The fatigue performance of an electron-beam welded joint between ALSI 4140 and AISI 316L steel has been investigated. Results indicated that a good strength weld can be achieved between the two dissimilar steels by electron beam welding with a fatigue limit approaching 190 MPa, which is a value between the fatigue limits of the base materials. The sharper slope in the Wohler curve of the weld specimen was attributed to the presence of intergranular chromium carbide precipitates within the heat-affected zone.