

# Characterization of electron beam (EB) welds for SUS310S

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In this work, SUS310S used for valve plate assembly was electron beam (EB) welded to determine the influence of the parametric conditions on the characteristics of the weld and to minimize porosity and micro-fissures among others. The evolution in the weld geometry and microstructure was examined as a function of the process conditions such as beam current and focusing current under a constant welding speed and accelerating voltage. The integrity of the EB welds in SUS310S was examined for defects (e.g. cracking, porosity, etc.), adequate penetration depth, and tolerable weld width deviation for the various welding conditions. Optical microscopy (OM), x-ray photoelectron spectroscopy analysis (XPS), scanning electron microscopy (SEM) and 3D micro-computed tomography (Micro-CT) for the cross section analysis of the electron beam welded SUS310S were utilized. The tensile strength and hardness were analyzed for the mechanical properties of the EB weld. At the 6 kV accelerating voltage, it was determined that a satisfactory penetration depth and desirable weld width deviation requires a beam current of 30 mA and a focusing current of 0.687 A at the welding speed of 25 mm/sec.

**Keywords:** electron beam welding, SUS310S