

Overview

This standard identifies the competences you need to carry out dimensional and visual checks of mechanical components and assemblies, in accordance with approved procedures. You will be required to obtain all relevant and current documentation, and to obtain the necessary tools and equipment. This will involve selecting the appropriate inspection equipment, based on the features to be checked and the accuracy to be measured.

You must ensure that the inspection equipment to be used is within current test/calibration dates. In carrying out the inspection activities, you will be expected to check the components for visual defects, and dimensional and geometrical accuracy. This may be required to be undertaken at various stages of manufacture, such as random sampling during production, pre-assembly, intermediate and final assembly. Components to be inspected will include machined components, pressings, mouldings, castings, forgings, assemblies and sub-assemblies, treated and coated components.

Your responsibilities will require you to comply with organisational policy and procedures for the checking activities undertaken, and to report any problems with the product, or activities that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to ensure that all tools and equipment used to inspect the mechanical product are returned to the correct location on completion of the activities. You will be expected to work to instructions, either alone or in conjunction with others, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will provide an informed approach to applying appropriate inspection techniques and procedures to mechanical components and products. You will understand how to use the tools and equipment required for inspecting the products, in adequate depth to provide a sound basis for carrying out the inspection activities and for identifying where features of the products do not meet the required specification tolerances.

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

Performance criteria

You must be able to:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- P2 follow the specification for the product or equipment being inspected
- P3 use the correct tools and equipment during the inspection activities
- P4 identify and confirm the inspection checks to be made and acceptance criteria to be used
- P5 carry out all required inspections as specified
- P6 identify any defects or variations from the specification
- P7 complete and store all relevant documentation in accordance with organisational requirements
- P8 deal with problems within your control and report those that cannot be solved

Knowledge and understanding

You need to know and understand:

- K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- K2 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
- K3 how and where to obtain the required job instructions, drawings and quality control/inspection documentation
- K4 how to extract information from engineering drawings and related specifications in relation to work undertaken
- K5 how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
- K6 the general principles of quality assurance systems and procedures
- K7 preparations to be undertaken before the product is inspected
- K8 the visual and dimensional inspection methods and techniques that are used for mechanical components and assemblies
- K9 the need to select and use set datum faces, and the effects of taking readings from different datums
- K10 the equipment that is used to carry out the various inspection checks
- K11 the need to check that the equipment is approved for the inspection activities undertaken
- K12 how to determine the correct equipment for the feature to be inspected, taking into account tolerances to be achieved
- K13 the importance of ensuring that tools and equipment are set up correctly and are in a safe and useable condition
- K14 the typical defects and variations that can be found on mechanical products, and

how to identify them

K15 the procedure to be followed when inspected products are out of specification

K16 the importance of completing inspection documentation; what needs to be recorded, and where records are kept

K17 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out all of the following during the inspection process:
 - 1.1 obtain and use the correct issue of drawings, job instructions and specifications
 - 1.2 obtain and check the condition and calibration dates of tools, measuring instruments and equipment to be used
 - 1.3 follow specified or appropriate inspection procedures
 - 1.4 use the correct and appropriate tools and equipment at all times
 - 1.5 identify and record out-of-specification features, in the appropriate format
 - 1.6 place products (both in and out of specification) in the correct location on completion of the inspection activities
 - 1.7 resolve any issues as they occur, within your level of responsibility
 - 1.8 leave the work area in a safe and tidy condition on completion of the activities
2. Inspect one of the following types of mechanical product:
 - 2.1 machined components
 - 2.2 castings
 - 2.3 extrusions
 - 2.4 mechanical assemblies/sub-assemblies
 - 2.5 forgings
 - 2.6 patterns
 - 2.7 pressings
 - 2.8 overhauled products
 - 2.9 models
 - 2.10 mouldings
 - 2.11 treated/coated components
 - 2.12 other specific mechanical product
3. Carry out one of the following inspection procedures:
 - 3.1 first/one-off
 - 3.2 one-hundred-percent final inspection of components or products
 - 3.3 in-process sample/patrol inspection
 - 3.4 random/selective sampling of finished components or product
 - 3.5 statistical quality control
4. Inspect mechanical products, using six of the following:
 - 4.1 micrometers
 - 4.2 gauges for external diameters
 - 4.3 profile gauges
 - 4.4 Verniers
 - 4.5 gauges for lengths or depths
 - 4.6 surface texture comparison plates or measuring equipment
 - 4.7 rules or tapes
 - 4.8 hole/bore gauges
 - 4.9 dial test indicators
 - 4.10 taper/angle gauges
 - 4.11 torque wrench

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- 4.12 engineer's square
 - 4.13 thread gauges
 - 4.14 hardness testing equipment
 - 4.15 straight edge
 - 4.16 gap gauges
 - 4.17 protractors
 - 4.18 other specific equipment
5. Use the relevant equipment to measure and check six of the following features:
- 5.1 external diameters
 - 5.2 thread fit
 - 5.3 fit/working clearance
 - 5.4 internal diameters
 - 5.5 thread form/profile
 - 5.6 bonding strength
 - 5.7 length/linear dimensions
 - 5.8 profiles/forms
 - 5.9 coating thickness
 - 5.10 depth
 - 5.11 angles
 - 5.12 torque
 - 5.13 internal tapers
 - 5.14 chamfers and radii
 - 5.15 security of fasteners/connections
 - 5.16 external tapers
6. Use appropriate equipment to check four of the following geometric features:
- 6.1 flatness
 - 6.2 position/location
 - 6.3 verticality
 - 6.4 alignment
 - 6.5 orientation
 - 6.6 parallelism
 - 6.7 squareness
 - 6.8 concentricity
 - 6.9 geometry
 - 6.10 ovality/lobing
 - 6.11 eccentricity
 - 6.12 distortion
 - 6.13 straightness
 - 6.14 level
 - 6.15 surface finish
7. Complete inspection documentation, to include one from the following, and pass it to the appropriate people:
- 7.1 inspection report
 - 7.2 concession report
 - 7.3 job card
 - 7.4 customer specific documentation

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