UK P&I CLUB

Ship Type: Chemical tankers **Trade Area: Worldwide**

Bulletin 225 - 12/01 - Pitting Damage Claims - Stainless Steel Tanks

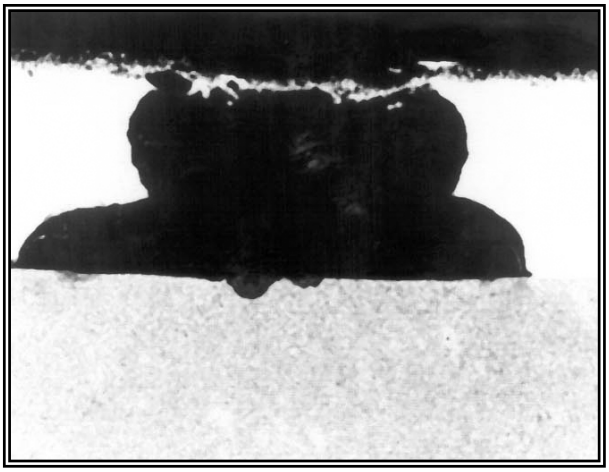
Ships with stainless steel tanks are said to be the Rolls Royce of the chemical tanker industry. 316 LN is the standard grade, and for it to achieve compliance with the AISI (American Iron & Steel Institute) standard, the content of chrome (Ch), nickel (Ni) and molybdenum (Mo) must fall within the following range:

Chrome	16-19%
Nickel	10-14%
Molybdenum	2-3%

As it is the molybdenum that provides the resistance to pitting corrosion and attacks from chlorides, prudent shipowners require the molybdenum content to be higher than the minimum AISI level – specifications of 2.70% and 2.75% minimum have become the norm. Avesta Sheffield steelworks who now have a policy to deliver 316 LN grade with an average molybdenum content of 2.70% and nothing below 2.50% mirrors this.

Despite the *Rolls Royce* reputation, there have been a number of cases recently involving 316 LN vessels where damage has been caused by cargoes which were not overly aggressive. All of the vessels concerned were built in Japan, and it was found that the 316 LN used in these vessels contained the absolute minimum levels of Ch, Ni and Mo acceptable to the AISI standard. It can be shown from experience that vessels with minimum molybdenum (say 2.02%) may suffer severe pitting corrosion, which would normally be shrugged off by steel with a 2.70% or greater Mo content. Clearly, the Mo content will depend upon the specifications given to the building yard – if owners fail to specify the required percentage of these expensive constituents and merely specify 316 LN, they will be liable to get the minimum that the yard can get away with.

Another issue that has recently come to light is the pitting of tanks clad with 316 LN. The picture below is a copy of a cross-section through a typical pit at X20 magnification - the stainless steel cap at the surface of the pit is still intact, but the corrosion attack has progressed below the surface and attacked the thin layer of nickel (between the stainless steel cladding and the mild steel structure), after which it rapidly consumes the mild steel. A very recent case involved a cargo of acetic acid that fell through the tank top into the double bottom (through a single corrosion pit). Aided by a photograph of a typical corrosion pit in a stainless steel clad tank, the shipowners' defence was able to show that the chief officer / pumpman had exercised due diligence before loading as the pit through which the cargo fell would not have been detectable by the exercise of due diligence by virtue of the typical "cap".



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