

LOW TEMPERATURE MECHANICAL PROPERTIES OF 316LN STAINLESS STEEL AFTER HYDROEXTRUSION PROCESS

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The stainless steel 316LN is commonly used in fusion devices and properties of this material at cryogenic temperatures have been widely described for rolled or forged products with the grain size of tens of micrometers. In the present study we report properties of this steel subjected to multi-pass hydrostatic extrusion (HE), which is one of the techniques of a significant grain refinement down to nanometres scale. Such a grain refinement in 316LN is expected to improve yield and ultimate tensile strength. It may also result in a better resistance of the steel to irradiation.

Microstructure and properties of the samples of the 316 LN steel were evaluated by electron microscopy, microhardness under a load of 200 g and in tensile tests. The tensile tests were performed at room, liquid nitrogen and liquid helium temperatures. The observed improvement of the mechanical properties is discussed in terms of the changes imposed on the microstructure of 316 LN steel by HE.