Training Package	Metal and Engineering (MEM05)			HSC Requirements and Advice
Title	**Apply safe welding practices**			
Unit code	Competency field	Band	Unit weight	HSC Indicative Hours
MEM05052A	Fabrication	A	4	**10**

Unit descriptor	This unit covers identifying risks associated with welding operations and implementing hazard reduction practices.
Prerequisites	None
Application of the competency	This unit applies to gas and electric arc welding. It includes the identification of risks associated with welding all commonly used metals and implementation of techniques used to reduce or eliminate welding hazards.
Related units	–

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 apply safe welding practices.	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit 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 applying safe welding practices 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.	Look for evidence that confirms skills in: • sourcing and interpreting safety-related information and Material Safety Data Sheets (MSDS) • planning and sequencing operations • identifying workplace risks and nonconformances • reporting workplace risks and nonconformances • checking and clarifying task-related information.	Look for evidence that confirms knowledge of: • characteristics and properties of common metals and welding materials • effect of gas and electrical welding operations on metals • hazards and control measures associated with gas and electrical welding, including housekeeping • welding safety practices and procedures • effect of various treatments on a range of commonly used metals • use and application of personal protective equipment.	• characteristics and properties of common metals and welding materials • correct manual handling techniques • effect of gas and electric arc welding on metals • effect of treatments on metals • electric arc welding processes/operations • exposure levels • factors associated with increased risk • gas welding processes/operations • gases in welding • hazard identification • Material Safety Data Sheets (MSDS) • occupational disease and injury • occupational health and safety (OHS) • OHS legislation • participation • personal protective equipment (PPE) • pollutants • recording and reporting • risk control • risk management • safe work practices and procedures • safe work practices for using welding tools, equipment and processes • sources of OHS information • work-related safety information • work sequencing • workplace documentation • workplace safety non-compliances.

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
1 Access and interpret OH&S information	1.1 *OH&S information* is obtained and interpreted.	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. The following variables may be present and *may include*, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable. **OH&S information** • National Occupational Health and Safety Commission guidelines • organisational OH&S practices and procedures manuals • Australian/New Zealand and ISO standards • company risk management policy • codes of practice • Australian dangerous goods legislation • trade practices • occupational health and safety reporting requirements • weld procedures.	**Learning experiences for the HSC must address:** An awareness of sources of information regarding occupational health and safety (OHS) in the workplace including:· • organisation/company policies and procedures - project/site safety plan - emergency plan - Australian Standards - training manuals - operator's manuals • WorkCover NSW publications/safety alerts • National Occupational Health and Safety Commission (NOHSC) guidelines • legislation/regulations/codes of practice • standard operating procedures (SOP) • standard operation sheets • Material Safety Data Sheets (MSDS) • manufacturer's specifications.
	1.2 Relevant OH&S legislation is identified.		**Learning experiences for the HSC must address:** A basic awareness of the difference between: • legislation • regulation • codes of practice. A basic understanding of OHS legislation regulations and codes of practice including: • *Occupational Health and Safety Act 2000* (NSW)
			• *Occupational Health and Safety Regulations 2001*

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
			(NSW) • Codes of practice (WorkCover NSW): - OHS Consultation - Risk Assessment.
	1.3 *Work related safety information* is obtained and interpreted.	**Work related safety information** • standard operating procedures • material safety data sheets (MSDS) • job sheets • emergency procedures • safety standards and procedures.	
2 Identify risks associated with welding	2.1 *Pollutants* formed by welding processes are identified.	**Pollutants** • nitrogen oxides • ozone • metal fumes etc. • lead oxide • silicon oxide • calcium fluoride • calcium oxide • magnesium oxide • sodium oxide • potassium oxides • carbon dioxide • organics • iron • manganese • calcium carbonate • zirconium oxide • titanium oxide • hexavalent chromium.	**Learning experiences for the HSC must address:** Identification of potential hazards to: • self • colleagues • visitors • general public. A basic understanding of risk management: • identify hazards • assess associated risks • use appropriate control measures to eliminate/ minimise risks • monitor and review the control measures. An awareness of pollutants associated with gas and electric arc welding.
	2.2 *Occupational diseases and injuries* which may be associated with welding are identified.	**Occupational diseases and injuries** • eye injuries • skin damage • respiratory irritations • chronic effects • allergies.	**Learning experiences for the HSC must address:** A range of occupational diseases and injuries that can result from gas and electric arc welding.
	2.3 *Factors* associated with increased risk are identified.	**Factors** • gas leakage from cylinders • type of consumable and metals used	**Learning experiences for the HSC must address:** A range of factors that can increase risks associated with gas and electric arc welding.

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
		• type of welding processes • type of electrodes • welding current • voltage and amperage • ventilation • contamination • interaction of chemicals • exposure levels • flammability.	
	2.4 *Exposure levels* for pollutants are identified.	**Exposure levels** • time weighted average • Short Term Exposure Limit (STEL) • Maximum Allowable Concentration (MAC) or Threshold Limit Value – Ceiling (TLV-C) • skin notation.	**Learning experiences for the HSC must address:** A basic understanding of the following concepts: • time weighted average • Short Term Exposure Limit (STEL) • Maximum Allowable Concentration (MAC) or Threshold Limit Value - Ceiling (TLV-C) • skin notation. An awareness of: • allowable exposure levels for a range of pollutants • typical workplace settings that ensure exposure levels close to a safe upper limit • machines/chemical processes used to measure exposure levels.
	2.5 Risks and potential health effects associated with *specific metals* are identified.	**Specific metals** • aluminium • antimony • arsenic • beryllium • boron • cadmium • chromium • copper • cobalt • iron • lead	**Learning experiences for the HSC must address:** Knowledge of the characteristics and properties of a range of common metals and welding materials. Knowledge of the effect of: • gas and electric arc welding operations on a range of commonly-used metals • various treatments on a range of commonly-used metals.
		• lithium • magnesium • manganese • mercury • molybdenum	

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
		• nickel • platinum • selenium • silver • thorium • tin • titanium • tungsten • vanadium • zinc • zirconium.	
	2.6 Risks and potential health effects associated with *gases* in welding are identified.	**Gases** • acetylene • argon • carbon dioxide • carbon monoxide • helium • nitrogen oxides • ozone • phosgene • phosphine • stibine.	
	2.7 *Other hazards* of welding are identified.	**Other hazards** • fluxes • electro-magnetic radiation • electric shock • sparks • spatter • contaminated and coated metals • gas cylinder and electrical hazards • confined spaces • noise • chemical exposure	
		• solvents • musculoskeletal, back and overuse injuries • vibration • dusts • heat stress • ultraviolet radiation • airborne pollutants • flammable gases	

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
		• infrared radiation • thermal damage.	
3 Reduce risks associated with welding	3.1 *Manual handling techniques* are used.	**Manual handling techniques** • housekeeping practices • lifting weight limits • appropriate storage • use of lifting devices • appropriate training • hazardous materials storage standards and procedures.	**Learning experiences for the HSC must address:** A basic knowledge of National Occupational Heath and Safety Commission (NOHSC) guidelines for manual handling. An awareness of legal requirements for weight limits. Awareness of correct manual handling techniques when: • moving • lifting/carrying • using hand tools • loading/unloading • working at heights • bending and twisting • using mechanical aids • undertaking repetitious tasks.
	3.2 *Personal protective equipment* is used correctly.	**Personal protective equipment** • respirators • ear muffs • protective clothing • gloves • boots • helmets • eye protection • face shields.	**Learning experiences for the HSC must address:** Use and application of a range of personal protective equipment (PPE) including: • footwear • head protection • gloves • protective clothing • respirator • face mask/shield • hearing protection • eye protection.
			Selection of PPE: • correct for the task • manufacturer's specifications for use • correct fitting • serviceability. Maintenance of PPE according to manufacturer's instructions and enterprise SOP: • cleaning and decontamination· • correct storage

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
			• regular checks for damage • repair/replacement of worn, malfunctioning or damaged equipment/parts • disposal of single-use equipment. Importance of correct fitting PPE.
	3.3 *Procedures to control hazards* are implemented.	**Procedures to control hazards** • substituting hazardous materials with safer materials • changing workplace design to eliminate hazards • modifying work practices to reduce exposure • using personal protective equipment • using adequate and appropriate ventilation.	**Learning experiences for the HSC must address:** A basic awareness of the hierarchy of risk control measures: • Level 1 – eliminate the risk (such as discontinue the activity or not use the equipment) • Level 2 – minimise the risk by: - substituting the system of work/equipment (with something safer) - modifying the system of work/equipment (to make it safer) - isolating the hazard (such as introducing a restrictive work area) - introducing engineering control (such as guarding, fencing or safety screens) • Level 3 – other controls: - adopt administrative controls and safe work practices - use PPE.
	3.4 *Workplace safety procedures* are implemented.	**Workplace safety measures** • shielding requirements • ventilation • general and diluted • local exhaustion	**Learning experiences for the HSC must address:** Safe work practices and procedures. Hazard identification and risk control.
		• use of personal protective equipment • checking equipment condition • equipment maintenance • correct operation of equipment • correct voltage and electrical connections • good posture • fire safety, plant and equipment isolation • communications with appropriate personnel.	Housekeeping/clean-up procedures with due consideration to OHS and the environment. Safe work practices for using welding tools, equipment and processes including: • following SOP and manufacturer's specification before, during and after use • risk management (identifying hazards and implementing control measures) • correct manual handling • safe handling, application and storage of hazardous

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
			substances • appropriate use of PPE • regular servicing and maintenance of tools and equipment • selection of appropriate tool for use • working with electricity in a safe manner • adequate ventilation • attaching appropriate safety guards where required • awareness of OHS issues in relation to welding. An awareness of information provided in MSDS: • manufacturer's/supplier's details • physical description and properties • identification of substance • use • ingredients • health hazard information • first aid • precautions for use • safe handling information • control point. How and where to obtain required MSDS. Work sequencing including: • receiving instruction • organising for the task: - selection of tools and equipment - locate materials and/or parts - PPE • carry out the task: - in a logical order
			- within completion time frame - according to quality measures • clean-up after task completion.
	3.5 Workplace safety non-compliances are reported in accordance with workplace procedures.		**Learning experiences for the HSC must address:** The concept of 'participation' as it related to workplace safety and employee rights and responsibilities. How and when to report.

Elements	Performance criteria	Range Statement	HSC Requirements and Advice
			A basic awareness of monitoring and reporting for OHS including: • formal/informal • verbal • written - safety inspection reports - checklists - accident reports - WorkCover NSW notification - registers/logs/files.