

Overview

This standard identifies the competences you need to analyse and interpret tested samples and data generated from mechanical testing, in accordance with approved procedures and techniques. This will require you to obtain all relevant information about the test samples, the acceptance criteria and technique to be followed, to ensure a valid outcome. You must ensure that sample viewing conditions are correct, and you will be expected to check the sample quality and to interpret the test data/results. You will then need to compare your findings with the customer/company acceptance criteria, and draw appropriate conclusions as to the condition of the products/components. The term mechanical testing is used in this standard and can include tensile, compression, hardness, impact and bending tests.

Your responsibilities will require you to comply with organisational policy and procedures for the mechanical testing analysis and interpretation activities undertaken, and to report any problems with these activities or with the 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 undertake.

Your underpinning knowledge will show a good understanding of your work, and will provide an informed approach to the analysing of products/components properties using mechanical testing techniques. You will have a sound understanding of the testing principles, also the required nature and characteristics of the test samples material. You will understand the principles and practice of the analysing and interpretation process, in particular the appearance of defects/flaws in the sample and the safe storage/archiving requirements of the sample/records in use. You will have an understanding of the samples product/component manufacturing process, especially those that relate to the properties of the materials used. You will know the criteria of acceptance for the samples, the relationship between its properties when used in components in service, and the consequences of their failure.

You will understand the safety precautions required when carrying out the analysing 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. ensure that you have the necessary test data on which to conduct the analysis
3. resolve promptly any inconsistencies in the data
4. analyse the data using approved methods and procedures
5. check that the data analysis is accurate and thorough and takes account of the test conditions
6. compare the analysis against the product or asset specification and identify any faults or variations from specification
7. record the results of the analysis in the appropriate format

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, temperatures), and how risks 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 reasons why it is sometimes necessary to test product materials using testing methods
6. why products may need to be tested by a range of different testing methods (such as tensile, compression, hardness, impact and bending)
7. the principles of mechanical testing methods
8. the components of the testing equipment (such as display panel, safety devices, power sources, recording mechanisms)
9. the different types of 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 carry out the analysing activities
13. how to interpret the various results from the sample and the data recording equipment
14. what actions to take when the testing results don't conform with the customers'/specification requirements
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 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 problems that can occur during the testing activities and how they can be overcome

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

Scope/range

1.

Ensure that you have the necessary test data on which to conduct the analysis, to include obtaining all of the following:

- 1.1 relevant product/component information
- 1.2 material of construction
- 1.3 acceptance criteria to be used
- 1.4 sample size
- 1.5 set up parameters and testing conditions
- 1.6 necessary data records obtained during the test

2.

Ensure that the sample quality meets specified requirements, to include all of the following:

- 2.1 correct dimensions
- 2.2 correct surface finish and preparation
- 2.3 absence of obvious significant defects

3.

Interpret the samples properties from one of the following materials:

- 3.1 ferrous
- 3.2 non-ferrous
- 3.3 alloys
- 3.4 other specific material

4.

Interpret the test samples and identify all of the following, as appropriate:

- 4.1 granular structure
- 4.2 location of any defect/flaws
- 4.3 sample measurements

5.

Compare your findings with the acceptance criteria, and record all of the following in the testing report:

- 5.1 personal data (such as details of analyser, date of test)
- 5.2 batch/product/sample identification
- 5.3 material of construction
- 5.4 sample size
- 5.5 test equipment settings and parameters
- 5.6 sample test data/recordings
- 5.7 defects/flaws identified
- 5.8 comparisons with acceptance criteria
- 5.9 conclusions reached

6.

Analysing and interpret the results of mechanical tests

Follow the correct procedure to deal with products which fall into three of the following categories:

- 6.1 samples which meet the specification
- 6.2 samples with identified defects/flaws
- 6.3 samples requiring further investigation
- 6.4 samples requiring other inspection methods

7.

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

- 7.1 marking up defective/flawed samples with all relevant information
- 7.2 recording all the required details of the inspection in the appropriate format
- 7.3 handing over the inspection details to the appropriate people

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