

Weld Inspection



Welded joints must be inspected following initial construction and intermittently during the lifetime of the constructed part.

There are multiple methods to inspect welds in NDT. Each has advantages and disadvantages, and the selection of method will depend on the needs of the inspection.

Radiography gives good inspection coverage and detection ability. However, as the name suggests it has certain health and safety implications when in use. Inspection times and workplace disruption can also be a problem.

Ultrasonic methods, Phased array, Total Focusing, and TOFD can be used in replacement of radiography in certain circumstances. These methods have speed advantages, however, the equipment can be costly and the user will require high levels of training.

The majority of weld inspections are carried out using conventional ultrasonic flaw detectors. They are beneficial to use as they are relatively low cost, simple to operate and require less training.



Weld Inspection using Ultrasonic Flaw Detection

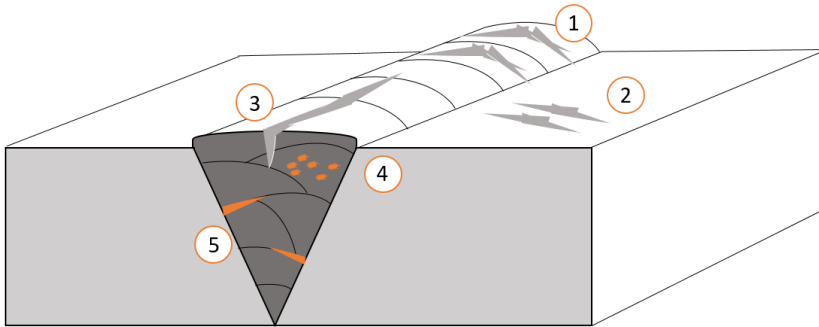


Conventional inspections generally use four transducers to ensure good weld inspection coverage.

- Zero degree, dual element transducer
- One single element, Angular transducers of 45/60/70 degrees

Potential Weld Failure Modes

Potential Weld Defects to be Inspected



- 1) Transverse Cracks in Weld
- 2) Transverse Cracks in HAZ
- 3) Longitudinal Crack
- 4) Porosity
- 5) Slag

6) Undercut

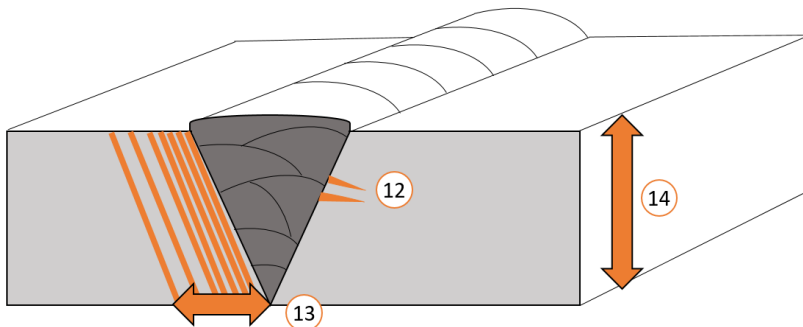
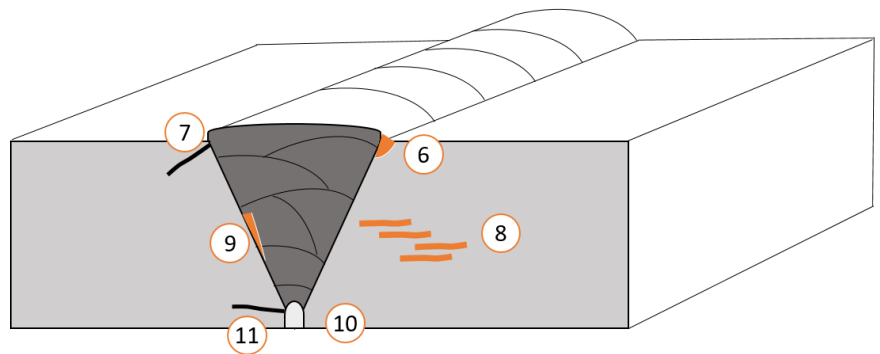
7) Toe Crack

8) Lamellar Tears

9) Fusion Line Crack/Lack of

10) Lack of Root Penetration

11) Root Crack



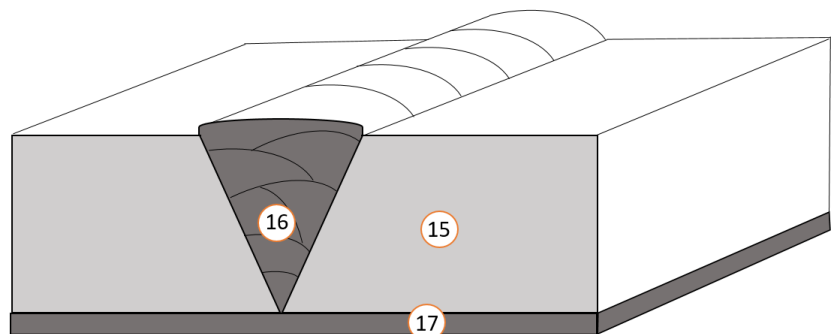
- 12) Hot Tears
- 13) HAZ-Heat Affected Zone
- 14) Base Metal

Duplex Welds = Corrosion Resistant

15) Base Metal e.g. Carbon Steel, or Duplex Stainless Steel

16) Duplex Filler Metal e.g. Stainless Steel

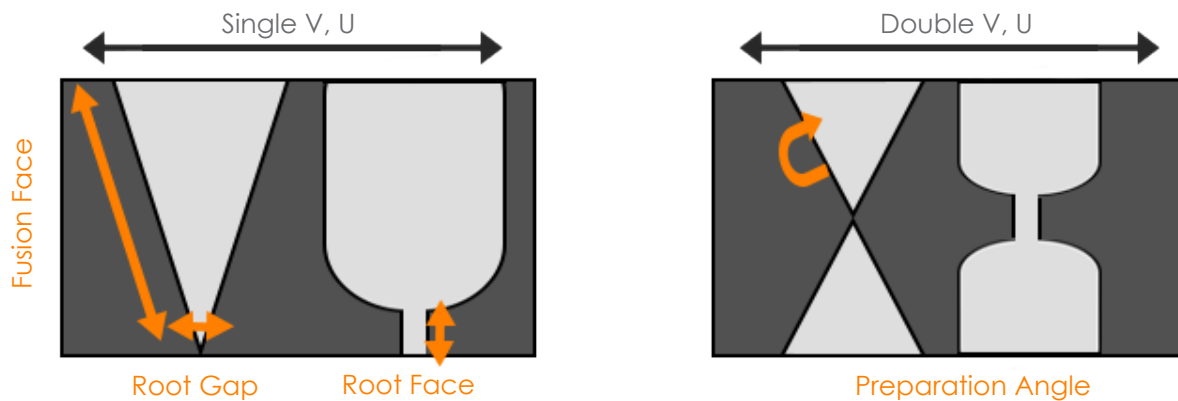
17) Optional Duplex Cladding for Base Material protection



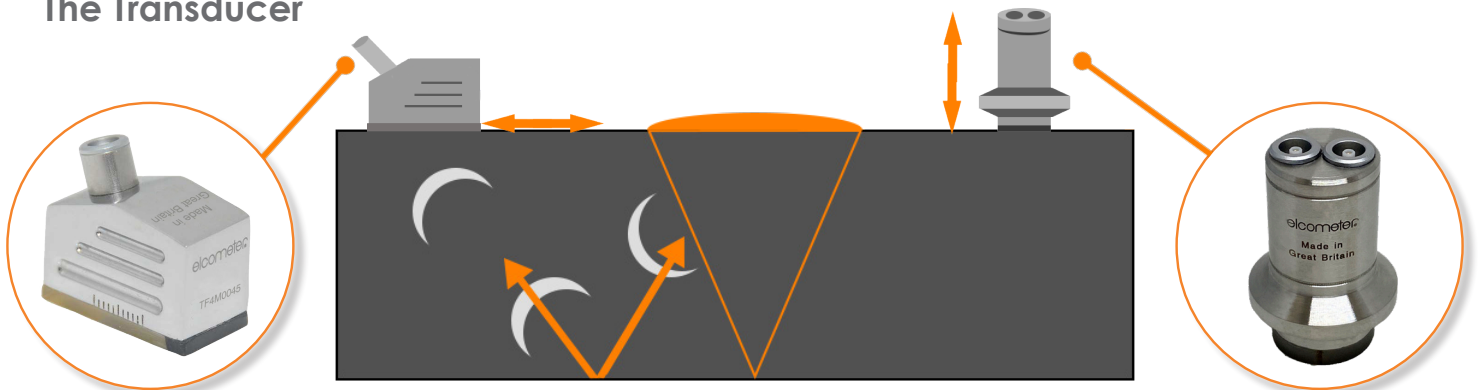
Weld Inspection

Defects appear in a variety of locations around the weld. It is vitally important to scan a weld with several transducers at multiple angles. This ensures the maximum probability of defect detection, the common angles used are 0, 45, 60, 70 degrees.

Common Weld Preparation Types



The Transducer



The transducer frequency and diameter will change depending on the size and type of weld and base material. Please see below an example of transducers for a general weld inspection:

- 45° Single Element Transducers, 4Mhz, 10mm Diameter, Lemo - PN TF4M0045
- 60° Single Element Transducers, 4Mhz, 10mm Diameter, Lemo - PN TF4M0060
- 70° Single Element Transducers, 4Mhz, 10mm Diameter, Lemo - PN TF4M0070
- 0° Dual Element, Short Focused 5Mhz, 10mm Diameter, Lemo-PN TF5M00F

These can be used with any conventional ultrasonic gauge; we suggest using the FD700DL+ for weld inspection.