

Overview

This standard identifies the competences you need to inspect castings, produced from sand or ceramic moulds, dies or investment shells, for dimensional accuracy using measuring instruments, gauges and jigs. You will be required to select the appropriate instruments and equipment to use, based on the type, size, alloy and inspection requirements of the castings. Both ferrous and non-ferrous castings may be covered in this standard. You will need to check that all measuring instruments and equipment are calibrated on a regular basis, to ensure that they meet the necessary quality assurance requirements. The castings being inspected may be circular, square or irregular in shape, with projections and internal cavities and curved or tapered profiles. You will carry out dimensional inspections of external and internal features of the castings, as laid down by the specification. The inspection will generally take place after the castings have been visually examined and fettled and any sub-standard parts have been rejected or sent for repair/reclamation. Where large numbers of castings are involved, you may apply approved sampling methods and statistical process control procedures. You will use measuring instruments and gauges or jigs that are provided and where appropriate, you will mark the castings to indicate non-conformance, in accordance with procedures. Where appropriate, you will use workholding devices, benches and lifting equipment to manipulate the castings during the inspection operation. There could be occasions when larger castings are sited on the floor and you will be expected to manoeuvre these to complete the work. Castings which meet specification will be passed to the next operation. Non-conforming castings will be scrapped or segregated for further inspection or testing. You will complete inspection record sheets to indicate your findings on inspected castings and pass these records to named persons. Your responsibilities will require you to comply with organisational policy and procedures for the inspection activities undertaken. You will report any problems with the inspection activities, measuring instruments and gauges that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to verbal or written instructions, and to take responsibility for the safe and correct inspection of the castings. Your underpinning knowledge will be sufficient to provide a sound basis for your work and will enable you to adopt an informed approach to the inspection of the various types and sizes of casting. You will understand the different inspection methods and the instruments and gauges/jigs used during the inspection operations. You will be familiar with the associated lifting and moving equipment that is used to handle the different types and sizes of casting. You will understand the safety precautions required when carrying out the inspection activities and when using the associated tools and equipment. You will be required to demonstrate safe working practices throughout. You will also understand your responsibilities for safety and the importance of taking the necessary safeguards to protect 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, regulations, directives and other relevant guidelines
2. follow the correct specification for the product or equipment being inspected
3. identify and confirm the inspection checks to be made and acceptance criteria to be used
4. carry out the inspection using appropriate equipment and to specification
5. identify any defects/flaws or variations from the specification
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. ensure that work records are completed, stored securely and available to others, as per organisational requirements
8. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials) 2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you 3. the hazards associated with the activities, and how to minimise them and reduce risks 4. the personal protective equipment and clothing (PPE) to be worn during the activities 5. how to obtain the job instructions and how to interpret their information 6. why different methods of inspecting castings are used for different types of defect/flaws 7. the types of defects/flaws that can be detected using measuring equipment (including sectional variances, swells, mis-placed cores, cross joints, incorrect dimensions, incorrect profiles, undercuts on runners/risers/feeders, poor ingate or feeder cut-off, excessive flash, inclusions on casting surfaces, lack of metal on machine faces and loss of definition/size on machining location points) 8. why different methods of inspection are used on castings that have to meet critical criteria (turbine blades) 9. why inspection equipment (micrometers, verniers, go/no go gauges, gap gauges, jigs and profile gauges) must be calibrated 10. the importance of keeping the measuring equipment clean and free from damage, good housekeeping of tools and equipment and maintaining a clean working area 11. why costs need to be considered carefully before any casting is submitted for repair/reclamation operations 12. the types of casting/fettling defect/flaws which can be acceptable following dimensional inspection 13. the reasons why sample inspection is performed 14. how to use statistical process control (SPC) charts 15. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve when checking castings 16. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1. Prepare for the inspection, carrying out all of the following activities:

1. obtain all necessary documents and job instructions for the inspection operations being performed
2. adhere to health and safety regulations, systems and procedures to realise a safe system of work
3. check that all inspection equipment is within current calibration dates
4. check that tools and handling/lifting/manipulating equipment are available and in good order

2. Use measuring devices, gauges and jigs in inspections, which must include one of the following:

1. micrometers
2. verniers plus three more from the following:
 3. tapes or rules
 4. radius gauge
 5. dividers
 6. protractors
 7. straight edges
 8. callipers
 9. squares
 10. profile gauges
 11. go/no go gauges
 12. jigs

3. Complete dimensional checks on castings, to include five of the following features:

1. flatness
2. concentricity
3. taper
4. angularity
5. squareness
6. straightness
7. profiles
8. roundness

4. Identify, by dimensional inspection, five of the following casting defects/flaws:

1. sectional variances
2. incorrect profiles
3. swells
4. undercuts on runners/risers/feeders
5. mis-placed cores
6. poor ingate or feeder cut-off
7. cross joints
8. excessive flash
9. incorrect overall dimensions
10. depth of inclusions on casting surfaces
11. loss of definition/size on machining location points
12. lack of metal on machine faces

5. Segregate castings according to company procedures, into all of the following categories:

1. castings which meet required specification
2. castings requiring further investigation
3. castings requiring repair/reclamation work
4. castings which are total scrap

6. Complete the inspection activities, to include carrying out both of the following:

1. completing all required inspection documentation
2. returning inspection equipment to its correct location

Checking castings for dimensional accuracy

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