

## Overview

This standard identifies the competences you need to carry out the dimensional and visual inspection of welded fabrications, in accordance with approved procedures. This includes checks during production, and post fabrication checks. You will be required to select the appropriate inspection equipment, based on the features to be checked and the accuracy to be measured. This will involve checking that the appropriate equipment is within current test dates and, where necessary, setting up and calibrating the equipment ready for the inspection operations to be performed. You will check that the materials to be fabricated are in the specified state and condition, and that the set-up arrangements for welding are correct. Inspection during manufacture will check that welding activities are proceeding according to the welding procedure specification and good practice. On completion of welding and fabrication activities, you will visually inspect the welded joints against the acceptance criteria, and check that dimensions and distortion are within specified tolerances. You will mark areas where non-compliance exists and record the results of the inspection.

Your responsibilities will require you to comply with organisational policy and procedures for the inspection activities, seeking out relevant information for the activities undertaken, and reporting any problems with the inspection equipment or activities that you cannot personally resolve, or are outside your personal authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying visual inspection procedures to welded fabrications. You will understand the inspection process and its application, and will know about the equipment and inspection techniques, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when working with fabricated components, and the safeguards necessary for undertaking the activities safely and correctly. You will be required to demonstrate safe working practices and procedures throughout and will understand the responsibility you owe to yourself and others in the workplace.

## Performance criteria

*You must be able to:*

1. work safely at all times, complying with health and safety legislation and other relevant regulations, directives and guidelines
2. follow the correct specification for the product or equipment being inspected
3. use the correct equipment to carry out the inspection
4. identify and confirm the inspection checks to be made and acceptance criteria to be used
5. carry out all required inspections as specified
6. identify any defects or variations from the specification
7. record the results, and complete inspection documentation in the appropriate format
8. deal promptly and effectively with problems within your control and report those that cannot be solved

## Knowledge and understanding

### *You need to know and understand:*

1. the specific health and safety precautions to be taken when inspecting welded fabrications (such as specific legislation or regulations governing the activities or work area, safe working practices and procedures to be adopted, general workshop safety practice, risk assessment procedures)
2. the personal protective clothing and equipment (PPE) that should be worn (such as leather gloves, eye protection, ear protection, safety harness)
3. the hazards associated with the inspecting welded fabrications (such as working at height, safety in enclosed/confined spaces, handling fabricated structures, slips, trips and falls), and how they can be minimised
4. how and where to obtain the required drawings and related specifications, and how to check that they are current and complete
5. how to extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken
6. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
7. how to extract information required from drawings and welding procedure specifications (such as interpretation of welding symbols; scope, content and application of the welding procedure specification)
8. types and features of welded joints in plate, tube and sections (including fillet and butt welds, single and multi-run welds, welding positions, weld quality)
9. the use of relevant standards in determining if welded fabrications are fit for purpose
10. the general principles of quality assurance systems and procedures
11. preparations to be undertaken before the welded fabrications are inspected (such as access to test area cleanliness and physical condition of test area)
12. the visual and dimensional inspection methods and techniques that are used for welded fabrications
13. the equipment that is used to carry out the various inspection checks (such as rules and tapes, weld measuring gauge, bore scope, optical aids (such as magnifying glass and mirror), CCTV viewing system)
14. the items that need to be checked prior to welding the fabrications (such as

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joint preparation, joint set-up, parent metal condition, condition of consumables, equipment settings)

15. the features of the welded joints to be checked (such as linearity or profile, weld root run, inter-runs, final dimensional tolerances, distortion, shrinkage, visual appearance of welds, excess weld metal, undercut, penetration and profile)

16. how to calculate allowances for weld gaps and weld shrinkage, in order to attain overall global tolerances

17. acceptance criteria to be used, and the influence of defects on the service performance of the fabrications (including risks and consequences of failure)

18. the need to carry out the checks and to record the results using the appropriate documentation

19. the procedure to be followed when inspected products are out of specification

20.

the importance of completing inspection documentation, what needs to be recorded and where records are kept

21.

the extent of your own responsibility, and whom you should report to if you have problems that you cannot resolve

## Scope/range

1.

Carry out all of the following activities during the inspection process:

- 1.1 observe all the required safety procedures for the work area/activity
- 1.2 obtain and use the correct issue of drawings, job instructions and welding procedure specifications
- 1.3 obtain and check the condition and calibration dates of tools, measuring instruments and equipment used
- 1.4 follow specified or appropriate inspection procedures
- 1.5 identify and record out-of-specification features, in the appropriate format
- 1.6 mark and identify areas where non-compliance with specification or defect indications are found
- 1.7 leave the work area in a safe and tidy condition on completion of the activities

2.

Ensure that you have the required inspection equipment and that it is in good working order, to include six of the following, as appropriate to the operation/features being checked:

- 2.1 weld measuring gauge
- 2.2 CCTV viewing system
- 2.3 rule, tape or other linear measuring device
- 2.4 magnifying glass
- 2.5 adjustable square/protractor
- 2.6 mirror
- 2.7 depth gauge
- 2.8 portable lighting
- 2.9 bore scope
- 2.10 means of marking defective areas

3.

Carry out specified prefabrication or sub-assembly inspection checks, to include all of the following:

- 3.1 the condition of joint preparations
- 3.2 welded joint preparation dimensions
- 3.3 flatness or profile of sheets, plates, and linearity of sections
- 3.4 the set-up arrangements for welding
- 3.5 the condition of consumables

4.

Carry out the inspection of two of the following types of welded fabrications:

- 4.1 fabricated frames
- 4.2 pipe sections
- 4.3 transformers

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- 4.4 structures
- 4.5 cylindrical components
- 4.6 segmented bends
- 4.7 square/rectangular tanks
- 4.8 conical components
- 4.9 modular components
- 4.10 curved/profiled structures
- 4.11 tubular structures
- 4.12 other specific welded fabrications

5.

Carry out specified inspection during fabrication, to check all of the following:

- 5.1 condition of the weld root zone and inter-runs
- 5.2 inter-run cleaning of weld faces and surfaces
- 5.3 distortion and shrinkage transformers segmented bends modular components other specific fabrications

6.

Carry out the specified final inspection checks, to include all of the following:

- 6.1 overall dimensional tolerances
- 6.2 visual appearance of welds/weld profile
- 6.3 extent of distortion, shrinkage or misalignment
- 6.4 evidence of damage (requiring restoration)
- 6.5 defect indications manifested on weld or parent metal surface
- 6.6 extent of excess metal, undercut, penetration or lack of penetration

7.

Carry out the inspection checks to one of the following:

- 7.1 approved construction drawings
- 7.2 client specifications/detail drawings
- 7.3 applicable national and international standards
- 7.4 welding procedure specification

8.

Complete the inspection documentation, to include one from the following, and pass to the appropriate people:

- 8.1 weld inspection report
- 8.2 job card
- 8.3 customer specific documentation
- 8.4 concession report

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<b>Developed by</b>	Enginuity
<b>Version Number</b>	3
<b>Date Approved</b>	30 Mar 2021
<b>Indicative Review Date</b>	01 Mar 2024
<b>Validity</b>	Current
<b>Status</b>	Original
<b>Originating Organisation</b>	Enginuity
<b>Original URN</b>	SEMETS314
<b>Relevant Occupations</b>	Engineering, Engineering and Manufacturing Technologies, Engineering Technicians
<b>Suite</b>	Engineering Technical Support Suite 3
<b>Keywords</b>	engineering; technical; support; visual; inspection; welded; fabrications; weld condition; distortion

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