Instruction – macroscopic testing

1. Scope

This instruction specifies the procedure for macroscopic testing of test pieces in connection to welder qualification testing in steel, ISO 9606-1.

2. References

- ISO 9606-1 Qualification testing of welders – Fusion welding Part 1: Steels
- ISO 17639 Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds
- ISO 5817 Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections

3. Extraction of test pieces

Normally two macro samples should be examined. The specimens should ideally be removed using a cold saw, an abrasive disk, or a cutting disk. One section must be cut through the start/stop area; the second can be removed from any point along the test surface area.

4. Preparation of test specimens

The test piece is normally grinded down to remove any processing marks from sawing/cutting. Thereafter the piece is sanded down using sandpaper of approximately 400-500 grit.

Do not touch the sanded surface with your bare fingers!!

5. Preparation of etching material

A bath of etchant material should be prepared in a plastic or glass jar. A suitable etchant is ammonium persulfate \((\text{NH}_4)_2\text{S}_2\text{O}_8\). Approximately 5mg can be diluted into 50 ml lukewarm water.
6. Etching of test piece

During etching it is beneficial to gently rub the surface with a cotton swab while the sample is submerged in the etching solution.

Allow the sample to remain in the etchant for approximately 1 minute. Thereafter, rinse off the surface under running water and dry the specimen using a hairdryer or compressed air.

7. Evaluation of test results, acceptance criteria

After etching, the weld surfaces must be examined. Melting of the plate as well as the fillet should be verified.

In general, no discontinuities are allowed that exceed quality level B according to ISO 5817.

A common occurrence with fillet welds is incomplete penetration (402) and lack of fusion to joint surfaces (401).

8. Documentation

The examiner verifies the results of the protocol for monitoring and testing in welding tests.