SEMETS376

Carrying out mechanical testing

## Overview

This standard identifies the competences you need to carry out mechanical testing activities on sample materials from engineering products, materials or structures, using manual, semi-automatic or fully automatic equipment, in accordance with approved procedures. This could include tests such as tensile, compression, hardness, impact and bending.

You will be required to check that the test equipment complies with the specification requirements, is safe to use, fit for purpose and that it has been correctly calibrated. You will prepare the samples for testing, identifying the samples material, recording any reference numbers and checking samples for features which might interfere with the tests. You will set up and adjust the equipment, carry out the specified tests using the correct procedures/techniques, according to the testing instructions and requirements, and observe and record the test indications.

You will complete the tests by preparing/completing a test report containing the required test information and data. The completed test report will be passed to the appropriate person, in accordance with procedures.

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

Your underpinning knowledge will show a good understanding of your work, and will provide an informed approach to the inspection of engineering products, materials or structures by using testing techniques. You will have a working knowledge of the principles of testing and will understand the functions and characteristics of the equipment used and other different types of tests available.

You will have an understanding of testing practice, including the equipment calibration requirements, measurement techniques, equipment performance checks and routine care of the equipment. Your knowledge will include an appreciation of hazards and

safe working practice, and you will understand the risks posed by material/structure defects/flaws, and the consequences of component failure. The importance of compiling accurate and legible reports will also be a key issue in completing this standard.

You will understand the safety precautions required when carrying out the testing activities, and when using the associated tools and equipment. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Glossary of Terms:

**Discontinuity** – Any imperfection in the material / component / structure

**Flaw** – A significant discontinuity to be recorded but within specified limits and tolerances

**Defect** – A flaw outside specified limits and tolerances causing the material / component / structure to be non-compliant and rejected

## 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 appropriate procedures/techniques for use of tools and equipment to carry out the required tests
3. set up and carry out the tests using the correct procedures/techniques and within agreed timescales
4. record the results of the tests in the appropriate format
5. review the results and carry out further tests if necessary
6. 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 safety precautions to be taken when carrying out testing activities on material samples from engineering products, or structures
2. the hazards associated with carrying out the activities (such as electrical contact, fast moving mechanical parts, stored pressures/forces, extreme temperatures), and how they can be minimised
3. the type of personal protective equipment (PPE) to be used, and how to obtain it
4. how to obtain the necessary job instructions/techniques, testing specifications, and how to interpret their information
5. the importance of testing product materials using mechanical testing methods
6. why products may need to be tested by a range of different mechanical testing methods (such as tensile, compression, hardness, impact and bending)
7. the basic principles of mechanical testing
8. the basic components of the testing equipment (such as display panel, safety devices, power sources, recording mechanisms)
9. the different types of mechanical testing methods (such as tensile, compression, hardness, impact and bending) and what material characteristics they are measuring
10. factors which will affect the selection of suitable testing methods
11. how the properties of the products to be tested will affect the way the equipment performs and the measurements recorded (such as tensile strength, compressibility, hardness)
12. how to set up and ensure the testing equipment is properly calibrated
13. how to carry out the mechanical testing activities
14. how to interpret the various results from the equipment
15. the system of quality control within the company, and who is responsible for it
16. why is it critical that records of testing on the products are accurate, comprehensive and maintained legibly
17. the person that you need to pass the testing records or report problems with the test to
18. care and control of the equipment (to include checking the condition of all electrical cables and connections, equipment operating controls and displays, mechanical functions and safety devices)

19. 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 during the testing activities:

1.1 obtain the required testing equipment, and ensure that it is in a safe and usable condition
1.2 use appropriate personal protective equipment
1.3 comply with job instructions, testing inspection specifications, relevant COSHH sheets and risk assessment documentation
1.4 follow the defined testing procedures/techniques, and apply safe working practices and procedures at all times
1.5 leave the work area in a safe and tidy condition on completion of the activities

2.

Obtain the correct type of equipment, as required by the testing instructions/techniques, to include all of the following:

2.1 test piece
2.2 calibration blocks / pieces
2.3 result conversion documents (as appropriate)

3.

Carry out testing activities, using one of the following types of equipment:

3.1 manual
3.2 semi-automatic
3.3 fully automatic

4.

Prepare the material samples for testing, to include carrying out all of the following:

4.1 checking for defects
4.2 surface preparation (as appropriate)
4.3 correct identification
4.4 correct dimensions (as appropriate)

5.

Carry out testing using one of the following types of tests:

5.1 tensile
5.2 compression
5.3 impact
5.4 hardness
5.5 bending
5.6 other specific mechanical test

6.

Record the test results and to include recording all of the following:

6.1 sample identification

6.2 sample material form
6.3 date and time
6.4 test criteria (such as specification, standard)
6.5 test indications and interpretation (including sample defects)
6.6 conclusions and recommendations
6.7 personal data

7.

Complete the testing activities, to include carrying out all of the following:

7.1 marking up tested samples with all relevant information
7.2 disposal / storage of sample remains
7.3 recording all the required details of the test in the appropriate format
7.4 handing over the test report details to the appropriate people
7.5 turn off equipment as required and leave in a safe and tidy condition

SEMETS376

# Carrying out mechanical testing

| | |
|---|---|
| **Developed by** | Enginuity |
| **Version Number** | 3 |
| **Date Approved** | 30 Mar 2021 |
| **Indicative Review Date** | 01 Mar 2024 |
| **Validity** | Current |
| **Status** | Original |
| **Originating Organisation** | Enginuity |
| **Original URN** | SEMETS376 |
| **Relevant Occupations** | Engineering, Engineering and Manufacturing Technologies, Engineering Technicians |
| **Suite** | Engineering Technical Support Suite 3 |
| **Keywords** | Engineering; technical; support; testing; mechanical testing; tensile; compression; hardness; bending; impact |