

Lamellar tearing

Lamellar tearing can occur beneath the weld especially in rolled steel plate which has poor through-thickness ductility. Lamellar tearing was observed in the construction of buildings, metal structure bridges, in the manufacture of pressure vessels, ships and nuclear equipment.

Visual appearance

Typically, the cracks appear in solders of several passes in the joints angle in T or L and they are always associated with points high stress concentration (Fig.1).

Fracture face

The surface of the fracture is fibrous with long parallel sections which are indicative of low parent metal ductility in the through-thickness direction, (Fig 2).

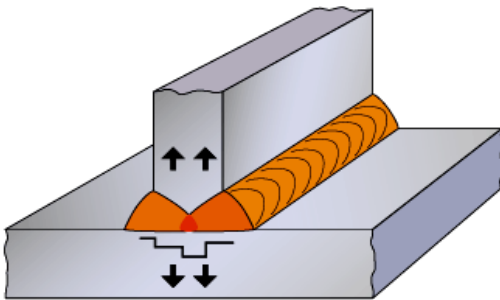


Fig. 1 lamellar tearing in T butt weld



Fig.2 Appearance of fracture face

Causes

It is generally recognized that there are three conditions which must be satisfied for lamellar tearing to occur:

1. Transverse strain - the shrinkage strains on welding must act in the short direction of the plate is through the plate thickness.
2. Weld orientation - the fusion boundary will be roughly parallel to the plane of the inclusions.
3. Material susceptibility - the plate must have poor ductility in the through-thickness direction.

The risk of lamellar tearing will be greater if the stresses generated on welding act in the through-thickness direction. The risk will also increase the higher the level of weld metal hydrogen.

Factors to be considered to reduce the risk of tearing

The choice of material, joint design (Fig.3), welding process, consumables, preheating and buttering can all help reduce the risk of tearing.

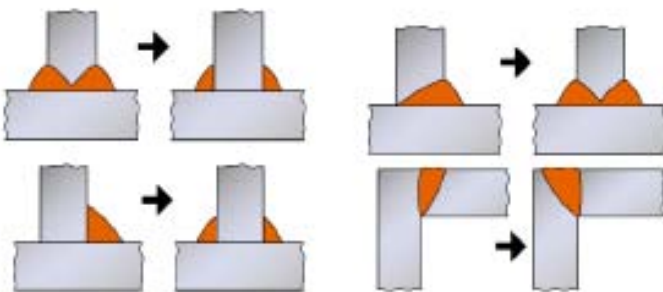


Fig.3 – Recommended joint configurations