

Training Package	Metal and Engineering (MEM05)			HSC Requirements and Advice
Title	Perform brazing and/or silver soldering			
Unit code	Competency field	Band	Unit weight	HSC Indicative Hours
MEM05006B	Fabrication	A	2	20

Unit descriptor	This unit covers performing brazing and silver soldering including the preparation of materials and equipment and the inspection of the completed work.
Prerequisites	None
Application of the competency	This unit applies to silver soldering and brazing using all grades of silver solder and braze. It also includes soldering of copper and refrigeration work. Work includes the preparation of materials and equipment and the inspection of the completed work. Work is undertaken in a production or maintenance environment using predetermined standards of quality, safety and work procedures.
Related units	None

Evidence Guide

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements	Context of assessment	Interdependent assessment	Method of assessment
A person who demonstrates competency in this unit must be able to perform brazing and silver soldering.	This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, i.e. the candidate is not in productive work, then appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with brazing and/or silver soldering or other units requiring the exercise of the skills and knowledge covered by this unit.	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Evidence Guide cont/d			HSC Requirements and Advice
Consistency of performance	Required skills	Required knowledge	Key Terms and Concepts
Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.	<p>Look for evidence that confirms skills in:</p> <ul style="list-style-type: none"> • preparing materials • performing brazing/silver soldering • undertaking visual inspection • reading and interpreting routine information on written job instructions, specifications and standard operating procedures • following oral instructions. 	<p>Look for evidence that confirms knowledge of:</p> <ul style="list-style-type: none"> • the reasons for selecting specific methods of assembly/alignment • the procedures for minimising distortion of the materials being brazed/silver soldered • the procedures for assembling and setting up the specific heating equipment • the reasons for selecting specific heating equipment • the reasons for selecting specific consumables • conducting test runs • typical applications of brazing and silver soldering processes • the procedures and precautions for preheating the materials to be joined • the effects of the use of inappropriate techniques on the performance of the jointed materials • the procedures for normalising the temperature of jointed materials • the consequences of using inappropriate techniques to normalise the temperature of the joint • the procedures for inspecting brazed/silver soldered joints • use and application of personal protective equipment for silver soldering and brazing • safe work practices and procedures. 	<ul style="list-style-type: none"> • align, mount and clamp materials • application of consumables and jointing material • assemble and set up equipment • brazing • brazing and silver soldering processes • clean and prepare materials • communication • consumables • distortion prevention/minimisation • ferrous and non-ferrous materials • heating equipment • inspection of joints • job requirements • normalising material temperatures • preheating materials • removal of excess jointing material • reporting and recording • safe work practices and procedures • silver soldering • standard operating procedures (SOP) • test run • typical applications • work instructions and procedures.

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
1 Prepare materials and equipment	1.1 Job requirements are determined from specifications and/or instructions.	<p>The range statement provides information about the context in which the unit of competency is carried out. The variables [in bold] and scope [dot points] cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.</p> <p>The following variables may be present and <i>may include</i>, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.</p>	<p>Learning experiences for the HSC must address:</p> <p>A range of sources for work instructions and procedures including:</p> <ul style="list-style-type: none"> • work schedules • job card/sheet/plans/specifications • standard operating procedures (SOP) • standard operation sheets • Material Safety Data Sheets (MSDS) • diagrams/sketches • regulations/legislation • manufacturer/workplace guidelines, policies and procedures • suppliers handbooks/representatives • seminars, field days and exhibitions. <p>An awareness of various modes of communication to receive work instructions including:</p> <ul style="list-style-type: none"> • verbal <ul style="list-style-type: none"> - face to face (supervisor to employee) - telephone/mobile phone - workplace meetings • written communication <ul style="list-style-type: none"> - work plans - drawings - memos/messages - job descriptions/statements - workplace forms - rosters • non-verbal <ul style="list-style-type: none"> - signage - diagrams. <p>Safe work practices and procedures.</p> <p>Use and application of personal protective equipment (PPE) including:</p> <ul style="list-style-type: none"> • footwear • head protection • gloves • protective clothing • face mask/shield

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
			<ul style="list-style-type: none"> hearing protection eye protection. <p>Importance of correct fitting PPE.</p>
	1.2 Materials are correctly prepared using appropriate tools and techniques.		<p>Learning experiences for the HSC must address:</p> <p>Cleaning and preparation of a range of ferrous and non-ferrous materials prior to brazing/silver soldering.</p>
	1.3 <i>Materials</i> are correctly assembled/aligned to meet specifications as required.	<p>Materials</p> <ul style="list-style-type: none"> Ferrous and non-ferrous. 	<p>Learning experiences for the HSC must address:</p> <p>Knowledge of techniques to align, mount and clamp materials to be joined.</p> <p>The reasons for selecting the chosen method of assembly/alignment.</p>
	1.4 Distortion prevention measures are identified and appropriate action is taken as required.		<p>Learning experiences for the HSC must address:</p> <p>Knowledge of the procedures for minimising distortion of the materials being brazed/silver soldered.</p>
	1.5 <i>Heating</i> equipment is assembled and set up safely and correctly in accordance with standard operating procedures.	<p>Heating</p> <ul style="list-style-type: none"> Oxy acetylene and fuel gas, cylinders, connections, hoses, tips and nozzles. 	<p>Learning experiences for the HSC must address:</p> <p>Knowledge of:</p> <ul style="list-style-type: none"> appropriate heating equipment for the given task safety precautions to be taken when assembling and setting up the heating equipment the reasons for selecting specific heating equipment procedures for assembling and setting up the chosen heating equipment.
	1.6 Correct and appropriate <i>consumables</i> are selected and prepared.	<p>Consumables</p> <ul style="list-style-type: none"> Fluxes (resin or powder), all types of silver solder and brazing grades, etc. 	<p>Learning experiences for the HSC must address:</p> <p>Knowledge of:</p> <ul style="list-style-type: none"> a range of consumables the reasons for selecting the specific consumables.
	1.7 Test run is undertaken and verified as required.		

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
2 Braze and/or silver solder	2.1 The correct process is selected to meet specifications.		<p>Learning experiences for the HSC must address:</p> <p>Knowledge of typical applications of brazing and silver soldering processes.</p> <p>Knowledge of the effects of the use of inappropriate techniques on the performance of the jointed materials.</p>
	2.2 Materials are preheated as required.		<p>Learning experiences for the HSC must address:</p> <p>Knowledge of:</p> <ul style="list-style-type: none"> • the procedures for preheating the materials to be joined • the precautions to be taken when preheating.
	2.3 Consumables are applied using correct techniques.		
	2.4 Jointing material is applied correctly and in appropriate quantities to meet job/ specifications.		
	2.5 Material temperature is normalised using correct and appropriate techniques.		<p>Learning experiences for the HSC must address:</p> <p>An awareness of the consequences of using inappropriate techniques to normalise the temperature of the joint.</p>
3 Inspect joints	3.1 Excess jointing materials are removed using correct and appropriate techniques.		
	3.2 Inspection of joints is undertaken to standard operating procedures.		<p>Learning experiences for the HSC must address:</p> <p>Visual inspection of brazed/silver soldered joint for conformance to specification.</p>
	3.3 Inspection results are reported/recorded using standard operating procedures as required.		<p>Learning experiences for the HSC must address:</p> <p>Reporting and recording:</p> <ul style="list-style-type: none"> • verbal/written • formal/informal.