



Cryogenic & Vacuum Engineering

Case study

UKAEA approached us searching for evidence of some stainless steel material properties beyond -196°C provided in ASME VIII Division 1 & PD5500 for applying in compliance checks for a Helium storage pressure vessel to be used for storage of helium at lower temperature of -261°C . EASL had relevant experience analyzing material properties at cryogenic temperatures. One of the most recent cases was assessing the effect of LNG spill on pressure vessels.

Expert design & assessment advice

UKAEA requested references and suggestions for stainless steel mechanical properties to -261°C and examples of stainless steel vessels that are being designed to such temperatures. In addition, evidence and advice on fracture toughness of the stainless steel materials at these lower temperatures was required.

The solution

A systematic literature review of existing reports was carried out, providing specific information on material properties at very low temperatures as well as the standards applicable for cryogenic application, which may provide further details on design requirements.

From there, a summary note was created including lists with various material properties that were relevant for design-by-analysis.

The extracts from handbooks and publications described low temperature properties of stainless steel in terms of its crystal structure and specific detail on stainless steel behavior at low temperatures.

Additional information was requested regarding the need for existing stainless steel to be code compliant and confirmation on whether an impact test was required for the same cast & heat number of stainless steels.

EASL provided authoritative advice on these matters and reassurance on the additional tests required also confirming the tests that weren't necessary based upon the vessel's design.

Our prompt advice and swift and focused response enabled the client to timely carry out the specific tests avoiding unnecessary costs.