Australian Government

Department of Education, Employment and Workplace Relations

MSL963001A Operate basic handblowing equipment

Revision Number: 1

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Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to operate handblowing equipment to perform basic glasswork. Personnel may be less experienced workers working under the guidance of an experienced scientific glassblower.

Application of the Unit

Application of the unit	This unit of competency is applicable to personnel working with experienced scientific glassblowers, generally in scientific educational institutions. 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 are found at the end of this unit of competency under the section 'This competency in practice'.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.

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.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for handblowing operations	1.1. Identify job, appropriate procedure, hazards and safety requirements 1.2. Use personal protective equipment and safety procedures specified for the job and materials to be used 1.3. Record description of the job to be undertaken, compare with specification and report any variations 1.4. Select and prepare tools and equipment in accordance with job requirements 1.5. Identify glass stocks and components required for the job
2. Follow sequence of operations for glasswork procedure to be performed	2.1. Prepare glass stocks and components as required for the job 2.2. Check and adjust equipment and tools for the job as applicable 2.3. Start up equipment using enterprise procedures 2.4. Carry out glasswork procedure using the appropriate standard method 2.5. Monitor process and rectify routine problems 2.6. Follow equipment shutdown procedures
3. Use annealing equipment	3.1. Prepare annealing equipment for the job 3.2. Start up, operate and shut down annealing equipment using enterprise procedures 3.3. Monitor, adjust and record annealing operation 3.4. Rectify routine problems
4. Maintain a safe work environment	4.1. Follow established work practices to ensure safety of self and other workers 4.2. Minimise the generation of wastes 4.3. Ensure the safe disposal of wastes 4.4. Clean, care for and maintain work area, equipment and tools 4.5. Report any hazards or incidents according to enterprise procedures
5. Maintain records	5.1. Record data as per enterprise requirements 5.2. Maintain equipment logs as per enterprise requirements 5.3. Maintain 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:

- working safely with glass
- using tools and equipment to perform basic glassblowing operations
- using appropriate glassblowing hand manipulation techniques
- cutting, heating, bending, shaping, sealing and related glassworking techniques
- techniques for minimising strain
- using coefficients of expansion
- maintaining safe working pressures
- storing glass appropriately
- making and grinding components, such as stopcocks than meet specifications
- starting up, setting up, shutting down and maintaining equipment in accordance with work instructions
- selecting appropriate grades of glass and preparation for use
- optimising of equipment operating parameters
- maintaining temperature and stress parameters
- reporting atypical results and problems to appropriate personnel according to enterprise procedures
- recording and communicating of work results
- following correct occupational health and safety (OHS) and principles of good laboratory practice (GLP)

Required knowledge

Required knowledge includes:

- composition and nature of glass types
- function and correct use of apparatus
- basic chemical and physical concepts relating to properties and behaviour of glass
- safe startup and shutdown procedures
- critical material properties and appropriate glassworking parameters
- pre-heating procedures
- basic theory of re-entry angles and stress points
- setup and annealing/conditioning process
- relationship of temperature and temporary and permanent stress
- pre-annealing, annealing and post-annealing processes
- potential quality problems
- relevant health, safety and environment requirements

Evidence Guide

EVIDENCE GUIDE	
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: • use basic bench/hand glasswork techniques and equipment to fabricate general glass apparatus • start up, set up and shut down equipment in accordance with work instructions • report atypical results and problems to appropriate personnel.
Context of and specific resources for assessment	This unit of competency is to be assessed in the workplace or simulated workplace environment. Resources may include: • access to a scientific glassblowing facility, appropriate equipment, materials and procedures • a bank of case studies is required where these form part of the assessment method.
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. The following assessment methods are suggested: • inspection of glasswork and workplace documentation completed by the candidate • analysis of work outputs over a period of time to ensure accurate and consistent work is obtained within required timelines • feedback from peers and supervisors • use of suitable simulation and/or a range of case studies/scenarios. 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.

EVIDENCE GUIDE	
	Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. Access must be provided to appropriate learning and/or assessment support when required. 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 show its relevance in a workplace setting. **Education** A trainee glassblower has been requested by her/his supervisor to make 100 Pasteur pipettes for a university chemistry practical class the next day. The trainee selects the appropriate glass and type and cuts 50 lengths of glass (two pipettes per length). She/he then proceeds to pull points at the designated markings in the centre of the glass tube using the bench burner. At the conclusion of this operation, the pipettes are cut to the relevant length and then flared at the other end using a specially profiled carbon hand tool. The pipettes are then annealed to eliminate stress caused by the manufacture process. After inspection through a polariscope, the pipettes are delivered to the laboratory for use.

Range Statement

RANGE STATEMENT	
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: • calibration and maintenance schedules • enterprise recording and reporting procedures • equipment manuals • equipment startup, operation and shutdown procedures • industry codes of practice • material safety data sheets (MSDS) • material, production and product specifications • National Environment Protection Measures • OHS national standards and codes of practice • production and laboratory schedules • quality manuals • standard operating procedures (SOPs)
Tools and equipment	Tools and equipment may include: • bench burner, hand torch, micro torch and ribbon burner, gas supplies and gas economiser • dydinium glasses and polariscope • glassworking lathe • annealing oven • measuring and recording equipment • 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 calipers and other measuring tools, and strain viewer

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	• mechanical glass cutters and saws • mechanical glass grinding equipment • communication equipment
Quality problems	Quality problems may include: • temperature and strain problems • devitrification • non-uniform thickness of seals or joints • equipment problems • quality problems, such as poor optics, distortion, excessive breakage, non-uniform break pattern, incorrect cross bend, excessive bow, scratches and poor glass shape • loss of utilities
Hazards	Hazards may include: • sharps and broken glassware • heat sources, such as burners and ovens • fluids under pressure (acetylene and oxygen) • glass dust • cuts associated with glass grinders and cutters • manual handling of heavy sample bags and containers
Safe work practices	Safe work practices may include: • use of personal protective equipment, such as heat resistant gloves, safety glasses, goggles, face guards, coveralls, respirators and safety boots • correct labelling of reagents and hazardous materials • handling, and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, and enterprise procedures and regulations • regular cleaning and/or decontamination of equipment and work areas
Occupational health and safety (OHS) and environmental management requirements	OHS and environmental management requirements: • all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these

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	requirements must not be compromised at any time • all operations assume the potentially hazardous nature of samples and require standard precautions to be applied • 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)

Unit sector	Scientific glassblowing

Competency field

Competency field	

Co-requisite units

Co-requisite units		