Australian Government

Department of Education, Employment and Workplace Relations

# MSL965002A Perform glass coating, grinding and finishing operations

**Revision Number: 1**

# MSL965002A Perform glass coating, grinding and finishing operations

## Modification History

Not applicable.

## Unit Descriptor

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| **Unit descriptor** | This unit of competency covers the ability to perform glass coating, grinding and finishing operations for scientific glassware. |

## Application of the Unit

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| **Application of the unit** | This unit of competency is applicable to skilled and experienced scientific glassblowers. They will apply specialised technical knowledge and precise technical skills and considerable planning and judgement in their work.<br><br>Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These can be found at the end of this unit of competency under the section 'This competency in practice'. |

## Licensing/Regulatory Information

Not applicable.

## Pre-Requisites

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| **Prerequisite units** | | |
| | *MSL963001A* | *Operate basic handblowing equipment* |

| **Prerequisite units** | | |
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| | *MSL963002A* | *Repair glass apparatus using simple glassblowing equipment* |

## Employability Skills Information

| **Employability skills** | This unit contains employability skills. |
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## Elements and Performance Criteria Pre-Content

| Elements describe the essential outcomes of a unit of competency. | Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide. |
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# Elements and Performance Criteria

| ELEMENT | PERFORMANCE CRITERIA |
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| 1. Prepare for work | 1.1. Identify appropriate specifications and procedures, and discuss any issues or problems with customer and work team<br>1.2. Identify hazards and enterprise safety requirements<br>1.3. Record description of the job, compare with specification and plan work activities<br>1.4. Prepare equipment in accordance with job requirements |
| 2. Perform glass coating operations | 2.1. Identify, select and prepare appropriate grades of glass, coating materials, abrasives, solutions and finishing agents as appropriate for the job<br>2.2. Clean and prepare glass as required for coating operation<br>2.3. Perform glass coating operation according to standard procedure<br>2.4. Perform post-coating procedures to maintain coated surface<br>2.5. Perform coating removal processes<br>2.6. Ensure appropriate disposal of all waste |
| 3. Perform glass grinding operations | 3.1. Identify and prepare grinding tools as required for procedure<br>3.2. Select appropriate abrasives for grinding operations<br>3.3. Perform grinding and repairing/re-grinding processes as appropriate<br>3.4. Test ground surfaces to ensure they meet compliance requirements<br>3.5. Identify and rectify problems that arise during operations |
| 4. Perform glass finishing operations | 4.1. Establish finishing requirements for the job<br>4.2. Perform finishing procedures as required for job |
| 5. Maintain a safe work environment | 5.1. Use established safe work practices and personal protective equipment to ensure safety of self and other workers<br>5.2. Minimise the generation of wastes<br>5.3. Ensure the safe disposal of wastes<br>5.4. Clean, care for and maintain work area, equipment and tools<br>5.5. Report any hazards or incidents according to enterprise procedures |

| ELEMENT | PERFORMANCE CRITERIA |
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| 6. Maintain records | 6.1. Record data as per enterprise requirements<br>6.2. Maintain glass apparatus and system equipment logs as per enterprise requirements<br>6.3. Ensure security and confidentiality of enterprise information |

# Required Skills and Knowledge

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit.

**Required skills**

Required skills include:

- following correct occupational health and safety (OHS) and principles of good laboratory practice (GLP)
- applying knowledge of chemical and physical science to glassblowing situations and making appropriate conclusions
- selecting appropriate grades of glass, coating materials, abrasives and finishing agents for the job
- cleaning and preparing glass surfaces
- metal coating glass surfaces and applying opaque treatments to industry standards
- grinding and hand lapping glass to be used in fabrication and for precision fit
- applying finishing techniques
- optimising and using materials and equipment
- identifying atypical situations and taking appropriate action
- communicating with customers/research team to meet timeline commitments
- recording and reporting work results

**Required knowledge**

Required knowledge includes:

- use of glassblowing materials, equipment, tools and techniques
- chemistry of coating materials and coating process
- theoretical and practical principles of materials and processes for glass coating, glass grinding and glass finishing
- theory of equipment operation and use
- common faults in coating, grinding and finishing operations and methods for control
- safety procedures relevant to coating, grinding and finishing operations
- waste disposal procedures
- relevant health, safety and environment requirements

# Evidence Guide

| EVIDENCE GUIDE | |
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| The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package. | |
| **Overview of assessment** | |
| **Critical aspects for assessment and evidence required to demonstrate competency in this unit** | Assessors should ensure that candidates can:<br>• apply appropriate techniques to clean and prepare glass surfaces<br>• apply knowledge of chemical and physical science to glassblowing situations and make appropriate conclusions<br>• metal coat glass surfaces or apply opaque treatments to industry standards<br>• grind and hand lap glass to be used in fabrication and for precision fit<br>• apply finishing techniques to complete job<br>• identify atypical situations and take appropriate action<br>• select appropriate grades of glass, coating materials, abrasives and finishing agents for job<br>• optimise and use materials and equipment<br>• communicate with customers/research team to meet timeline commitments<br>• record and report work results<br>• follow correct OHS and principles of GLP. |
| **Context of and specific resources for assessment** | This unit of competency is to be assessed in the workplace or simulated workplace environment.<br>This unit of competency may be assessed with:<br>• *MSL965001A Design and manufacture glass apparatus and glass systems*<br>• *MSL965003A Construct, modify and maintain vacuum systems*.<br>Resources may include:<br>• access to scientific glassblowing facility, appropriate equipment, materials and procedures which will allow for appropriate and realistic simulation<br>• access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable |

| EVIDENCE GUIDE | |
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| | range of equipment. |
| **Method of assessment** | It is strongly recommended that assessment is conducted through observation over time. The timeframe must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.<br><br>The following assessment methods are suggested:<br>• inspection of examples of glasswork and workplace documentation completed by the candidate<br>• analysis of the candidate's work records over a period of time to ensure accurate and consistent work is obtained within required timelines<br>• feedback from peers and supervisors<br>• oral/written questioning.<br><br>In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly.<br><br>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.<br><br>Access must be provided to appropriate learning and/or assessment support when required.<br><br>The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work like environment. |
| **This competency in practice** | Industry representatives have provided the case study below to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting.<br><br>**Education**<br><br>A request has been made for a non-standard, 30mm diameter optical cell with a 125mm path length that has a silvered evacuated jacket for insulation properties and stopcock for filling. The scientific glassblower completes a full scale drawing from the schematic sketch provided with the request and determines the type of glass to be used from the transmittance wavelength properties of the |

| EVIDENCE GUIDE | |
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| | light source used. The two optical discs are then ground and polished and tested for flatness. The custom dimension stopcock is manufactured and stopcock barrel and key are ground on specialised mandrel tapers using carborundum slurries. The stopcock is then tested to British Standards to ensure compliance with leakage rates. The cell is then assembled by sealing the stopcock and optical discs to the insulated jacketed glass tube. Annealing protocols are followed and then the jacket is silvered, mindful of the safety issues related to the chemicals used. The jacket is emptied of the silver solution, dried, evacuated using a vacuum line and then sealed. The optical cell is then delivered for use. |

# Range Statement

| RANGE STATEMENT | |
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| The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included. | |
| **Codes of practice** | Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used |
| **Standards**, **codes**, **procedures and/or enterprise requirements** | Standards, codes, procedures and/or enterprise requirements may include<br>• calibration and maintenance schedules<br>• enterprise recording and reporting procedures<br>• equipment manuals<br>• equipment startup, operation and shutdown procedures<br>• industry codes of practice<br>• material safety data sheets (MSDS)<br>• material, production and product specifications<br>• national environment protection measures<br>• occupational health and safety national standards and codes of practice<br>• production and laboratory schedules<br>• quality manuals<br>• standard operating procedures (SOPs) |
| **Tools and equipment** | Tools and equipment may include:<br>• coating solutions and baths<br>• grinding tools and abrasives<br>• bench, handlamp and ribbon burners<br>• gas supplies and gas economisers<br>• glass working lathes<br>• annealing ovens<br>• measuring and recording equipment<br>• hand tools, such as carbon paddles and mandrels, range of forceps, glass tubing gauges, angle setting jigs, calipers, glass support rollers, brass shapers, carbon rods, glass knife, stainless steel gauze, vernier |

| **RANGE STATEMENT** | |
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| | calipers and other measuring tools, and strain viewer<br>• mechanical glass cutters and saws<br>• mechanical glass grinding equipment<br>• safety clothing and equipment |
| **Glass coating** | Glass coating may include:<br>• cleaning and preparation of glass<br>• preparing coating solutions<br>• coating/strip coating and dedicated coating<br>• protecting coated surfaces<br>• electroplating<br>• removal/partial removal of coating |
| **Grinding** | Grinding may include:<br>• selection of abrasives and metal grinding tools<br>• interpreting specifications for glass-ground joints<br>• using grinding procedures<br>• testing ground surfaces for leakage<br>• preparing glass stopcocks |
| **Finishing** | Finishing may include:<br>• cleaning, rinsing and drying<br>• evacuating and sealing<br>• metallising (if applicable)<br>• flame and/or mechanical polishing |
| **Hazards** | Hazards may include:<br>• sharps and broken glassware<br>• residues on used glassware, such as mercury<br>• heat sources, such as burners and ovens<br>• fluids under pressure (acetylene and oxygen)<br>• glass dust<br>• cuts associated with glass grinders and cutters<br>• manual handling of heavy equipment and containers |
| **Safety practices** | Safety practices may include:<br>• use of personal protective equipment, such as heat resistant gloves, safety glasses, goggles, face guards, coveralls, respirators and safety boots |

| RANGE STATEMENT | |
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| | • correct labelling of reagents and hazardous materials<br>• handling, and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, and enterprise procedures and regulations<br>• regular cleaning and/or decontamination of equipment and work areas |
| **Occupational health and safety (OHS) and environmental management requirements** | OHS and environmental management requirements:<br>• all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time<br>• all operations assume the potentially hazardous nature of samples and require standard precautions to be applied<br>• where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health |

# Unit Sector(s)

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| **Unit sector** | Scientific glassblowing |

# Competency field

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| **Competency field** | |

# Co-requisite units

| Co-requisite units | | |
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