

10. INSPECTION

The purpose of inspection is to evaluate the quality of fabricated products and more specifically to grade the quality of a weld against an acceptable level of defects.

The acceptable level of defects is determined by a number of parameters:

- the load modes and load conditions – static and dynamic,
- the levels and variations of stress,
- the safety of persons and property,
- the technical and financial consequences of failure,
- the options for routine operational inspection and control.

10.1 Approval procedures

Approval procedures are contractual but they also make reference to standards (if any) and to the regulations of classification societies, especially as regards the qualification of welders.

They may be complemented by the fabricator's own inhouse procedures, governing welding methods in particular.

Tensile and bending tests are conducted on test specimens following approval procedures laid down by the classification societies. These tests are very important as they can help:

- to detect a lack of fusion that is hard to identify by NDT testing, and
- to adjust parameters so as to limit defects.

10.2 Testing welded joints

The frequency and extent of weld testing will depend on a number of criteria, such as:

- structure,
- rate of stress,
- any loads imposed on the welds.

In the course of fabrication it is possible to perform:

- non-destructive tests including random X-ray testing (28), ultrasonic etc.,
- visual inspection and dye-penetration (29) which can be performed over the whole of some welds to detect incipient cracks,
- tests of mechanical properties and bending tests on specimens taken from batches of welded metal according to the current methods

(28) X-ray testing is not normally possible on filler welds.

(29) According to NF A 08-120. Non-destructive tests. General principles of dye-penetration testing. June 1984.

(30) EN ISO 6520-1 Classification of geometric imperfections in metallic materials. Part 1: Fusion welding.

11. WELD IMPERFECTIONS

The causes of weld imperfections are numerous, and are a result of either the preparation of the metal or poor workmanship.

The most common defects encountered in aluminium welding are virtually the same as are found in the welding of steel: isolated cracks ('star cracks') or longitudinal cracks, incomplete penetration, poor bonding (fusion), porosity and undercuts.

Standards define weld imperfections based on measurements on a cross section (figure 88) of the weld and observations on its appearance.

An international nomenclature of defects has been established and is given in EN ISO 6520-1 (30) which lists 6 groups of imperfections, as shown in table 53, p. 104).

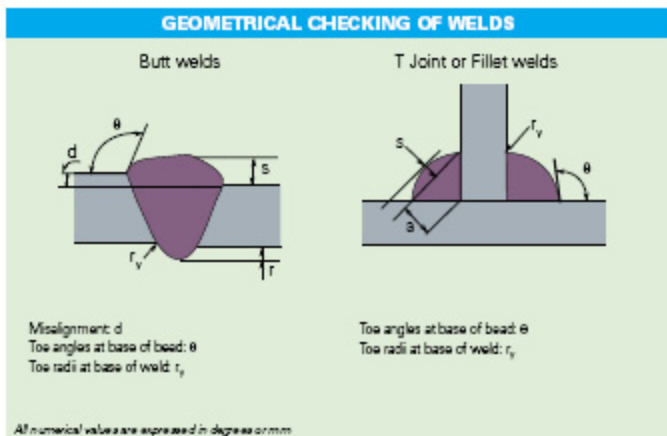


Figure 88