

The Everyday Pocket Handbook for Visual Inspection and Weld Discontinuities— Causes and Remedies



Number 2 in a series

Compiled as a useful tool for
on-the-job welding personnel by the
AWS Product Development Committee

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Visual Inspection Notes

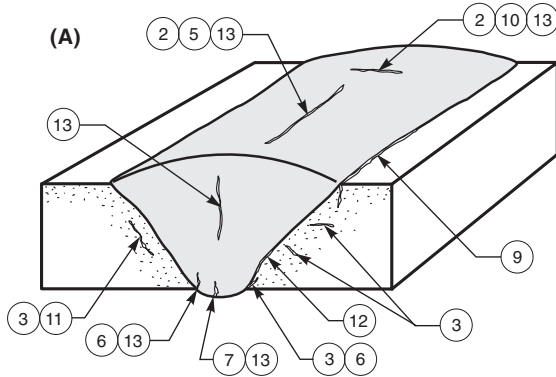
Visual Inspection is a very effective inspection method, and it should be the primary method included in any effective Quality Control Program. It has been shown repeatedly that, **“Visual inspection, conducted by properly trained inspectors, results in the discovery of the vast majority of those defects which would only be discovered later by some more expensive nondestructive test method.”** While visual inspection is limited to materials’ surface-only examination, it often detects the most damaging defects. Visual inspection [abbreviated **“VT”** by the American Society for Nondestructive Testing (ASNT)] of welded components requires inspectors to have a broad knowledge of many technologies, including welding, destructive testing, non-destructive testing, and metallurgy, as well as the correct terminology for each.

It is important to distinguish between the words ‘discontinuity’ and ‘defect’. Discontinuity refers to **“An interruption of the typical structure of a material, such as a lack of homogeneity in its mechanical, metallurgical, or physical characteristics; a discontinuity is not necessarily a defect.”** A defect refers to **“A condition, or conditions, that render a part unable to meet applicable minimum acceptance standards or specifications.”** All defects are discontinuities, but not all discontinuities are defects. A defect can be considered a ‘rejectable discontinuity’.

This pocket handbook provides a convenient source for the most common base metal and weld metal discontinuities found by effective VT. The handbook is arranged by discontinuity type, including applicable VT detection methods, and likely causes and remedies in addition to suggested repair methods.

Cracks

A crack is defined as “A fracture type discontinuity characterized by a sharp tip and a high ratio of length and width to opening displacement.” Cracks are usually considered the most severe discontinuity because of their tendency to propagate under stress. Cracks are usually further described by their location geometry, time of occurrence, or common usage terms; see figure below for AWS crack terminology.



LEGEND:

- | | |
|----------------------------|-------------------------|
| 1 CRATER CRACK | 7 ROOT SURFACE CRACK |
| 2 FACE CRACK | 8 THROAT CRACK |
| 3 HEAT-AFFECTED ZONE CRACK | 9 TOE CRACK |
| 4 LAMELLAR TEAR | 10 TRANSVERSE CRACK |
| 5 LONGITUDINAL CRACK | 11 UNDERBEAD CRACK |
| 6 ROOT CRACK | 12 WELD INTERFACE CRACK |
| | 13 WELD METAL CRACK |

