

# Highfield Level 3 End-Point Assessment for Spectacle Maker

EPA-Kit

## Delivering the Standard

- Health and Safety
- Materials
- Tools
- Quality (Knowledge)
- Construction of spectacles
- The manufacture, service and repair of spectacles
- Health & Safety and working environment
- Technical interpretation and understanding
- Manufacturing and repair process
- Tools and equipment
- Quality (Skills)
- Quality focused
- Professionalism
- Self-development
- Safety orientated

# Highfield Level 3 End-point Assessment for Spectacle Maker Apprenticeship Standard

The following pages contain the spectacle maker standard and the assessment criteria in a suggested format that is suitable for delivery.

## Knowledge - Health and Safety

### Professional Discussion

#### Learning outcome

Know how to comply with relevant legislation and official guidance

#### To pass

HS1 Demonstrate understanding of health and safety principles, employee and employer rights and responsibilities. Can describe the company procedures and documentation related to the above, and how to source further details. Knows the types of organisations that represent the industry and their roles

#### To achieve a distinction

HS3 Has a more detailed understanding of health and safety, COSHH, equality and employment responsibilities and can describe their role in the company around these. Understands the company procedures for the above, in addition to statutory rules. Can source details and reference outside bodies, and can demonstrate understanding of the roles and activities of different organisations in the optical industry and other overseeing bodies

#### Amplification

- Exhibit knowledge and understanding of a range of employer and employee statutory rights and responsibilities under Employment Law: rights and responsibilities under the Employment Rights Act (1996); Equality Act (2010); health and safety legislation; responsibilities and duties of employers
- Exhibit knowledge and understanding of the organisation's procedures and documentation which recognise and protect the relationship with the apprentice
- Show knowledge and understanding of the range of sources of information and advice available on employment rights and responsibilities
- Exhibit knowledge of the types of representative bodies and understand their relevance within the optical industry and their main roles and responsibilities

<b>Direct Observation</b>	
<b>Learning outcome</b>	
Understand the importance of environmental protection	
<b>To pass</b>	<b>To achieve a distinction</b>
HS2 Knows the potential hazards present in the lab working environment, how to deal with them and implement waste disposal according to product	HS4 Knowledge of COSHH and the products under its regulations, the implications of poor hazard/risk analysis and waste disposal, and detail the potential environmental issues in both the lab and wider business
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Identify typical environmental hazards in an optical production unit</li> <li>• Describe the environmental issues around waste disposal</li> <li>• Implement the procedures for waste disposal</li> <li>• Implement the disposal procedures for packaging</li> </ul>	

<b>Knowledge - Materials</b>	
<b>Professional Discussion</b>	
<b>Learning outcome</b>	
Be able to identify lenses appropriate for given prescriptions	
<b>To pass</b>	<b>To achieve a distinction</b>
MA1 Can provide details of lens materials, types, uses and some basic technical information	MA3 Can detail the challenges and benefits of various lens types and materials, and further detail on how multifocals work
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Describe the properties of lens materials</li> <li>• Describe <b>single vision, bifocal and progressive power lens type</b></li> </ul>	
<b>Learning outcome</b>	
Understand the materials used in spectacle frames	
<b>To pass</b>	<b>To achieve a distinction</b>
MA2 Can describe a number of common frame materials and list various parts correctly	MA4 Can provide details on the different frame materials used, how they differ in performance, and provide more detail on parts
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Identify the materials used in spectacle frames</li> <li>• Describe the properties of spectacle frame materials</li> <li>• List the components of a spectacle frame by their <b>BS EN terms</b></li> </ul>	

## Unit Amplification and Guidance

### BS EN terms

Table 1 - Tolerances on the back vertex power of single-vision and multifocal lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 3,00	± 0,12	± 0,09	± 0,12	± 0,18	-
> 3,00 and ≤ 6,00	± 0,12	± 0,12	± 0,12	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,12	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 2 - Tolerances on the back vertex power of progressive- and degressive-power lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 6,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,18	± 0,18	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,18	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 3 - Tolerances on the direction of cylinder axis

<b>Absolute cylindrical power</b> (values in dioptres)	≥ 0,125 and ≤ 0,25	> 0,25 and ≤ 0,50	> 0,50 and ≤ 0,75	> 0,75 and ≤ 1,50	> 1,50 and ≤ 2,50	> 2,50
<b>Tolerance on the axis direction</b> (values in degrees)	± 16	± 9	± 6	± 4	± 3	± 2

Table 4 - Tolerances on the addition power for multifocal and progressive-power lenses (values in dioptres)

<b>Value of the addition power</b>	≤ 4,00	> 4,00
<b>Tolerance</b>	± 0,12	± 0,18

Table 5 - Prism imbalance (relative prism error) tolerances for single-vision and multifocal lenses

<b>Higher absolute ordered component prism value</b> $\Delta$	<b>Tolerance on the horizontal component</b> (Relative to the ordered centration distance)	<b>Tolerance on the vertical component</b> (Relative to the ordered centration distance)
≥ 0,00 and ≤ 2,00	For powers <sup>a</sup> ≥ 0,00 to ≤ 3,25 D 0,67 $\Delta$  For powers <sup>a</sup> > 3,25 D the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> ≥ 0,00 and ≤ 5,00 D 0,50 $\Delta$  For powers <sup>a</sup> > 5,00 D the prismatic effect of 1,0 mm displacement
> 2,00 and ≤ 10,00	For powers <sup>a</sup> ≥ 0,00 to ≤ 3,25 D 1,00 $\Delta$  For powers <sup>a</sup> > 3,25 D 0,33 $\Delta$ + the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> ≥ 0,00 and ≤ 5,00 D 0,75 $\Delta$  For powers <sup>a</sup> > 5,00 D 0,25 $\Delta$ + the prismatic effect of 1,0 mm displacement

> 10,00	For powers <sup>a</sup> ≥ 0,00 to ≤ 3,25 D 1,25 Δ	For powers <sup>a</sup> ≥ 0,00 and ≤ 5,00 D 1,00 Δ
	For powers <sup>a</sup> > 3,25 D 0,58 Δ + the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> > 5,00 D 0,50 Δ + the prismatic effect of 1,0 mm displacement
<sup>a</sup> These tolerances are applied to the lowest absolute principal power of the pair of lenses		

**Single vision, bifocal and progressive power lens type**

Single vision - one prescription, e.g. reading or distance

Bifocal - two elements of prescriptions on lens, can vary between: distance, intermediate and near

Progressive power lens (PPL) - variable focus lens, blended surface incorporating distance, intermediate and near



<b>Knowledge - Tools</b>	
<b>Professional Discussion</b>	
<b>Learning outcome</b>	
Understand how to check finished spectacle specifications against the received order	
<b>To pass</b>	<b>To achieve a distinction</b>
TO1 Can provide details of what is needed to carry out QC, and detail the functions used when checking prism and power	TO5 Knows all essential tools and equipment required and can confidently check power and prism with little/no supervision
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>List the equipment required for the final verification and quality check</li> <li>Describe the use of the <b>focimeter</b> for verifying <b>lens power and prism</b></li> </ul>	

<b>Direct Observation</b>	
<b>Learning outcome</b>	
Have a practical understanding of optical machinery	
<b>To pass</b>	<b>To achieve a distinction</b>
TO2 Can detail the processes and systems required to effectively glaze a variety of lenses	TO6 Knows how to set up more complex lenses/frames to glaze, and can explain the operation of a number of optical equipment items
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>Explain the principles of <b>optical machinery</b></li> <li>Explain the operation of <b>optical machinery</b></li> <li>Set up <b>optical machinery</b> for a full range of products</li> </ul>	

Learning outcome	
Be able to calibrate precision optical manufacturing machinery	
To pass	To achieve a distinction
TO3 Know when to do a calibration and what is involved; correct errors on edger displays	TO7 Can plan for and carry out calibration, examine any data provided and determine the outcome, analyse error messages and know how to interpret the data
Amplification	
<ul style="list-style-type: none"> <li>• Explain when to calibrate <b>precision optical machinery</b></li> <li>• Calibrate <b>precision optical machinery</b></li> <li>• Correct <b>optical machinery</b> with an error message or fault indication</li> </ul>	
Learning outcome	
Have a practical understanding of 'first line' maintenance for optical machinery	
To pass	To achieve a distinction
TO4 Can carry out basic optical equipment maintenance, record what is done and any outcomes. Describe the consequences of a poor maintenance regime	TO8 Performs detailed first-line maintenance, records data and can analyse its meaning and potential issues, and provide detailed description of the results of poor maintenance
Amplification	
<ul style="list-style-type: none"> <li>• Demonstrate completion of a maintenance schedule or services log</li> <li>• Complete 'first line' maintenance on <b>optical machinery</b></li> <li>• Describe the consequences of not carrying out regular maintenance</li> </ul>	
Unit Amplification and Guidance	
<p><b>Focimeter</b> Used to read the prescription and take measurements of lenses</p> <p><b>Lens power and prism</b> Two elements of a prescription measured by a focimeter</p>	

### **Optical machinery**

Different machines used in the production of spectacles e.g.

- focimeter
- auto edger/hand edger
- blocker
- tint unit
- frame heater

<b>Knowledge - Quality</b>	
<b>Professional Discussion</b>	
<b>Learning outcome</b>	
Understand quality control methods and the use of standards	
<b>To pass</b>	<b>To achieve a distinction</b>
QU1 Understanding the basic principles of quality checking and can perform QC practically. Understand different production checks and describe how they use standards	QU6 Can explain the benefits of good QC process, and process more complex orders through quality checking, using standards accurately and describing how/why. Good knowledge of different product quality checks
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Explain the importance of quality control</li> <li>• Describe the procedure for quality inspection of a given uncut lens type before dispatch</li> <li>• Compare and contrast quality inspection procedures in given lens production methods</li> <li>• Explain how and why standards are used in quality inspection and control</li> </ul>	
<b>Learning outcome</b>	
Assure uncut spectacle lenses	
<b>To pass</b>	<b>To achieve a distinction</b>
QU2 Can describe the differences between lens types and identify surface defects and explain how they happen. Use tolerances for surface inspection and returns processes as applicable	QU7 Has detailed knowledge of lens types and different forms. Can identify various defects and explain how they can happen and be prevented. Can apply tolerances to surface inspection accurately and document findings in the required detail

Amplification	
<ul style="list-style-type: none"> <li>Identify the features of <b>uncut lenses</b></li> <li>Identify the types of surface and material defects</li> <li>Explain the problems associated with types of surface and material defects</li> <li>Assure uncut spectacle lenses to <b>BS EN ISO standards</b></li> <li>Complete the required quality documentation</li> </ul>	
Learning outcome	
Demonstrate the importance of record-keeping	
To pass	To achieve a distinction
QU3 Can access essential reports and records, explain the data and reasons for keeping it	QU8 Can access report data, show analysis of the information, the benefits for keeping it and how it fits with other store data recording
Amplification	
<ul style="list-style-type: none"> <li>Source reports and explain their relevance</li> <li>Explain, interpret and evaluate report information</li> <li>Explain the benefits of good record-keeping</li> </ul>	

Direct Observation	
Learning outcome	
Be able to visually inspect lenses	
To pass	To achieve a distinction
QU4 Can spot faults in cut and uncut lenses, check shapes are symmetrical and assess cosmetic appearance to company and industry standards	QU9 Can provide reasons for faults and errors found and how to correct them, knows how to adjust symmetry issues before and/or after cutting, and can accurately use company and industry standards to assess quality

Amplification	
<ul style="list-style-type: none"> <li>Identify defects and faults in <b>lens uncuts</b></li> <li>Identify defects and faults in <b>edged lenses</b></li> <li>Ensure the symmetry of lens shapes</li> <li>Judge the cosmetic appearance of the spectacles</li> <li>Use <b>BS EN ISO standards</b> to aid visual inspection of <b>uncut and edged lenses</b></li> </ul>	
Learning outcome	
Be able to assure assembled spectacles	
To pass	To achieve a distinction
QU5 Knows how to deal with a variety of frame materials and can check the finished job against the order for the right parameters at QC. Can correctly check against standards and take the correct action if incorrect. Use of manual and automatic focimeter types	QU10 Can explain the differences between various frame materials, how they are handled and cleaned, and set up adjustments. Accurately check orders and explain how/why certain actions are performed. Good knowledge of standards and tolerances, and taking corrective action if errors found. Use of manual and automatic focimeter types
Amplification	
<ul style="list-style-type: none"> <li>Explain the properties of lens and frame materials with regard to handling and cleaning</li> <li>Ensure that the prescription specifications match the order specification</li> <li>Verify that the form and positioning of the lenses match the order specification</li> <li>Verify that all the specifications match the order specification</li> <li>Use <b>BS EN ISO standards</b> to aid the verification of finished spectacles</li> <li>Take appropriate action if the spectacles do not match the order specification</li> <li>Demonstrate the use of two <b>focimeter</b> types that use different principles to measure lens power</li> </ul>	
Unit Amplification and Guidance	
<b>Uncut/edged lenses</b> Uncut (or 'blank') - the lenses received in the lab, before they are cut to shape. Circular or elliptical lenses from the prescription manufacturer	

Edged - lens once manufactured in the lab, to correct shape and size

**Focimeter**

Used to read the prescription and take measurements of lenses (pass = single vision, distinction = bifocal and varifocals)

**BS EN ISO standards**

Table 1 - Tolerances on the back vertex power of single-vision and multifocal lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 3,00	± 0,12	± 0,09	± 0,12	± 0,18	-
> 3,00 and ≤ 6,00	± 0,12	± 0,12	± 0,12	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,12	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 2 - Tolerances on the back vertex power of progressive- and degressive-power lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 6,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,18	± 0,18	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,18	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 3 - Tolerances on the direction of cylinder axis

<b>Absolute cylindrical power</b> (values in dioptres)	≥ 0,125 and ≤ 0,25	> 0,25 and ≤ 0,50	> 0,50 and ≤ 0,75	> 0,75 and ≤ 1,50	> 1,50 and ≤ 2,50	> 2,50
<b>Tolerance on the axis direction</b> (values in degrees)	± 16	± 9	± 6	± 4	± 3	± 2

Table 4 - Tolerances on the addition power for multifocal and progressive-power lenses (values in dioptres)

<b>Value of the addition power</b>	≤ 4,00	> 4,00
<b>Tolerance</b>	± 0,12	± 0,18

Table 5 - Prism imbalance (relative prism error) tolerances for single-vision and multifocal lenses

<b>Higher absolute ordered component prism value</b> Δ	<b>Tolerance on the horizontal component</b> (Relative to the ordered centration distance)	<b>Tolerance on the vertical component</b> (Relative to the ordered centration distance)
≥ 0,00 and ≤ 2,00	For powers <sup>a</sup> ≥ 0,00 to ≤ 3,25 D 0,67 Δ  For powers <sup>a</sup> > 3,25 D the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> ≥ 0,00 and ≤ 5,00 D 0,50 Δ  For powers <sup>a</sup> > 5,00 D the prismatic effect of 1,0 mm displacement
> 2,00 and ≤ 10,00	For powers <sup>a</sup> ≥ 0,00 to ≤ 3,25 D 1,00 Δ  For powers <sup>a</sup> > 3,25 D 0,33 Δ + the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> ≥ 0,00 and ≤ 5,00 D 0,75 Δ  For powers <sup>a</sup> > 5,00 D 0,25 Δ + the prismatic effect of 1,0 mm displacement



<p>&gt; 10,00</p>	<p>For powers<sup>a</sup> ≥ 0,00 to ≤ 3,25 D 1,25 Δ</p> <p>For powers<sup>a</sup> &gt; 3,25 D 0,58 Δ + the prismatic effect of 2,0 mm displacement</p>	<p>For powers<sup>a</sup> ≥ 0,00 and ≤ 5,00 D 1,00 Δ</p> <p>For powers<sup>a</sup> &gt; 5,00 D 0,50 Δ + the prismatic effect of 1,0 mm displacement</p>
<p><sup>a</sup> These tolerances are applied to the lowest absolute principal power of the pair of lenses</p>		

## Knowledge - Construction of spectacles

### Professional Discussion

#### Learning outcome

Understand the processes for the range of lens treatments for spectacle lenses

#### To pass

CS1 Knows the fundamental elements of why/how we apply lens treatments, and select the correct lens options accordingly

#### To achieve a distinction

CS8 Has a broad technical understanding of the various treatments, their application process and purpose, and how to select the right lens types/materials

#### Amplification

- Discuss the types of **lens treatments**
- Explain the purpose of **tinting**
- Explain the purpose of **antireflection coatings**
- Explain the purpose of **hydrophobic coatings**
- Outline the processes of **lens tinting and coatings**
- Explain the purpose of **toughening lens materials**
- Explain **lens toughening** processes
- Select suitable types of lens materials for specified **lens treatments**

#### Learning outcome

Ensure that frame components prior to glazing meet the required specifications

#### To pass

CS2 Can describe a number of common frame materials and list various parts correctly

#### To achieve a distinction

CS9 Can provide details on the different frame materials used, how they differ in performance, and provide more detail on parts

Amplification	
<ul style="list-style-type: none"> <li>Identify modern frame materials</li> <li>Describe the properties of modern frame materials</li> <li>State the <b>BS EN ISO terms</b> for frame components</li> <li>Demonstrate the measurement of spectacle frames</li> <li>Demonstrate the adjustment of spectacle frames to the order specification</li> </ul>	
Learning outcome	
Know the optical and physical properties of multifocal lenses	
To pass	To achieve a distinction
CS3 Understand the design and use of multifocals, how they differ and how they are manufactured. Work out the prism in reading area and can describe prism control bifocals	CS10 Can identify different multifocal types and describe how they differ in both identity and performance, and with more technical elements included (curvature, addition, inset, etc.) Understand the prismatic effect in reading area and discuss the prism control bifocal in detail
Amplification	
<ul style="list-style-type: none"> <li>Explain the terms relating to <b>multifocal lenses</b></li> <li>Describe <b>multifocal lens</b> designs</li> <li>Compare and contrast the manufacturing processes of <b>multifocals</b></li> <li>Compare and contrast the optical and physical performance of <b>multifocal lenses</b></li> <li>Calculate <b>prismatic effects</b> in the reading portion of <b>bifocals and trifocals</b></li> <li>Describe <b>prism-controlled bifocals</b>, using calculations and illustrations where appropriate</li> </ul>	
Learning outcome	
Understand the anatomical structures of the eye	
To pass	To achieve a distinction
CS4 Can identify and describe the basic anatomical structures	CS11 Can detail how certain anatomical structures work in conjunction to each other

Amplification	
<ul style="list-style-type: none"> <li>Identify the <b>anatomical structures of the eye</b></li> <li>Describe the functions of the <b>non-refracting elements of the eye</b></li> </ul>	
Learning outcome	
Understand the effect of a lens on light and how it relates to the correction of refractive error	
To pass	To achieve a distinction
CS5 Knows the basic function of eye structures and how to correct refractive errors. Use correct terms for errors and describe lens types to use	CS12 Can illustrate knowledge on refractive errors, how to correct, what the impact is on vision, before and after correction, and the correlation of prescription and refractive error
Amplification	
<ul style="list-style-type: none"> <li>Describe the effect of a <b>positive lens on incident light</b></li> <li>Describe the effect of a <b>negative lens on incident light</b></li> <li>Describe the <b>refracting elements of the eye</b></li> <li>Explain the causes of refractive errors in the eye</li> <li>Explain the classification of refractive errors in the eye</li> <li>Explain how spectacle lens power relates to refractive error</li> <li>Explain how a spectacle lens corrects a refractive error</li> </ul>	
Learning outcome	
Know the range of spectacle lens types for vision correction	
To pass	To achieve a distinction
CS6 Can describe various lens types, their properties and optical uses	CS13 Can describe various lens types, how they are used, the material seen, the variations in technical information on a given lens (Abbe no., index, thickness, etc.), benefits over other products

Amplification	
<ul style="list-style-type: none"> <li>Identify <b>modern single-vision lens types</b></li> <li>Identify <b>modern multifocal lens types</b></li> <li>Explain the <b>physical properties of specified lens types</b></li> <li>Explain the <b>optical properties of specified lens types</b></li> </ul>	
Learning outcome	
The historical and contemporary context of spectacle making	
To pass	To achieve a distinction
CS7 Can describe the basic parts of spectacle makers' history and modern-day context, and can describe the importance of maintaining industry knowledge	CS14 Has more detailed understanding of spectacle makers' history and involvement in wider optical bodies, its current format and how their industry knowledge could influence their care
Amplification	
<ul style="list-style-type: none"> <li>Determine the wider context of spectacle making in terms of historical origins and its current technical development</li> <li>Identify the importance of continually updating knowledge about the wider context of spectacle making</li> </ul>	
Unit Amplification and Guidance	
<p><b>Lens treatments</b></p> <p>Tinting - Apply a dye or colour to a lens</p> <p>Antireflection coating - process of applying a coating to aid with reducing reflection from a lens surface. This is applied through a vacuum chamber process</p> <p>Hydrophobic coating - additional coating process to add a water-repellent coating to the lens</p> <p><b>Lens toughening</b></p> <p>The process of enabling an optical lens to be compliant to safety eyewear standards</p>	

**BS EN ISO terms**

Table 1 - Tolerances on the back vertex power of single-vision and multifocal lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
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> 3,00 and ≤ 6,00	± 0,12	± 0,12	± 0,12	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,12	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 2 - Tolerances on the back vertex power of progressive- and degressive-power lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 6,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,18	± 0,18	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,18	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 3 - Tolerances on the direction of cylinder axis

<b>Absolute cylindrical power</b> (values in dioptres)	≥ 0,125 and ≤ 0,25	> 0,25 and ≤ 0,50	> 0,50 and ≤ 0,75	> 0,75 and ≤ 1,50	> 1,50 and ≤ 2,50	> 2,50
<b>Tolerance on the axis direction</b> (values in degrees)	± 16	± 9	± 6	± 4	± 3	± 2

Table 4 - Tolerances on the addition power for multifocal and progressive-power lenses (values in dioptres)

<b>Value of the addition power</b>	≤ 4,00	> 4,00
<b>Tolerance</b>	± 0,12	± 0,18

Table 5 - Prism imbalance (relative prism error) tolerances for single-vision and multifocal lenses

<b>Higher absolute ordered component prism value</b> $\Delta$	<b>Tolerance on the horizontal component</b> (Relative to the ordered centration distance)	<b>Tolerance on the vertical component</b> (Relative to the ordered centration distance)
≥ 0,00 and ≤ 2,00	For powers <sup>a</sup> ≥ 0,00 to ≤ 3,25 D 0,67 $\Delta$  For powers <sup>a</sup> > 3,25 D the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> ≥ 0,00 and ≤ 5,00 D 0,50 $\Delta$  For powers <sup>a</sup> > 5,00 D the prismatic effect of 1,0 mm displacement
> 2,00 and ≤ 10,00	For powers <sup>a</sup> ≥ 0,00 to ≤ 3,25 D 1,00 $\Delta$  For powers <sup>a</sup> > 3,25 D 0,33 $\Delta$ + the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> ≥ 0,00 and ≤ 5,00 D 0,75 $\Delta$  For powers <sup>a</sup> > 5,00 D 0,25 $\Delta$ + the prismatic effect of 1,0 mm displacement
> 10,00	For powers <sup>a</sup> ≥ 0,00 to ≤ 3,25 D	For powers <sup>a</sup> ≥ 0,00 and ≤ 5,00 D

	1,25 $\Delta$  For powers <sup>a</sup> > 3,25 D 0,58 $\Delta$ + the prismatic effect of 2,0 mm displacement	1,00 $\Delta$  For powers <sup>a</sup> > 5,00 D 0,50 $\Delta$ + the prismatic effect of 1,0 mm displacement
<sup>a</sup> These tolerances are applied to the lowest absolute principal power of the pair of lenses		

### **Multifocal/bifocal/trifocal lenses**

Lenses with various focal elements, e.g. bifocal = 2, trifocal = 3

### **Prismatic effects**

How vision is affected from one focal point to another, e.g. distance to near or vice versa

### **Anatomical structures of the eye**

The various refractive and non-refractive elements of the eye's structure

### **Refracting/non-refracting elements of the eye**

Refracting - the path of light through the eye and its focus, e.g. cornea

Non-refracting - the components of the eye that are not involved in refraction and form the structure of the eye e.g. sclera

### **Positive/negative lens on incident light**

How a prescription lens affects the path of light through the eye based on a visual defect, e.g. myopia (negative lens/short-sightedness)

### **Modern lens types**

Single vision - A lens with only one power

Multifocal - A lens with multiple powers



**Physical/optical properties of lens types**

Physical properties - to describe the appearance of a lens form or design

Optical properties - to describe the purpose of the optical function of a lens form or design

## Knowledge - The manufacture, service and repair of spectacles

### Professional Discussion

#### Learning outcome

Be able to perform arithmetical calculations for optical manufacturing

#### To pass

MS1 Correctly complete the set questions provided; arithmetic calculations, use of BODMAS, etc.

#### To achieve a distinction

MS11 Describe reasons why/how these calculations would be used in practical optics

#### Amplification

- Perform arithmetical operations using mathematical priorities
- Perform calculations involving reciprocals
- Perform calculations involving squares and square roots

#### Learning outcome

Be able to apply the properties of circles and right-angled triangles to optical manufacturing

#### To pass

MS2 Label parts of a circle and discuss where these apply in optical manufacturing. Use of SIN, COS, TAN in calculating right-angled triangle parameters and how these relate to optics

#### To achieve a distinction

MS12 Provide further detail on how the circle and right-angled triangle definitions fit into optical manufacturing and where they might be used

#### Amplification

- Describe the properties of a circle using appropriate terminology
- Relate the properties of a circle to applications in optical manufacturing
- Explain the properties of a right-angled triangle
- Explain what is meant by sine, cosine and tangent
- Calculate the parameters of a right-angled triangle
- Relate the properties of right-angled triangles to optical manufacturing

Learning outcome	
Understand how values for lens properties are obtained using fundamental lens formulae	
To pass	To achieve a distinction
MS3 Correctly complete the set questions provided; lens power, focal length, radius of surface, etc.	MS13 Show full working out, and describe reasons why/how these calculations would be used in practical optics
Amplification	
<ul style="list-style-type: none"> <li>Identify the <b>standard symbols for fundamental lens parameters</b></li> <li>Ascribe a value to <b>fundamental formulae in optical manufacturing</b></li> </ul>	
Learning outcome	
Be able to use graphs	
To pass	To achieve a distinction
MS4 Can accurately produce graphical info from data and work back from graphs too. Provide examples of where this is used in their role	MS14 Can interpret graphical data in both directions, analyse its importance/relevance and state when/where graphs and data analysis would be used
Amplification	
<ul style="list-style-type: none"> <li>Draw a line graph from a table of data</li> <li>Extract graphical data</li> <li>Interpret graphical data</li> <li>Give examples of graphs used within optical manufacturing</li> </ul>	
Learning outcome	
Demonstrate the importance of record-keeping	
To pass	To achieve a distinction
MS5 Can access essential reports and records, explain the data and reasons for keeping it	MS15 Can access report data, show analysis of the information, the benefits for keeping it and how it fits with other store data recording

Amplification	
<ul style="list-style-type: none"> <li>• Source reports and explain their relevance</li> <li>• Explain, interpret and evaluate report information</li> <li>• Explain the benefits of good record-keeping</li> </ul>	
Learning outcome	
Understand the principles of stock control	
To pass	To achieve a distinction
MS6 Explains the stock control process, data tracking involved and advantages of good/disadvantages of bad stock control	MS16 Can provide evidence of jobs affected by good and bad stock control and records of the results
Amplification	
<ul style="list-style-type: none"> <li>• Explain the need for keeping stock control</li> <li>• Accurately record stock control data</li> <li>• List the advantages of good stock control</li> <li>• List the disadvantages of poor stock control</li> </ul>	
Learning outcome	
Understand the audit process in stock control	
To pass	To achieve a distinction
MS7 Can perform audits as required and describe the benefits of stock audit	MS17 Knows the benefits and challenges of auditing stock products and can accurately detail the process
Amplification	
<ul style="list-style-type: none"> <li>• Describe how materials are audited within the stock system</li> <li>• Explain the importance of the audit of stock</li> </ul>	

<b>Direct Observation</b>	
<b>Learning outcome</b>	
Demonstrate the management of quality processes and the application of the relevant quality standards	
<b>To pass</b>	<b>To achieve a distinction</b>
MS8 Understands how quality management has an impact on the lab performance and knows the internal structure. Can identify tolerances as required and knows how to process an order that does not comply	MS18 Can describe the consequences of poor quality management, describe the process in place and how it fits with other store data, use tolerances and standards accurately and detail the processes for dealing with errors found
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Show how the management of quality has been applied</li> <li>• Explain the quality processes in place</li> <li>• Identify tolerances for a given prescription order using current <b>BS EN ISO standards</b></li> <li>• Implement procedures when a given prescription does not meet the required standards</li> </ul>	
<b>Learning outcome</b>	
Be able to operate the processes of stock control for optical products	
<b>To pass</b>	<b>To achieve a distinction</b>
MS9 Knows how to process new stock products through the lab, use records and systems correctly, and identify stock-holding issues	MS19 Knows how to process stock in and out using the systems in place, audit and manage stock accurately and ensure the products are stored correctly
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Deal with incoming stock</li> <li>• Deal with outgoing stock</li> <li>• Record the movement of stock</li> <li>• Monitor stock levels</li> <li>• Operate stock replacement procedures</li> <li>• Check and monitor product expiry dates</li> </ul>	

Learning outcome					
Be able to answer technical questions from other staff and customers					
To pass			To achieve a distinction		
MS10 Can discuss technical queries with colleagues to a successful conclusion			MS20 Can describe the details around why the order has a technical question, and how to resolve it		
Amplification					
<ul style="list-style-type: none"> <li>• Liaise with colleagues regarding technical queries</li> </ul>					
Unit Amplification and Guidance					
<b>BS EN ISO standards</b>					
Table 1 - Tolerances on the back vertex power of single-vision and multifocal lenses (values in dioptres)					
Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 3,00	± 0,12	± 0,09	± 0,12	± 0,18	-
> 3,00 and ≤ 6,00	± 0,12	± 0,12	± 0,12	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,12	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 2 - Tolerances on the back vertex power of progressive- and degressive-power lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 6,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,18	± 0,18	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,18	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 3 - Tolerances on the direction of cylinder axis

Absolute cylindrical power (values in dioptres)	≥ 0,125 and ≤ 0,25	> 0,25 and ≤ 0,50	> 0,50 and ≤ 0,75	> 0,75 and ≤ 1,50	> 1,50 and ≤ 2,50	> 2,50
Tolerance on the axis direction (values in degrees)	± 16	± 9	± 6	± 4	± 3	± 2

Table 4 - Tolerances on the addition power for multifocal and progressive-power lenses (values in dioptres)

Value of the addition power	≤ 4,00	> 4,00
Tolerance	± 0,12	± 0,18

Table 5 - Prism imbalance (relative prism error) tolerances for single-vision and multifocal lenses

Higher absolute ordered component prism value $\Delta$	Tolerance on the horizontal component (Relative to the ordered centration distance)	Tolerance on the vertical component (Relative to the ordered centration distance)
$\geq 0,00$ and $\leq 2,00$	For powers <sup>a</sup> $\geq 0,00$ to $\leq 3,25$ D $0,67 \Delta$  For powers <sup>a</sup> $> 3,25$ D the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> $\geq 0,00$ and $\leq 5,00$ D $0,50 \Delta$  For powers <sup>a</sup> $> 5,00$ D the prismatic effect of 1,0 mm displacement
$> 2,00$ and $\leq 10,00$	For powers <sup>a</sup> $\geq 0,00$ to $\leq 3,25$ D $1,00 \Delta$  For powers <sup>a</sup> $> 3,25$ D $0,33 \Delta$ + the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> $\geq 0,00$ and $\leq 5,00$ D $0,75 \Delta$  For powers <sup>a</sup> $> 5,00$ D $0,25 \Delta$ + the prismatic effect of 1,0 mm displacement
$> 10,00$	For powers <sup>a</sup> $\geq 0,00$ to $\leq 3,25$ D $1,25 \Delta$  For powers <sup>a</sup> $> 3,25$ D $0,58 \Delta$ + the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> $\geq 0,00$ and $\leq 5,00$ D $1,00 \Delta$  For powers <sup>a</sup> $> 5,00$ D $0,50 \Delta$ + the prismatic effect of 1,0 mm displacement

<sup>a</sup> These tolerances are applied to the lowest absolute principal power of the pair of lenses

**Standard symbols for fundamental lens parameters and fundamental formulae in optical manufacturing**

Use of focal length and radius of curvature calculations and their application in manufacturing optics



## Skills - Health & Safety and working environment

### Professional Discussion

#### Learning outcome

Understand the importance of environmental protection

#### To pass

HW1 Can describe what environmental hazards are present in the lab (and store if applicable), and show the processes for different types of waste disposal

#### To achieve a distinction

HW4 Describe specific products and processes in the lab (and store if applicable) that pose a hazard, what the implication of such hazards might be, and how to dispose of specific waste products and what the processes are for disposal of packaging

#### Amplification

- Identify typical environmental hazards in an optical production unit
- Describe the environmental issues around waste disposal
- Implement the procedures for waste disposal
- Implement the disposal procedures for packaging

#### Learning outcome

Be able to respond appropriately to accidents and incidents in the workplace

#### To pass

HW2 Explain their own responsibilities to the Health and Safety at Work etc. act, and what emergency response processes are in place

#### To achieve a distinction

HW5 Can explain the Health and Safety at Work etc. act in terms of employer/employee responsibilities, who is involved in incident reporting and the emergency/alarm procedures

#### Amplification

- Explain employees' responsibilities regarding health and safety at work
- Respond to emergency situations at work
- Use emergency response equipment
- Explain the use of alarm systems

<b>Direct Observation</b>	
<b>Learning outcome</b>	
Be able to follow the health and safety regulations in an optical production workplace	
<b>To pass</b>	<b>To achieve a distinction</b>
HW3 Can demonstrate understanding of the needs of Health and Safety at Work etc. act, any company standards that apply, COSHH regulations and how this information is communicated in the business	HW6 Can describe the importance of following, and consequences of not following, health and safety guidelines and company standards. Can explain the reasons for COSHH regulations, and describe the process for reporting incidents
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Show that they know the location of the essential health and safety regulations in the workplace</li> <li>• Show that they know the objectives of the Health and Safety at Work Act</li> <li>• Show that they know the requirements of the Control of Substances Hazardous to Health regulations</li> <li>• Show that they know their company rules relating to health and safety</li> <li>• Describe the lines of communication regarding health and safety issues</li> </ul>	

## Skills - Technical interpretation and understanding

### Professional Discussion

#### Learning outcome

Be able to process orders and information accurately

#### To pass

T11 Demonstrate the ability to understand orders, process the data and discuss the technical terms used. Can identify and correct errors found

#### To achieve a distinction

T14 Discuss in detail the reasons for specific terms, how data can affect an order, how errors can cause further issues and elaborate on what they could be. Can accurately deal with error correction and the processes around it

#### Amplification

- Explain the significance of elements of a given spectacle order
- Use order information to be able to process an order
- Explain the technical terms used on optical orders
- Identify errors on a given order
- Correct errors on an order

#### Learning outcome

Be able to interpret orders for spectacles

#### To pass

T12 Can describe order document contents, various order types, transpose prescriptions and explain the links between order content and successful lens delivery

#### To achieve a distinction

T15 Can explain the interaction of various elements of an order document, the different ordering processes available, and how to transpose. Understands and can explain the variations that can result from incorrect information on orders

<b>Amplification</b>
<ul style="list-style-type: none"> <li>• Be able to interpret orders for spectacles</li> <li>• Describe the content of prescription order forms for spectacles</li> <li>• Outline the different types of spectacle orders</li> <li>• Transpose <b>ophthalmic prescriptions</b></li> <li>• Explain how the process of ordering relates to the overall manufacturing process</li> </ul>

<b>Direct Observation</b>	
<b>Learning outcome</b>	
Be able to answer technical questions from other staff and customers	
<b>To pass</b>	<b>To achieve a distinction</b>
T13 Can deal with basic technical enquiries and customer interaction	T16 Can demonstrate effective technical resolution, and comfortably communicate with customers in a wide range of situations
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Liaise with colleagues regarding technical queries</li> <li>• Communicate with customers regarding technical queries</li> </ul>	
<b>Unit Amplification and Guidance</b>	
<b>Ophthalmic prescriptions</b> Understanding prescription information and transposition	

## Skills - Manufacturing and repair processes

### Professional Discussion

#### Learning outcome

Have a practical understanding of optical machinery

#### To pass

MR1 Demonstrates ability and knowledge in how to start the glazing process with fundamental edger settings

#### To achieve a distinction

MR10 Can understand and demonstrate why edgers are set up for different products and materials and can describe/demonstrate the outcomes of the settings used

#### Amplification

- Explain the principles of **optical machinery**
- Explain the operation of **optical machinery**
- Set up **optical machinery** for a full range of products

#### Learning outcome

Be able to calibrate precision optical manufacturing machinery

#### To pass

MR2 Knows how and when to perform calibration processes and deal with edger errors/faults

#### To achieve a distinction

MR11 Can explain the reasons for calibration, what the positive and negative effects can be, and the reasons behind errors and faults observed on edgers and cut lenses

#### Amplification

- Explain when to calibrate **precision optical machinery**
- Calibrate **precision optical machinery**
- Correct **optical machinery** with an error message or fault indication

Learning outcome	
Be able to demonstrate an understanding of the characteristics of lenses, their materials and their alternative forms	
To pass	To achieve a distinction
MR3 Can perform basic transposition, lens power measurements, and visually identify lens products	MR12 Understands the reasons for transposition, what powers/meridians mean and how lenses of different types of power differ from each other in appearance
Amplification	
<ul style="list-style-type: none"> <li>• Transpose to an alternate <b>sph/cyl</b> for a given prescription</li> <li>• Identify principal powers of a given prescription</li> <li>• Identify different types of lenses by inspection</li> </ul>	
Learning outcome	
Be able to source the full range of manufacturing parameters and adjustments that are technically possible	
To pass	To achieve a distinction
MR4 Can perform/source basic frame and lens measurements and decide on suitable/unsuitable lenses accordingly	MR13 Can demonstrate the interaction of prescription and frame measurements and the effect this can have on the finished item
Amplification	
<ul style="list-style-type: none"> <li>• Select the correct uncut based on an order</li> <li>• Explain the limitations of a given lens product based on prescription and measurements</li> <li>• Make recommendations if an uncut is not available for a given order</li> </ul>	
Learning outcome	
Demonstrate the processes of stock control for optical product	
To pass	To achieve a distinction
MR5 Can demonstrate general stock product management process, and discuss the benefits	MR14 Can advise colleagues on stock process, and manage stock process independently

Amplification	
<ul style="list-style-type: none"> <li>• Deal with incoming and outgoing stock</li> <li>• Record the movement of stock</li> <li>• Monitor and maintain stock levels</li> <li>• Explain the benefits of good stock control</li> </ul>	
Learning outcome	
Understand the manufacturing and administrative journey of an order	
To pass	To achieve a distinction
MR6 Demonstrate knowledge of prescription lens glazing/manufacturing process, and the admin involved, including stock control	MR15 Can accurately describe how to manufacture different prescription lenses and glaze different frame types, what reports or administration is involved and what forms of stock control might be required
Amplification	
<ul style="list-style-type: none"> <li>• Describe the sequence of processes for manufacturing a given order</li> <li>• Describe the administrative processes for manufacturing a given order</li> <li>• Demonstrate the processes of stock control for optical products</li> </ul>	

<b>Direct Observation</b>	
<b>Learning outcome</b>	
Be able to operate the processes of stock control for optical products	
<b>To pass</b>	<b>To achieve a distinction</b>
MR7 Knows how to process new stock products through the lab, use records and systems correctly, and identify stock issues	MR16 Knows how to process new and existing orders for stock products in and out using the systems in place, audit and manage stock accurately and ensure the products are stored correctly
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Deal with incoming stock</li> <li>• Deal with outgoing stock</li> <li>• Record the movement of stock</li> <li>• Monitor stock levels</li> <li>• Operate stock replacement procedures</li> <li>• Check and monitor product expiry dates</li> </ul>	
<b>Learning outcome</b>	
Understand and work within any restrictions placed on any design	
<b>To pass</b>	<b>To achieve a distinction</b>
MR8 Prepare various lenses for glazing. Set up machinery for different types of lenses and frames. Cut and fit lenses. Hand edge lenses to fit. Set up frames for QC. Inspect and report on finished glasses. Set up and glaze a non-standard job	MR17 Provide further commentary on more detail around these processes; why set up edgers in a particular way; when to hand edge, when not to; how to correct sizing issues on the edger; how to adjust various frame types/materials and what set-up is expected; can prepare a detailed report on finished jobs, whether correct or if faults were found



Amplification	
<ul style="list-style-type: none"> <li>• Lay off lenses for <b>glazing</b> to a given specification</li> <li>• Prepare <b>glazing machinery</b> to edge lenses</li> <li>• Edge the lenses using <b>glazing machinery</b></li> <li>• Hand edge the lenses to fit the spectacle frame</li> <li>• Set up finished spectacles ready for verification and dispatch</li> <li>• Inspect the finished spectacles</li> <li>• Provide a report on the finished spectacles</li> <li>• Lay off a pair of nonstandard lenses for <b>glazing</b></li> </ul>	
Learning outcome	
Be able to glaze a variety of spectacle types	
To pass	To achieve a distinction
MR9 Can prepare a variety of lens and frame types for glazing	MR18 Can apply further special instructions/settings on equipment used
Amplification	
<ul style="list-style-type: none"> <li>• Lay off a variety of lenses for glazing to a given specification</li> </ul>	
Unit Amplification and Guidance	
<p><b>Precision/ Optical machinery</b></p> <p>Different machines used in the production of spectacles, e.g.:</p> <ul style="list-style-type: none"> <li>• focimeter</li> <li>• auto edger</li> <li>• blocker</li> <li>• hand edger</li> <li>• tint unit</li> <li>• frame heater</li> </ul>	

**Sph/cyl**

Different parts of the prescription

Sphere - single

Cyl - dual, to fix astigmatism

**Glazing machinery**

Edger and blocker - examples of optical machinery

## Skills - Tools and equipment

### Direct Observation

#### Learning outcome

Have a practical understanding of 'first line' maintenance for optical machinery

#### To pass

TE1 Knows the basic needs of maintenance of equipment and the recording of data, and knows the benefits/disadvantages of this

#### To achieve a distinction

TE2 Can maintain all lab equipment to a satisfactory level, record any resultant information logically and can identify the extended issues of poor maintenance

#### Amplification

- Demonstrate completion of a maintenance schedule or services log
- Complete 'first line' maintenance on optical machinery
- Describe the consequences of not carrying out regular maintenance

## Skills - Quality

### Professional Discussion

#### Learning outcome

Understand quality control methods and the use of standards

#### To pass

QT1 Understanding the basic principles of quality checking and can perform QC practically. Understand different production checks and describe how they use standards

#### To achieve a distinction

QT9 Can explain the benefits of good QC process, and is able to process more complex orders through quality checking, using standards accurately and describing how/why. Good knowledge of different product quality checks and when/where they apply to the manufacturing process

#### Amplification

- Explain the importance of quality control
- Demonstrate the procedure for quality inspection of a given uncut lens type before dispatch
- Compare and contrast quality inspection procedures in given lens production methods
- Explain how and why standards are used in quality inspection and control

#### Learning outcome

Demonstrate the importance of record-keeping

#### To pass

QT2 Knows where to access productivity data; can describe why and how we use it and the benefits of using data

#### To achieve a distinction

QT10 Can access, describe and correlate various types of productivity data, and explain the benefits and challenges around this

#### Amplification

- Source reports and explain their relevance
- Explain, interpret and evaluate report information
- Explain the benefits of good record-keeping

Learning outcome	
Understand the labelling requirements for spectacles	
To pass	To achieve a distinction
QT3 Can explain the MDD labelling requirements	QT11 Is able to translate incorrect labelling into possible consequences for the customer
Amplification	
<ul style="list-style-type: none"> <li>• Explain the labelling requirements of the <b>Medical Devices Directive</b></li> <li>• Explain the importance of correct labelling</li> </ul>	

Direct Observation	
Learning outcome	
Demonstrate an understanding of the importance of maintaining quality throughout the process of receiving orders and then manufacturing	
To pass	To achieve a distinction
QT4 Can resolve basic errors and problems effectively	QT12 Can deal with more complex order errors and resolve issues accurately and with limited/no supervision
Amplification	
<ul style="list-style-type: none"> <li>• Carry out the process for dealing with problems or errors in received orders</li> <li>• Carry out the process for dealing with problems or errors during and after manufacture</li> </ul>	

Learning outcome	
Understand quality control methods and the use of standards	
To pass	To achieve a distinction
QT5 Understanding the basic principles of quality checking and can perform QC practically. Understand different production checks and describe how they use standards	QT13 Can explain the benefits of good QC process, and process more complex orders through quality checking, using standards accurately and describing how/why. Good knowledge of different elements of product quality checking
Amplification	
<ul style="list-style-type: none"> <li>• Explain the importance of quality control</li> <li>• Demonstrate the procedure for quality inspection of a given uncut lens type before dispatch</li> <li>• Compare and contrast quality inspection procedures in given lens production methods</li> <li>• Explain how and why standards are used in quality inspection and control</li> </ul>	
Learning outcome	
Demonstrate the management of quality processes and the application of the relevant optical quality standards	
To pass	To achieve a distinction
QT6 Functional understanding of QC process, essential tolerances and standards. Can identify and rectify errors found, and manage the process of remaking an order	QT14 Detailed knowledge of QC process and the tools and standards used. Tolerance knowledge is good, with ability to use without prompts. Can identify, correct and advise on errors, faults or challenges with completing an order correctly, and manage the entire remake process
Amplification	
<ul style="list-style-type: none"> <li>• Explain the quality processes in place</li> <li>• Identify tolerances for a given prescription order using current <b>BS EN ISO standards</b></li> <li>• Implement procedures when a given prescription does not meet the required standards</li> <li>• Show how the management of quality has been applied</li> </ul>	

Learning outcome	
Be able to implement the process for the dispatch of spectacle orders	
To pass	To achieve a distinction
QT7 Demonstrate the final checks and processes in place, how this is documented and processed for dispatch	QT15 Describe the reasons for quality checking, how this varies from start to finish, the various dispatch and documentation processes for different orders, and costs applicable to different types of order
Amplification	
<ul style="list-style-type: none"> <li>• Undertake the final quality checks required before dispatch to the customer</li> <li>• Dispatch a range of finished orders</li> <li>• Use the types of documentation for dispatching orders</li> <li>• Discuss the relative costs of different shipping methods</li> </ul>	
Learning outcome	
Understand the labelling requirements for spectacles	
To pass	To achieve a distinction
QT8 Can explain the MDD labelling requirements	QT16 Is able to translate incorrect labelling into possible consequences for the customer
Amplification	
<ul style="list-style-type: none"> <li>• Explain the labelling requirements of the <b>Medical Devices Directive</b></li> <li>• Explain the importance of correct labelling</li> </ul>	

## Unit Amplification and Guidance

### BS EN ISO standards

Table 1 - Tolerances on the back vertex power of single-vision and multifocal lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 3,00	± 0,12	± 0,09	± 0,12	± 0,18	-
> 3,00 and ≤ 6,00	± 0,12	± 0,12	± 0,12	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,12	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 2 - Tolerances on the back vertex power of progressive- and degressive-power lenses (values in dioptres)

Power of principal meridian with higher absolute back vertex power	Tolerance on the back vertex power of each principal meridian	Tolerance of the cylindrical power			
		≥ 0,00 and ≤ 0,75	> 0,75 and ≤ 4,00	> 4,00 and ≤ 6,00	> 6,00
≥ 0,00 and ≤ 6,00	± 0,12	± 0,12	± 0,18	± 0,18	± 0,25
> 6,00 and ≤ 9,00	± 0,18	± 0,18	± 0,18	± 0,18	± 0,25
> 9,00 and ≤ 12,00	± 0,18	± 0,18	± 0,18	± 0,25	± 0,25
> 12,00 and ≤ 20,00	± 0,25	± 0,18	± 0,25	± 0,25	± 0,25
> 20,00	± 0,37	± 0,25	± 0,25	± 0,37	± 0,37

Table 3 - Tolerances on the direction of cylinder axis

<b>Absolute cylindrical power</b> (values in dioptres)	$\geq 0,125$ and $\leq$ 0,25	$> 0,25$ and $\leq$ 0,50	$> 0,50$ and $\leq$ 0,75	$> 0,75$ and $\leq$ 1,50	$> 1,50$ and $\leq$ 2,50	$> 2,50$
<b>Tolerance on the axis direction</b> (values in degrees)	$\pm 16$	$\pm 9$	$\pm 6$	$\pm 4$	$\pm 3$	$\pm 2$

Table 4 - Tolerances on the addition power for multifocal and progressive-power lenses (values in dioptres)

<b>Value of the addition power</b>	$\leq 4,00$	$> 4,00$
<b>Tolerance</b>	$\pm 0,12$	$\pm 0,18$



Table 5 - Prism imbalance (relative prism error) tolerances for single-vision and multifocal lenses

Higher absolute ordered component prism value $\Delta$	Tolerance on the horizontal component (Relative to the ordered centration distance)	Tolerance on the vertical component (Relative to the ordered centration distance)
$\geq 0,00$ and $\leq 2,00$	For powers <sup>a</sup> $\geq 0,00$ to $\leq 3,25$ D 0,67 $\Delta$  For powers <sup>a</sup> $> 3,25$ D the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> $\geq 0,00$ and $\leq 5,00$ D 0,50 $\Delta$  For powers <sup>a</sup> $> 5,00$ D the prismatic effect of 1,0 mm displacement
$> 2,00$ and $\leq 10,00$	For powers <sup>a</sup> $\geq 0,00$ to $\leq 3,25$ D 1,00 $\Delta$  For powers <sup>a</sup> $> 3,25$ D 0,33 $\Delta$ + the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> $\geq 0,00$ and $\leq 5,00$ D 0,75 $\Delta$  For powers <sup>a</sup> $> 5,00$ D 0,25 $\Delta$ + the prismatic effect of 1,0 mm displacement
$> 10,00$	For powers <sup>a</sup> $\geq 0,00$ to $\leq 3,25$ D 1,25 $\Delta$  For powers <sup>a</sup> $> 3,25$ D 0,58 $\Delta$ + the prismatic effect of 2,0 mm displacement	For powers <sup>a</sup> $\geq 0,00$ and $\leq 5,00$ D 1,00 $\Delta$  For powers <sup>a</sup> $> 5,00$ D 0,50 $\Delta$ + the prismatic effect of 1,0 mm displacement

<sup>a</sup> These tolerances are applied to the lowest absolute principal power of the pair of lenses

**Medical Devices Directive**

Understanding the use of CE guidelines and their requirements

## Behaviours - Quality focused

### Professional Discussion

#### Learning outcome

Follow policies and procedures, have a strong attention to detail and apply quality assurance checks through the spectacle repair or manufacturing process

#### To pass

QF1 Demonstrate the ability to manage own workload, identify individual stages in manufacturing and change work role as required by day-to-day operational needs

#### To achieve a distinction

QF2 Can manage own workload without supervision and assist in varied tasks/multitasking as required. Describe the 'job journey' through the lab process. Ensure that quality and environmental standards are maintained

#### Amplification

- Break down complex tasks into stages
- Allocate time and resources to work efficiently
- Adapt to changing situations, maintain a tidy working environment and replace equipment after use

## Behaviours - Professionalism

### Direct Observation

#### Learning outcome

Have a strong professional work ethic including pride in their work and attention to detail. Plan and manage time effectively

#### To pass

PR1 Can discuss appropriate and work-based content effectively and considerately with others, maintaining an appropriate attitude to work, while maintaining focus on the job and tasks as required

#### To achieve a distinction

PR2 Understands the needs of others in the work environment, and can react positively to work requests as required. Has a positive approach to work requests and can demonstrate an empathic approach to others

#### Amplification

- Initiate conversation
- Use questions confidently and appropriately
- Exhibit appropriate body language and attitude when dealing with colleagues

## Behaviours - Self-development

### Professional Discussion

#### Learning outcome

Plan and manage continued professional development

#### To pass

SD1 Understands the importance of continuing development, can highlight individual elements and how the business is supporting them. Can provide evidence of colleague interaction and adaptation of work-based skills to adjust to their role

#### To achieve a distinction

SD4 Knows the importance of personal development, to both self and the business. Can provide evidence of 1-2-1, review and colleague-supported development. Knows the opportunities for support in the business and can evidence any external contact and skill changes/improvements through development

#### Amplification

- Identify current experience, skills, knowledge and understanding through the 1-2-1 process
- Identify the benefits of continuous personal development
- Identify the importance of reviewing training and development objectives
- Determine the organisational procedure for supporting training and development issues
- Evidence regular contact with other individuals within the optical industry

#### Learning outcome

Keep up to date with best practice and emerging technologies within the optical sector. Obtain and offer constructive feedback to others, and develop and maintain professional relationships

#### To pass

SD2 Shows the right approach to the role and the continual need to develop technical skills and knowledge. Can demonstrate understanding of the history of spectacle making

#### To achieve a distinction

SD5 Has a positive approach to all work tasks and willingly takes on extra responsibility as relevant to their ability. Keeps up with new products and services in the industry and appreciates both the historical and the contemporary involvement of spectacle making

<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Demonstrate a passion for spectacle making</li> <li>• Maintain an awareness of new materials in the market</li> <li>• Show an understanding of historical and contemporary context of spectacle making</li> </ul>	
<b>Learning outcome</b>	
Self-evaluate and obtain feedback from others to inform work and work practice	
<b>To pass</b>	<b>To achieve a distinction</b>
SD3 Evidence of objectives, achievements, and feedback on development with clear records	SD6 Can evidence and personally report on development objectives and what level of achievement has been reached. Feedback is clear and actioned, records are precise and clear
<b>Amplification</b>	
<ul style="list-style-type: none"> <li>• Confirm what objectives have been agreed with the employer and in conjunction with colleagues</li> <li>• Identify what has been achieved against objectives</li> <li>• Determine feedback from employer and colleagues to ensure personal work is of highest quality and to help inform development of personal professional practice</li> <li>• Describe methods for keeping records of feedback</li> </ul>	

## Behaviours - Safety orientated

### Direct Observation

#### Learning outcome

Be aware of and adopt the processes and procedures for the safe manufacturing or repair of spectacles for both self and others

#### To pass

SO1 Understands the importance of COSHH and PPE, can describe and demonstrate the use of both in their workplace

#### To achieve a distinction

SO2 Can describe the individual and corporate needs of COSHH and PPE in their workplace in detail and how/when they are applied, and assist in non-lab staff being made aware

#### Amplification

- Identify with the appropriate disposal of waste and hazardous materials and fluids
- Understand the importance of PPE (Personal Protective Equipment)
- Routinely work safely in the optical lab environment