SEMMME241

Carrying out inspection activities on optical components

Overview

This standard identifies the competences you need to carry out optical inspection operations, in accordance with approved procedures, using optical inspection techniques and equipment. You will be expected to check components made from a range of optical materials, using a mixture of inspection equipment, as appropriate. You will be required to inspect a range of components that combine a number of different features, such as centre-thickness, diameters, generated blanks, optical lens form and power, angles, profiles, and with cosmetic defects.

You will be required to operate the equipment in line with safe working practices and approved procedures, and to continuously monitor the equipment operations, making any necessary minor adjustments or seek help in making the adjustments, in order to ensure that the work output is to the required quality and accuracy.

Your responsibilities will require you to comply with organisational policy and procedures for the optical inspection activities undertaken, and to report any problems with the optical inspection activities, equipment or materials that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, 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 be sufficient to provide a good understanding of your work, and will enable you to adopt an informed approach to applying optical inspection procedures. You will understand the optical inspection procedures used, and their application, and know about the equipment, materials and consumables, in adequate depth to provide a sound basis for carrying out the activities, identifying out-of-specification components, and ensuring accepted components meet the required specification.

You will understand the safety precautions required when working with the inspection 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.

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 correct specification for the product or equipment being inspected
P3 use the correct equipment to carry out the inspection
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 to extract and use information from optical engineering drawings and related specifications in relation to work undertaken

K4 how to use imperial and metric systems of measurement, work piece reference points and system of tolerance

K5 the various optical inspection operations to be performed, and types of equipment used

K6 how to set or check the calibration of the equipment before inspection operations are carried out

K7 how to recognise the various cosmetic defects

K8 how to handle and store all inspection equipment, safely and correctly

K9 how the various types of material will affect the way the inspection operation is performed

K10 the effect of clamping the work piece, and how this can cause distortion in the finished component

K11 how to recognise inspection equipment faults, and identify when inspection equipment needs refurbishment

K12 the issues that can occur with optical inspection activities, and how they can be overcome

K13 the quality control procedures used, inspection checks to be carried out, and the equipment used

K14 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 activity:

1.1 obtain and use the appropriate documentation (such as job instructions, drawings, quality control documentation, material data sheets)

1.2 adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work

1.3 obtain and check that the required inspection equipment is within current calibration dates

1.4 use appropriate inspection techniques to check the components

1.5 determine any out-of-specification components

1.6 complete all relevant inspection documentation, accurately and legibly

1.7 apply safe working practices at all times

2. Operate four types of optical inspection equipment from the following:

2.1 lens centring rig

2.2 optical measuring equipment

2.3 optical flats

2.4 centre thickness gauge

2.5 focometer test equipment

2.6 dial test indicators

2.7 microscopes

2.8 auto collimators

2.9 slip gauges

2.10 micrometers

2.11 optical spheres

2.12 vernier equipment

2.13 interferometry and phase analysis equipment

2.14 shadowgraph test equipment

2.15 other specific inspection equipment

3. Inspect three types of optical component from the following:

3.1 infra-red lens

3.2 combiners

3.3 infra-red glass flats

3.4 infra-red glass domes

3.5 cylinders
3.6 glass prisms
3.7 infra-red prisms
3.8 plastic lens components
3.9 glass lens
3.10 optical mirrors
3.11 profiled optical components
3.12 other specific type of component

4. Inspect six features of machined optical components from the following:
4.1 prism angles
4.2 lens diameter
4.3 cap height
4.4 truncation
4.5 concentricity
4.6 lens form error
4.7 flats form error
4.8 lens wedge
4.9 profiles
4.10 sag depth
4.11 centre thickness
4.12 flat/parallelism
4.13 focal length
4.14 lens centring
4.15 refractive index
4.16 lens power (radius)
4.17 flats power error
4.18 cosmetic defect
4.19 other specific features

5. Use inspection methods and techniques suitable for components made from three different types of material:
5.1 germanium
5.2 dense flints
5.3 infra-red glass 4,5,6
5.4 zinc selenide

5.5 silicon
5.6 barium crowns
5.7 flints/light flints
5.8 barium dense flints
5.9 zinc sulphide
5.10 plastics
5.11 lanthanum crowns
5.12 optical orange filter glass
5.13 thallium ideobromide
5.14 anomalous dispersion flour crowns
5.15 optical blue filter glass
5.16 borosilicate crowns
5.17 optical neutral density glass
5.18 other specific method/technique

6. Inspect optical components to one of the following:
6.1 BS, ISO or BSEN standards and procedures
6.2 customer (contractual) standards and requirements
6.3 organisational standards and procedures
6.4 other accepted international standards

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