



Australian Government

**Assessment Requirements for MSL965003
Construct, modify and maintain high
vacuum systems**

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MSL965003A Construct, modify and maintain high vacuum systems

Performance Evidence

Evidence of competence in this unit must satisfy all of the requirements of the elements and performance criteria, and include demonstration of:

- safely constructing, trialling and commissioning at least one (1) glass high vacuum system
- consulting with clients about design specifications and cost
- preparing and interpreting blueprints, drawings, sketches, designs and customer requirements
- applying theoretical concepts and practical principles to make relevant design conclusions, modifications and fine tune vacuum operation
- using advanced bench/hand glasswork techniques and equipment to fabricate glass apparatus
- safely modifying at least one (1) high vacuum system by evaluating its efficiency and usefulness, recommending improvements and making the approved modifications
- safely maintaining at least one (1) high vacuum system, including:
 - checking and maintaining gas manifolds, cylinders and pumps
 - ensuring the safety of vacuum and related equipment
 - monitoring performance of the apparatus, troubleshooting problems and restoring it to specification
- completing workplace documentation accurately and communicating work results.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- design principles for high vacuum glass systems
- operating principles and procedures for high vacuum pumps and leak detectors
- glass working methods and procedures relevant to high vacuum systems, including:
 - control of stress and strain in glass systems
 - characteristics, capabilities and limitations of specific glassblowing techniques
 - properties of glass and specific ways to join glass for high vacuum applications
 - ideal joint placement for high vacuum systems
 - ultra cleaning procedures for glass in high vacuum systems
 - preparation and use of glass-to-metal seals
- hazards and safety procedures relevant to constructing and working with high vacuum systems
- other relevant work health and safety (WHS) and environment requirements.

Assessment Conditions

- Judgement of competence must be based on holistic assessment of the evidence. Assessment methods must confirm consistency of performance over time, rather than a single assessment event. The timeframe must allow for adequate assessment of operation under all normal and a range of abnormal conditions.
- This unit of competency is to be assessed in the workplace or a simulated workplace environment. A simulated workplace environment must reflect realistic operational workplace conditions that cover all aspects of workplace performance, including the environment, task skills, task management skills, contingency management skills and job role environment skills.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept in each case).
- This unit of competency may be assessed with:
 - MSL965001 Design and manufacture glass apparatus and glass systems
 - MSL965002 Perform glass coating, grinding and finishing operations
- Holistic assessment methods are suggested:
 - inspection of glass high vacuum systems that the candidate has constructed, modified and maintained
 - analysis of the candidate's work outputs over a period of time to ensure accurate and consistent work is obtained within required timelines
 - feedback from peers and supervisors
 - oral/written questioning about design principles for glass high vacuum system, glass working methods and procedures used in high vacuum systems, quality problems and safe work procedures.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - a scientific glassblowing facility, appropriate safety equipment, materials and safe work procedures, and repair methods
 - bench burner, hand torch, micro torch and ribbon burner, gas supplies and gas economiser
 - 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
 - glassworking lathe, mechanical glass cutters and saws, and mechanical glass grinding equipment
 - annealing oven
 - high vacuum apparatus, including leak detection equipment, pumps and lubricants, pressure gauges/manometers, vacuum traps, vacuum manifolds, vacuum distillation apparatus and gas handling systems
 - measuring and recording equipment.

- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competence and currency.
- Technical competence can be demonstrated through:
 - relevant VET or other qualification/Statement of Attainment AND/OR
 - relevant workplace experience.
- Currency can be demonstrated through:
 - performing the competency being assessed as part of current employment OR
 - having consulted with a laboratory about performing the competency being assessed within the last twelve months.

Links

MSA Training Package Implementation Guides - <http://mskills.org.au/training-packages/info/>