measurement system displacement for probing a big area of the sample surface.

Keywords: supermartensitic stainless steels, welding, niobium, titanium, pitting corrosion.

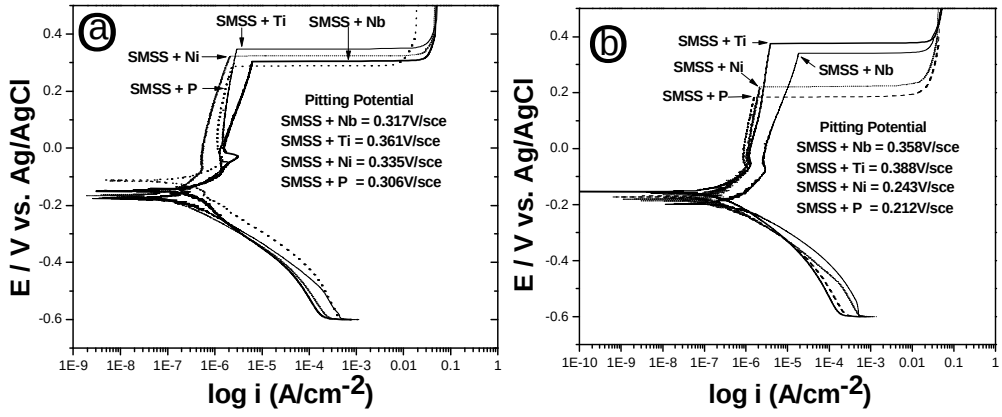

Figure 1. Anodic polarization curves for all steels: (a) weldless and (b) welded conditions.

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