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-ofSpecification 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.
Carrying out inspection activities on optical components

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. follow the correct specification for the product or equipment being inspected
3. use the correct equipment to carry out the inspection
4. identify and confirm the inspection checks to be made and acceptance criteria to be used
5. carry out all required inspections as specified
6. identify any defects or variations from the specification
7. record the results of the inspection in the appropriate format
8. 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 safe working practices and procedures to be followed while using optical inspection equipment
2. the safety mechanisms on the equipment, and the procedure for checking that they function correctly
3. the personal protective equipment (PPE) to be worn, and where this can be obtained
4. the hazards associated with carrying out optical inspection operations, and how to minimise them and reduce any risks
5. the importance of keeping the work area clean and tidy
6. how to extract and use information from optical engineering drawings and related specifications (to include symbols and conventions to appropriate BS, ISO or BSEN standards) in relation to work undertaken
7. how to use imperial and metric systems of measurement, work piece reference points and system of tolerance
8. the various optical inspection operations to be performed, and types of equipment used
9. how to set or check the calibration of the equipment before inspection operations are carried out
10. how to recognise the various cosmetic defects
11. how to handle and store all inspection equipment, safely and correctly
12. how the various types of material will affect the way the inspection operation is performed
13. the effect of clamping the work piece, and how this can cause distortion in the finished component
14. how to recognise inspection equipment faults, and identify when inspection equipment needs refurbishment
15. the problems that can occur with optical inspection activities, and how they can be overcome
16. the quality control procedures used, inspection checks to be carried out, and the equipment used
17. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
1. Carry out all of the following during the inspection activity:
   1. obtain and use the appropriate documentation (such as job instructions, drawings, quality control documentation, material data sheets)
   2. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
   3. obtain and check that the required inspection equipment is within current calibration dates
   4. use appropriate inspection techniques to check the components
   5. determine any out-of-specification components
   6. complete all relevant inspection documentation, accurately and legibly
   7. apply safe working practices at all times

2. Operate four types of optical inspection equipment from the following:
   1. lens centring rig
   2. optical measuring equipment
   3. optical flats
   4. centre thickness gauge
   5. focometer test equipment
   6. dial test indicators
   7. microscopes
   8. auto collimators
   9. slip gauges
   10. micrometers
   11. optical spheres
   12. vernier equipment
   13. interferometry and phase analysis equipment
   14. shadowgraph test equipment
   15. other specific inspection equipment

3. Inspect three types of optical component from the following:
   1. infra-red lens
   2. combiners
   3. infra-red glass flats
   4. infra-red glass domes
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5. cylinders
6. glass prisms
7. infra-red prisms
8. plastic lens components
9. glass lens
10. optical mirrors
11. profiled optical components
12. other specific type of component

4. Inspect **six** features of machined optical components from the following:
   1. prism angles
   2. lens diameter
   3. cap height
   4. truncation
   5. concentricity
   6. lens form error
   7. flats form error
   8. lens wedge
   9. profiles
   10. sag depth
   11. centre thickness
   12. flat/parallelism
   13. focal length
   14. lens centring
   15. refractive index
   16. lens power (radius)
   17. flats power error
   18. cosmetic defect
   19. other specific features

5. Use inspection methods and techniques suitable for components made from **three** different types of material:
   1. germanium
   2. dense flints
   3. infra-red glass 4,5,6
   4. zinc selenide
   5. silicon
   6. barium crowns
   7. flints/light flints
8. barium dense flints
9. zinc sulphide
10. plastics
11. lanthanum crowns
12. optical orange filter glass
13. thallium ideobromide
14. anomalous dispersion flour crowns
15. optical blue filter glass
16. borosilicate crowns
17. optical neutral density glass
18. other specific method/technique

6. Inspect optical components to **one** of the following:
   1. BS, ISO or BSEN standards and procedures
   2. customer (contractual) standards and requirements
   3. company standards and procedures
   4. other accepted international standards
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<tr>
<td>Date Approved</td>
<td>February 2016</td>
</tr>
<tr>
<td>Indicative Review Date</td>
<td>March 2019</td>
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<td>Keywords</td>
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