Competency Standards for Caribbean Vocational Qualifications (CVQ)

CCMEM20607 CVQ Level II in Air Conditioning & Refrigeration

Unit Number	Unit Title	Core/ Elective	Hours
MEMCOR0081A	Mark off/out (general engineering)	Mandatory	10
MEMCOR0071A	Use electrical/electronic measuring devices	Mandatory	10
MEMCOR0091A	Draw and interpret sketches and simple drawings	Mandatory	20
MEMCOR0111A	Use power tools	Mandatory	15
MEMCOR0121A	Classify engineering materials – (basic)	Mandatory	30
MEMCOR0141A	Follow principles of Occupational Health and Safety (OH&S) in work environment	Mandatory	20
MEMCOR0161A	Plan to undertake a routine task	Mandatory	10
MEMCOR0171A	Use graduated measuring devices	Mandatory	10
MEMCOR0191A	Use hand tools	Mandatory	5
MEMCAC0011A	Perform technical computations - basic	Mandatory	40
MEMCOM0011A	Apply language and communication skills (basic)	Mandatory	40
MEMFAB0041A	Carry out mechanical cutting operations – (basic)	Mandatory	10
MEMMAH0081A	Perform housekeeping duties	Mandatory	10
MEMMAH0071A	Perform manual handling and lifting	Mandatory	5
MEMSUF0061A	Prepare for the application of protective coating	Mandatory	5
MEMFAB0051A	Perform brazing and/or silver soldering	Mandatory	20
MEMFAB0151A	Prepare for oxyacetylene/metal arc welding processes	Mandatory	20
MEMMRD0101A	Evacuate and dehydrate refrigeration systems	Mandatory	40
MEMMRD0111A	Carry out routine servicing of coils, filters and room air conditioners	Mandatory	40
MEMINS0061A	Prepare for pipes and tubing installation	Mandatory	20
MEMMRD0081A	Remove, dismantle assemble and replace basic engineering components	Mandatory	50
MEMCOR0012A	Plan a complete activity	Mandatory	5
MEMCOR0042A	Interpret standard specifications and manuals	Mandatory	5
MEMCOR0052A	Operate in an autonomous team environment	Mandatory	5
MEMCOR0122B	Write technical reports (basic)	Mandatory	20
MEMCOR0152A	Use graphical techniques and perform simple statistical computations (basic)	Mandatory	20
MEMCAC0012A	Perform technical computations - general	Mandatory	40
MEMCOM0012A	Apply language and communication skills (I)	Mandatory	40
MEMINS0182A	Install valves, regulators and metering devices	Mandatory	15
MEMMRD0262A	Maintain and repair domestic and commercial refrigeration systems and components	Mandatory	60
MEMMRD0272A	Maintain and repair industrial refrigeration systems and components	Mandatory	40
MEMMRD0592A	Test evacuate and charge refrigeration systems	Mandatory	20

CCMEM20607 CVQ Level II in Air Conditioning & Refrigeration (Cont'd.)

Unit Number	Unit Title	Core/ Elective	Hours
MEMFAB0071A	Undertake fabrication, forming, bending and shaping – (basic)	Elective	40
MEMMRD0041A	Remove/install standard mechanical seals	Elective	20
MEMMRD0061A	Remove and replace basic pneumatic system components	Elective	40
MEMMRD0071A	Remove and replace basic hydraulic system components	Elective	40
MEMMPO0021A	Perform general machining	Elective	60
MEMMPO0011A	Perform daily operational maintenance of machines/equipment	Elective	20
MEMMPO0081A	Use workshop machines for basic operations	Elective	20
MEMFAB0141A	Develop basic geometric shapes	Elective	20
MEMFAB0061A	Perform manual heating, and thermal cutting	Elective	20
MEMFAB0121A	Weld using oxyacetylene welding process (OAW) - fuel gas welding	Elective	50
MEMFAB0111A	Weld using manual metal arc welding process (MMAW)	Elective	50
MEMINS0011A	Install, terminate and connect electrical wiring	Elective	20
MEMMRD0161A	Disconnect and reconnect fixed wired electrical machinery, appliances and fixtures	Elective	20
MEMMRD0181A	Attach flexible cables & plugs to electrical machinery appliances and fixtures	Elective	20
MEMASY0071A	Assembly pipes and fittings for clients	Elective	40
MEMINS0041A	Install and maintain piping and tubing	Elective	40
ITICOR0011A	Carry out data entry and retrieval procedures	Elective	40
MEMCOR0101A	Prepare basic engineering drawing	Elective	30
MEMMRD0032A	Perform fault diagnosis, installation and removal of bearings	Elective	20
MEMMRD0062A	Perform leveling and alignment of machines and engineering components	Elective	20
MEMMRD0122A	Maintain and repair pneumatic systems	Elective	40
BSBSBM0012A	Craft personal entrepreneurial strategy	Elective	50
MEMMRD0182A	Locate and repair/rectify basic electrical circuits and secondary wiring	Elective	40
MEMMRD0652A	Service and maintain electrical motor starting systems	Elective	40
MEMMRD0402A	Check/identify/isolate/rectify malfunctioning electrical machinery appliance and fixtures	Elective	30
MEMMRD0452A	Maintain and repair commercial and/or industrial refrigeration and/or air conditioning controls	Elective	60
MEMINS0232A	Prepare material and locations for installing drains and waste systems	Elective	15
MEMMRD0072A	Shut down/isolate machines/equipment	Elective	20
MEMMAH0042A	Order materials	Elective	20

CCMEM20607 CVQ Level II in Air Conditioning & Refrigeration (Cont'd)

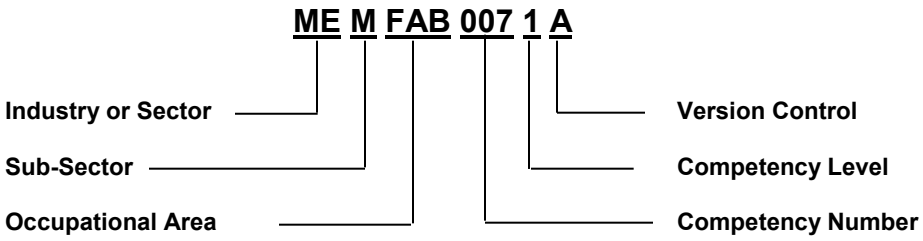
Unit Number	Unit Title	Core/ Elective	Hours
MEMCOR0063A	Attend to breakdown in hazardous area	Elective	20
MEMMAH0073A	Purchase materials	Elective	20
MEMCOR0013A	Assist in the provision of on the job training	Elective	30
MEMCOM0023A	Perform internal and external customer service	Elective	20
MEMPLN0063A	Coordinate and manage basic installation projects	Elective	20

To achieve this qualification ALL Core competencies plus a minimum of Two (2) level one electives, Three (3) level two electives and One (1) level three elective must be achieved.

Nominal Training Hours (Institutional Delivery) include total hours of Core competencies and Electives selected.

Legend to Unit Code

Example: MEMFAB0071A



KEY: **COR – Core; SBM – Small Business Management (Sub-Sector); FAB – Fabrication; MAH – Machine Handling; INS – Installation; ASY – Assembly; MPO – Machine & Process Operations; MAS – Masonry; MRD – Maintenance Repairs & Diagnostic; QUA - Quality ITI - Information Technology (Industry); CAC Calculations and Computations; SUF Surface Finishing; PLN Planning; MEM – Metal Engineering (Maintenance); BSB – Business Services (Industry); COM - Communication**

MEMCOR0081A: Mark off/out (general engineering)

Competency Descriptor: This unit deals with the skills and knowledge required to effectively transfer dimensions from engineering drawings, prints or plans and applies to individuals working in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Determine job requirements	1.1	Drawings, job instructions and specifications are interpreted and understood.
		1.2	Appropriate methods and sequencing are selected and are consistent with proposed fabricating process.
2.	Transfer dimensions	2.1	All marking off/out is carried out to specifications using appropriate tools and equipment.
		2.2	Datum points are correctly established.
		2.3	Dimensions transferred are correct and appropriate.
3.	Make templates	3.1	Appropriate template materials are selected.
		3.2	Templates are produced to specifications and appropriate to desired use.
		3.3	Correct storage procedures are followed.

RANGE STATEMENT

This unit applies to the marking off/out techniques used for the transfer of dimensions from engineering drawings, prints or plans. Work is undertaken under supervision using predetermined standards of quality, safety and workshop procedures. The task may be performed in the workshop or on site. Marking off/out is undertaken using appropriate tools and equipment; templates and are produced as required. Marking off/out techniques may apply to a range of materials and shapes.

Storage procedures include labelling and identification to standard operating procedures

Equipment may include but not limited to:

- marking out tables
- surface tables
- rotary tables
- dividing heads etc.
- vee blocks
- cylinder squares
- sine bars and the like
- vernier height gauges
- protractors
- straight edge
- set squares
- marking out tools

Marking out covers but not limited to:

- engineering components
- jigs and fixtures
- castings
- templates
- dies and tooling

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- tools
- apparatus
- drawing interpretation
- basic numeracy
- marking off/out techniques
- materials relevant to the engineering process
- basic operations in simple geometry measurement and calculations

Skills
The ability to:

- work safely to instructions
- use marking out tools and equipment
- handle materials
- select tools/equipment
- select material
- transfer measurements
- apply quality assurance
- read and interpret drawings and specifications
- measure and calculate manually
- record measurement

EVIDENCE GUIDE

Competency is to be demonstrated by the effective use of the marking off/out techniques used for the transfer of dimensions in accordance with the range listed in the range of variables statement, relevant to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the marking off/out of components or other units requiring the exercise of the skills and knowledge covered by this unit.

- during assessment the individual will:
- demonstrate safe working practices at all times
- demonstrate the ability to measure and calculate manually
- demonstrate the ability to transfer and record measurements accurately
- demonstrate the ability to mark off/out accurately
- communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

Competency shall be assessed on the job, off the job or a combination of both in accordance with workplace procedures.

MEMCOR0071A: Use electrical/electronic measuring devices

Competency Descriptor: This unit deals with the skills and knowledge required to perform electrical/electronic measurement using appropriate measuring devices in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Use electro-measuring devices to measure variables	1.1	Appropriate device or equipment and setting are selected to achieve required outcome.
		1.2	Appropriate connections are made to achieve required outcome according to standard operating procedure.
		1.3	Readings are obtained and interpreted correctly and conversion into the units of measurement made where necessary.
2.	Maintain electro devices	2.1	Routine care and storage of devices undertaken to manufacturer's specifications or standard operating procedures.

RANGE STATEMENT

This unit applies to electrical/electronic measurements on AC and DC circuits up to 1000v, using appropriate measuring devices. Electrical/electronic measuring devices may require the connection or disconnection of circuitry. Adjustment of measuring devices may include zero and linear adjustment. Work may be undertaken under supervision or as part of a team.

Measurement may include not limited to:

- voltage
- current
- frequency
- resistance
- power
- temperature

Measuring devices may include but not limited to:

- analogue/digital multimeters
- tong testers
- oscilloscopes
- potentiometers
- digital devices

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- comparison measurements
- comparison devices
- comparative measurements
- measuring devices
- electrical/electronic measurements
- drawings and specifications
- reading
- writing English
- basic numeracy

Skills
The ability to:

- work safely to instructions
- use power tools and hand tools
- select equipment
- apply quality assurance
- read and interpret drawings and specifications
- measure and calculate manually
- record measurement
- operate electronic measurement calculating devices

EVIDENCE GUIDE

Competency is to be demonstrated by the effective use of comparison and basic measuring devices in accordance with the range listed in the range of variables statement, relevant to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the taking of electrical/electronic measurements or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to mmeasure and calculate manually
- demonstrate the ability to operate electrical/electronic measuring devices
- demonstrate the ability to rrecord measurement
- take responsibility for the quality of their own work
- perform all related tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures.

(2) Method of Assessment

The candidate will be required to.

- Answer questions put by the assessor
- Identify colleagues who can be approached for the collection of competency evidence where appropriate
- Present evidence of credit for any off-job training related to this unit.

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.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. The competencies covered by this unit would be demonstrated by an individual working undersupervision or as part of a team.

The assessment environment should not disadvantage the candidate.

MEMCOR0091A: Draw and interpret sketch and simple drawing

Competency Descriptor: This unit deals with the skills and knowledge required to effectively draw and interpret sketches and simple drawings, and applies to all individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Prepare freehand sketch	1.1	Sketch is correctly and appropriately drawn.
		1.2	Sketch depicted object or part.
		1.3	Dimensions are obtained correctly.
		1.4	Dimensions are shown clearly.
		1.5	Instructions are shown clearly.
		1.6	Base line or datum point is indicated.
2.	Interpret details from freehand sketch	2.1	Components, assemblies or objects are recognised.
		2.2	Dimensions identified are appropriate to field of employment.
		2.3	Instructions are identified and followed.
		2.4	Material requirements are identified.
		2.5	Symbols are recognised in sketch.
3.	Select correct technical drawing	3.1	Drawing is checked and validated against job requirements or equipment.
		3.2	Drawing version is checked and validated.

4.	Identify drawing requirements	4.1	Requirements and purpose of drawing is determined from customer and/or work specification and associated documents.
		4.2	Identified and collected all data necessary to produce the drawing.
		4.3	Drawing requirements are confirmed with relevant personnel and timeframes for completion established.
5.	Prepare or make changes to engineering drawing	5.1	Selected appropriate drafting equipment.
		5.2	Applied drafting principles to produce a drawing that is consistent with standard operating procedures within the company.
		5.3	All work is undertaken to prescribed procedure.
		5.4	Completed drawing is approved in accordance with standard operating procedures.

RANGE STATEMENT

Technical drawing interpretation is applied to any of the full range of metal, engineering and maintenance disciplines.

Technical drawings may utilise any of the following techniques:

- perspective
- exploded views
- hidden view

Drawing instruments and supplies:

- drafting kit/instruments
- blue prints
- drawings/modules/photographs

Alphabet of line:

- object line
- hidden line
- centre line
- section line
- dimension
- extension line
- cutting line
- short break line
- phantom line

Geometric construction to include:

- circles
- regular polygons with four, seven and eight sides
- pentagon inscribed within measured circle
- ellipse
- triangles with specified angles
- arcs thru three points tangent to two
- circles

Drawings are to be provided to Engineering Standards and/or their equivalents from the full range of engineering disciplines.

Standard engineering symbols or equivalent and are to be recognised in the field of employment.

Pictorial (3-D) drawing to include:

- isometric corner with left and right side lines each 30 degrees up from horizontal and third line at a vertical, with all three lines joining in a common intersection
- full scale (1:1) basic isometric drawing

Multi-view (orthographic 2-D) drawings:

- full scale (1:1) orthographic 3-view drawing using third angle projection with top, front and right side view – show all hidden features and centrelines

Dimension reading:

- dimensioning styles and methods: co-ordinate, linear/datum
- dimensioning 2-D drawing
- dimensioning complex shapes: spheres, cylinders, tapers, pyramids

Measurement systems:

- inch/foot system
- metric(SI) system

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- types and use of drawing instruments and supplies
- identification of alphabet of lines, line type variation, order of usage and application on drawings
- types of scale and proportion and how they are used for measurement
- symbols, dimensions and terminology types of drawings and their applications

Skills
The ability to:

- estimate measurements
- read and interpret simple drawings
- measure accurately
- communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated by developing and effectively reading and interpreting simple drawings and sketches to locate or identify specified features or specifications in accordance with the performance criteria and the range listed within the range statement.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the drawing and interpretation of exercise of the sketches or other units requiring the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate the ability to identify, understand, read and interpret various types of technical drawings
- demonstrate the ability to identify alphabet of lines, scales, lettering, dimensions, symbols, abbreviations and key features
- demonstrate the ability to identify title panel and reference date of drawings
- take responsibility for the quality of their own work;
- perform all tasks in accordance with standard drafting procedures;
- use accepted engineering techniques, practices, processes and workplace procedures

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

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.

(3) Context of Assessment

Competency should be assessed in a classroom environment in accordance with work practices and industry procedures.

MEMCOR0111A: Use power tools

Competency Descriptor

This unit deals with skills and knowledge required to competently select and use appropriate power tools for hand held operations of the metal engineering and maintenance trades, and applies to all individuals in the industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Use power tools	1.1 Appropriate power tools are selected according to the task requirements.
	1.2 Power tools are used following a determined sequence of operations to produce desired outcomes.
	1.3 All safety requirements are adhered to before, during and after use.
	1.4 Unsafe or faulty tools are identified and marked for repair according to designated procedures.
	1.5 Operational maintenance of tools is undertaken according to standard workplace procedures, principles and techniques.
	1.6 Power tools are stored safely in appropriate location according to standard workshop procedure and manufacturer's recommendations.

RANGE STATEMENT

Work undertaken under supervision or in a team environment using predetermined standards of quality, safety and workshop procedures involving the use of various power tools for applications, maintenance tasks and the finishing of items or components metallic and non-metallic material to size and shape using engineering principles, tools, equipment and procedures to company and regulatory requirements.

Outcomes to job specifications may include

- finish
- size
- shape

Operations may include:

- clamping
- aligning
- adjusting

Applications may include power tools used for:

- adjusting
- dismantling
- assembling
- finishing
- cutting
- scraping
- threading
- cleaning
- lubricating
- tightening
- simple tool repairs
- hand sharpening
- adjustments

Power tools may include but not limited to electric or pneumatic:

- drills
- grinders
- jigsaws
- nibblers
- cutting saws
- threading machine
- sanders
- planers
- routers
- pedestal drills
- pedestal grinders

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements and OH&S legislation
- work shop procedures
- engineering principles
- technical applications
- power tools and equipment
- materials
- materials handling whilst operating tools

Skills
The ability to:

- work safely to instructions
- apply appropriate hand-eye co-ordination in the use of tools
- handle/hold materials during operation of tools
- select appropriate tools for material usage
- communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated by the safe and effective use of particular power tools listed within the range of variables statement relevant to the work orientation

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the use of power tools in hand held operations or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to select and use appropriate power tools for hand held operations
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. 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.

MEMCOR0121A: Classify engineering materials – (basic)

Competency Descriptor: This unit deals with skills and knowledge required to competently select and use appropriate metals for operations and procedures in the metal engineering and maintenance trades, and applies to individuals in the industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Distinguish between the characteristics of engineering materials	1.1	Identified the characteristics of engineering materials.
		1.2	Demonstrated knowledge of the effect external factors has on engineering metals.
2.	Distinguish between the characteristics of metals	2.1	Identified the characteristics of engineering metals.
		2.2	Compared the properties and characteristics of engineering metals.
		2.3	Demonstrated the ability to carry out testing methods for engineering metals.
		2.4	Demonstrated the ability to carry out heat treatment process.
3.	Identify and select engineering metals for specific applications	3.1	Identified common applications of engineering metals.
		3.2	Identified ferrous and non-ferrous metals according to specific requirements.

RANGE STATEMENT

This unit applies to the knowledge of and skills required to classify identify, select and use engineering materials for various procedures and operations in the engineering and maintenance field.

Materials may include both ferrous and non-ferrous metals, plastics ceramics and metal alloys.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements and OH&S legislation
- properties and nature of materials
- properties of plastics and ceramics
- properties of metals
- heat treatment procedures
- material testing procedures
- engineering application of metals
- ferrous and non-ferrous metals

Skills
The ability to:

- work safely to instructions
- compare the properties and characteristics of engineering metals
- apply appropriate principles/techniques to identify materials
- select appropriate material for usage
- carry out specific heat treatment and testing procedures
- communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated by classifying engineering in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, maintenance and fabrication associated with the use of materials in engineering operations or other units requiring the exercise of the skills and knowledge covered by this unit.

- during assessment the individual will:
- demonstrate safe working practices at all times
- demonstrate the ability to identify and compare the properties and characteristics of engineering metals
- demonstrate the ability to apply appropriate principles/techniques to identify materials
- demonstrate the ability to carry out specific heat treatment and testing procedures
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures

Use accepted engineering techniques, practices, processes and workplace procedures.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. 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.

MEMCOR0141A: Follow principles of Occupational Health and Safety (OH&S) in work environment

Competency Descriptor: This unit deals with the skills and knowledge required to effectively perform work activities to conform to Occupational Health and Safety requirements, and applies to all individuals working in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Follow safe work practices	1.1 Work is carried out safely and in accordance with company policy and company procedures and industry requirements.
	1.2 Housekeeping is undertaken in accordance with company procedures.
	1.3 Responsibilities and duties of employees are understood and demonstrated in day-to-day actions.
	1.4 Personal protective equipment is worn and stored according to company procedures.
	1.5 All equipment and safety devices are used according to legislative requirements and company/manufacturer's procedures/instructions.
	1.6 Safety signs/symbols are identified and followed as per instruction.
	1.7 All manual handling is carried out in accordance with Industry requirements, company procedures and National Occupational Health & Safety guidelines.
	1.8 Occupational Health & Safety Commission guidelines demonstrated.
2. Report workplace hazards	2.1 Workplace hazards identified during the course of work are reported to appropriate person according to standard operating procedures/factory act.

3.	Follow emergency procedures	3.1 Means of contacting the appropriate personnel and emergency services in the event of an accident demonstrated.
		3.2 Emergency and evacuation procedure understood and carried out when required.

RANGE STATEMENT

This Occupational Health and Safety (OHS) unit applies to safe working practices as applied to all metal and engineering workplaces. Competencies to be demonstrated must be associated with performance of duties and use of specialist skills. This unit and these standards do not cover the skills of emergency teams such as fire fighting, first aid officer etc.

Emergency procedures may include but not limited to the isolation of the following equipment as appropriate

- electrical
- mechanical
- hydraulic
- pneumatic
- emergency
- steam and water
- oxy fuel

Safety responsibilities apply to:

- personal protection
- safe interactive work practices (duty of care)
- Occupational Health and Safety (OHS) regulations
- National Environment and Planning agency (NEPA) regulations

Quality Assurance requirements may include:

- working environment/fellow workers
- adverse weather conditions
- protection of work personnel
- protection of public

Power connections include:

- ELCB systems
- isolation transformer (safe-T-pack)
- power pole/B4
- switch board area

Ladders and work platforms include:

- extension ladders
- step ladders
- trestle ladders
- simple work platforms

Personal protective equipment may include but is not limited to:

- overalls, safety glasses/goggles, hard hat cap
- dust masks/respirator, gum boots
- ear plugs/muffs

Emergency procedures include:

- fire fighting
- medical and first aid
- evacuation

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- basic level of ability in speaking
- basic level in reading & writing English
- workplace and equipment safety requirements
- material handling requirements
- relevant acts, regulations and codes of practice
- company policy

Skills
The ability to:

- work safely to instructions
- use tools and equipment safely
- select and use material equipment and tools to standards
- communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively carrying out safe work practices within the range of variables statement relevant to the work orientation

(1) Critical Aspects of Evidence

It is essential that competence is observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- demonstrate application of organizational policies and procedures including Quality Assurance requirements where applicable
- carry out correct procedures prior to and during work activities
- safe and effective operational use of tools, plant and equipment
- carry out appropriate applications in accordance with regulatory and legislative requirements

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. Aspects of this unit will need to be assessed in a work situation.

The context in which the OH & S principles are applied should be consistent with the individual's field of work. The competencies covered by this unit would be demonstrated by an individual working lone or as part of a team. Assessment should be conducted in an environment that the individual is familiar with.

MEMCOR0161A: Plan to undertake a routine task

Competency Descriptor: This unit deals with the skills and knowledge required to effectively plan to undertake a routine task and applies to all individuals working in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Identify task requirements	1.1	Instructions as to procedures are obtained, understood and where necessary clarified.
		1.2	Relevant specifications for task outcomes are obtained, understood and where necessary clarified.
		1.3	Task outcomes are identified.
		1.4	Task requirements such as completion time and quality measures are identified.
2.	Plan steps required to complete task	2.1	Based on instructions and specifications provided, the individual steps or activities required to undertake the task are understood and where necessary clarified.
		2.2	Sequence of activities required to be completed is identified in plan.
		2.3	Planned steps and outcome are checked to ensure conformity with instructions and relevant specifications.
3.	Review plan	3.1	Outcomes are identified and compared with (planned) objectives, task instructions, specifications and task requirements.
		3.2	If necessary, plan is revised to better meet objectives and task requirements.

RANGE STATEMENT

This unit applies to the activities related to planning to undertake a routine task. The task and associated planning activity are carried out under supervision. The plan may or may not be documented. The task involves one or more steps or functions carried out routinely on a regular basis. The planning activity does not require the exercise of judgement as to priorities or time limitations; it requires that precise information provided in the instructions be accurately followed, steps in the process be completed in the appropriate sequence and that the time limits specified are met.

Instructions may include but not limited to:

- standard operation sheets
- clear specifications and requirements
- quality and time allowances
- standard operating procedures

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- basic level of ability in speaking
- basic level in reading
- basic level in writing English
- basic numeracy
- task requirements
- work place operating procedures
- the use of work schedules, charts, work bulletins and memos

Skills
The ability to:

- work safely to instructions
- convey information in simple English to invoke correct actions
- apply quality procedures
- read and interpret simple drawings, and specifications
- plan a routine task
- undertake a routine task

Basic numeracy means the ability to perform simple arithmetic using whole numbers applying the four basic rules of addition, subtraction, multiplication and division. The unit however does not refer to competence in English but in communication. English language ability should be professionally assessed.

EVIDENCE GUIDE

Competency is to be demonstrated by the effective use of planning activities relating to instructions, information sources and meeting procedures listed within the range statement relative to the work orientation.

(1) Critical Aspects of Evidence

This unit should be assessed in conjunction with other specialisation or core units and not in isolation. The assessment should be linked with performance of normal workplace activities where the competency covered by this unit is demonstrated concurrently with other core or elective competencies. The assessment of this competency may be associated with the assessment of core or elective units that require planning for undertaking a routine task in the individual's field of work.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to plan to undertake a routine task
- communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

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.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. The communication Activities undertaken should be consistent with the individual's field of work and be based on Interaction with others related to workplace tasks and procedures, tools, equipment, materials and documentation relevant to that field of work.

The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. Assessment should be conducted in an environment that the individual is familiar with.

MEMCOR0171A: Use graduated measuring devices

Competency Descriptor: This unit deals with the skills and knowledge required to effectively measure with graduated devices, and applies to all individuals working in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Use a range of graduated devices to measure/determine dimensions or variables	1.1	Selected appropriate device or equipment to achieve required outcome.
		1.2	Used correct and appropriate measuring technique.
		1.3	Measured accurately to finest graduation of instrument. As appropriate to field or area.
2.	Maintain graduated devices	2.1	Carried out routine care and storage of devices to manufacturer's specification or standard operating procedure.
		2.2	Checked and made routine adjustments to devices eg "zeroing".

RANGE STATEMENT

This unit applies to work undertaken in field, workstation and workshops. Work can be undertaken under supervision or part of team environment. This unit covers measurement skills requiring straightforward application of the measuring device and may utilise the full range of graduations of measuring device.

Measuring devices may include but not limited to:

- verniers
- feeler gauges
- pressure gauges
- squares
- levels
- micrometres
- dial indicators
- thermometers
- measuring tapes
- protractors

Measurements undertaken may include but not limited to:

- length/width/depth
- roundness
- squareness
- flatness angle
- angles
- clearance
- measurements that can be read off antilog digital or other graduated device
- plumb ness

Electrical/electronic devices used are those not requiring the connection or disconnection of circuitry. Measurements may include metric and imperial measurement. All measurements undertaken to standard operating procedures. Adjustment of measuring devices is through external means and includes zero and linear adjustment.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- comparison devices
- comparison measurements
- comparative measurements
- electrical/electronic devices
- basic measuring devices
- reading
- writing English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use power tools and hand tools
- use measuring devices
- adjust measurements
- handle materials
- select material
- apply quality assurance

EVIDENCE GUIDE

Competency is to be demonstrated by the effective use graduated measuring devices in accordance with the range listed in the range of variables statement, relevant to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling recording and reporting associated with the use of graduated measuring devices or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to use graduated measuring devices
- communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures.

Tasks involved will be completed within reasonable timeframes relating to typical workplace Activities.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

(3) Context of Assessment

Competency shall be assessed on the job, off the job or a combination of both in accordance with workplace procedures.

MEMCOR0191A: Use hand tools

Competency Descriptor: This unit deals with skills and knowledge required to competently select and use appropriate hand tools of the metal engineering and maintenance trades, and applies to all individuals in the industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Use hand tools	1.1 Selected appropriate hand tools according to the task requirements.
	1.2 Hand tools used to produce desired outcomes to job specifications which may include finish, tension, size or shape.
	1.3 Adhered to all safety requirements before, during and after use.
	1.4 Unsafe or faulty tools identified and marked for repair according to designated procedures before, during and after use.
	1.5 Carried out routine maintenance of tools, including hand sharpening according to standard operational procedures, principles and techniques.
	1.6 Hand tools are stored safely in appropriate location according to standard operational procedures and manufacturer's recommendations.

RANGE STATEMENT

Work undertaken under supervision or in a team environment using predetermined standards of quality, safety and workshop procedures involving the use of various hand tools for applications, maintenance tasks and the finishing of items or components metallic and non-metallic material to size and shape using engineering principles, tools, equipment and procedures.

Applications may include hand tools used for

- adjusting
- dismantling
- assembling
- finishing
- cutting
- scraping
- cleaning
- lubricating
- tightening
- simple tool repairs
- hand sharpening
- adjustments

Hand tools may include but not limited to:

- hacksaws
- hammers
- punches
- screwdrivers
- sockets
- wrenches
- scrapers
- chisels
- gouges
- wood planes
- files of all cross-sectional shapes and types

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements and OH&S guidelines
- work shop procedures
- technical applications
- hand tools and equipment
- materials
- materials handling whilst operating tools

Skills
The ability to:

- work safely to instructions
- apply appropriate hand-eye co-ordination in the use of tools
- handle/hold materials during operation of tools
- select appropriate tools for material usage
- communicate effectively
- use tools correctly

EVIDENCE GUIDE

Competency is to be demonstrated by the safe and effective use of particular hand tools listed within the range of variables statement relevant to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the use of hand tools or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to use hand tools
- take responsibility for the quality of their own work
- plan tasks in all situations and review task requirements as appropriate
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. 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.

MEMCAC0011A: Perform technical computations (Basic)

Competency Descriptor: This unit deals with the skills, knowledge and attributes required to explore mathematical principles and techniques which are applicable to engineering and maintenance activities. The candidate is required to use numerical techniques to solve problems in related trade situations.

Competency Field: Calculations and Computations

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Use the rules of addition, subtraction, multiplication and division of decimal fractions to solve related trade problems	1.1 Number system is used to solve problems in related trade situations.
	1.2 Simple calculations are performed using four basic rules, addition, subtraction, multiplication and division.
	1.3 Concepts are understood and simple calculations are performed involving rounding off.
	1.4 Concepts are understood and simple calculations are performed involving changing to common fractions and vice versa.
	1.5 Concepts are understood and simple calculations are performed involving use of decimal equivalent table.
	1.6 Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.
2. Solve problems using whole numbers, fractions and decimal numbers	2.1 Simple calculations are performed using four basic rules, addition, subtraction, multiplication and division.
	2.1 Concepts are understood and simple calculations are performed involving whole numbers.
	2.3 Concepts are understood and simple calculations are performed involving fractions.

		2.4	Concepts are understood and simple calculations are performed involving decimal numbers.
		2.5	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.
3.	Use percentage and ratio to solve related skill problems	3.1	Concepts are understood and simple calculations using percentages are performed involving decimal numbers.
		3.2	Concepts are understood and simple calculations using percentages are performed involving fractions.
		3.3	Concepts are understood and simple calculations using percentages are performed involving whole numbers.
		3.4	Concepts are understood and simple calculations using ratio are performed involving decimal numbers.
		3.5	Concepts are understood and simple calculations using ratio are performed involving fractions.
		3.6	Concepts are understood and simple calculations using ratio are performed involving whole numbers.
		3.7	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.
4.	Change percent to decimal or fractions and vice versa and subsequently perform these operations on related trade problems.	4.1	Concepts of conversion are understood and simple calculations using percent to decimal or fractions and vice versa are performed involving cost.
		4.2	Concepts of conversion are understood and simple calculations using percent to decimal or fractions and vice versa are performed involving wages.
		4.3	Concepts of conversion are understood and simple calculations using percent to decimal or fractions and vice versa are performed involving related applications.
		4.4	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.

5.	Calculate perimeters and areas of applications in related trade	5.1	Concepts of calculating perimeters and areas are understood and simple calculations using squares and rectangles are performed involving related applications.
		5.2	Concepts of calculating perimeters and areas are understood and simple calculations using circles (circumferences and areas) are performed involving related applications.
		5.3	Concepts of calculating perimeters and areas are understood and simple calculations using trapezoids are performed involving related applications.
		5.4	Concepts of calculating perimeters and areas are understood and simple calculations using cones are performed involving related applications.
		5.5	Concepts of calculating perimeters and areas are understood and simple calculations using cylinders are performed involving related applications.
		5.6	Concepts of calculating perimeters and areas are understood and simple calculations using triangles (hypotenuse) are performed involving related applications.
		5.7	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.
6.	Calculate volume of applications in related trade	6.1	Concepts of calculating volume are understood and simple calculations using squares and rectangles cross section are performed involving related applications.
		6.2	Concepts of calculating volumes are understood and simple calculations using conical cross section are performed involving related applications.
		6.3	Concepts of calculating volumes are understood and simple calculations using cylindrical cross section are performed involving related applications.
		6.4	Concepts of calculating volumes are understood and simple calculations using triangular cross section are performed involving related applications.
		6.5	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.

7. Apply angular measurement between 0 and 360 degrees with the use of a protractor	7.1 Protractor is used to solve problems in related trade situations.
	7.2 Concepts of calculating angles are understood and simple calculations using four basic rules, addition, subtraction, multiplication and division are performed involving related applications.
	7.3 Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.

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.

The following variables 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

Computations performed in an appropriate application for the industry in which the person is working. Skills may be demonstrated in relation to:

- measurement
- fundamentals of general mathematics
- statistical application
- ratio and proportion
- estimation
- calculations with fractions and decimals
- interpretation of drawings
- interpretation of diagrams
- interpretation of mathematical statements and formulae
- interpretation of numbers and arithmetic operations

Basic numeracy skills below those described in this unit are not covered in these standards and are assumed to be held on entry to the industry. Basic numeracy means the ability to:

- perform simple arithmetic using whole numbers
- apply the four basic rules of:
- addition
- subtraction
- multiplication
- division

This unit applies to simple projects applicable to:

- metal fabrication
- mechanical maintenance
- electrical/electronic maintenance
- manufacturing

Calculations may be performed using:

- pen
- paper
- calculator
- protractor

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- drawings and specifications
- basic operations in simple geometry,
- measurement and calculations
- costing relative to the trade application
- numbers and arithmetic operations
- calculations with fractions and decimals
- estimation and measurement
- percentages (some applications)
- ratio and proportion (some applications)
- basic statistics (data, tables, graphs and sales)
- mathematical statements and formulae

Skills
The ability to:

- read and interpret drawings
- apply the fundamentals of general mathematics
- measure and calculate manually
- record measurements
- operate electronic calculating devices
- perform basic technical computation
- communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated by the effective calculation of measurements and calculation of materials in accordance with range of variables statement relevant to the work orientation.

(1) Critical Aspects of Evidence

During assessment the individual will:

- take responsibility for the quality of their own work
- perform computations in accordance with standard principles
- apply the four basic rules of calculations
- performs basic calculations involving fractions and decimals
- perform computations accurately
- use accepted motor vehicle repair techniques, practices, processes and workplace procedures

All must be associated with the calculations and computations being performed or other units requiring the exercise of the skills and knowledge covered by this unit.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Evidence of competence may be obtained through a variety of methods including:

- observation
- written questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of installation activities to which applicant has contributed, or worked on
- training courses on basic math
- examples of authenticated assessments and/or assignments from formal education courses
- self assessment reports

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMCOM0011A: Apply language and communication skills (basic)

Competency Descriptor: This unit applies to the attitudes, skills and knowledge necessary to communicate effectively in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Communication

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA	
1. Apply grammar and usage	1.1	Knowledge of the types of sentences are demonstrated.
	1.2	Different kinds of phrases are identified.
	1.3	Sentences are constructed using different subordinates clauses.
	1.4	Sentences are constructed showing correct use of agreement between subject and verb.
	1.5	Sentences are constructed showing agreement between pronouns and the antecedents.
	1.6	The correct forms of verbs are identified and appropriately used.
	1.7	Different tenses are identified and appropriately used.
	1.8	Knowledge of the correct use of adjectives is demonstrated.
	1.9	Sentences are constructed showing verbs in their active and passive voice.
	1.10	Sentences faults are identified and corrected.
2. Apply mechanics vocabulary and spelling	2.1	Knowledge of rules governing the use of capitalization, punctuation and abbreviation is demonstrated.
	2.2	Punctuation marks are used correctly in written exercises.
	2.3	Abbreviations are identified and used as related to skill area.
	2.4	Words are spelt and their meanings interpreted through context clues and industry standards.

3.	Communicate concepts in writing	3.1	Concepts are written using appropriate terminology/industry jargon where required.
		3.2	Concepts are written using appropriate sentence construction techniques.
		3.3	Concepts are coherent, adequately.
		3.4	Main points identified and expanded.
		3.5	Activities are completed within specified time.
		3.6	References are acknowledged as required.
4.	Apply intrapersonal and interpersonal communication skills to work environment	4.1	Subject matter are identified and communicated.
		4.2	Effective communication is practiced in the workplace.
		4.3	Good communication is practiced in the workplace.

RANGE STATEMENT

Report is used to denote any required written communication that goes beyond a simple recording of facts (such as completion of a pro forma shift production schedule) to include level of analysis and/or research.

Reports may be of a technical nature and it should be based on the writer having technical knowledge.

Conclusions and/or recommendations where required are based on research or analysis of data

Reports include graphs, charts, tables, etc. as required.

The analysis and conclusions should be consistent with the level of skill and knowledge of an employee working at that level. Simple analysis and work would be required.

Intrapersonal and interpersonal communication skills including:

- goal setting
- effective communication practice
- good customer service
- oral presentation techniques

Grammar and usage may include:

- types and functions of sentences
- phrases and their functions
- subordinate clauses (adverbial adjectival, noun)
- subject and verb (focus on compound subjects, indefinite pronoun as subject collective noun as subject)
- pronouns and their antecedents
- verbs: action, linking, regular, irregular
- tenses: present, past, future, present perfect, past perfect, future perfect
- adjectives and adverbs
- sentence faults: fragments and run-on

Mechanics, vocabulary and spelling may include:

- rules governing the use of capitalization, punctuation and abbreviation
- punctuation marks: end marks, commas, semi-colon and colon, quotation marks, dashes and parentheses, hyphen, apostrophes
- Abbreviations: symbols, measurements, time, number
- spelling words and interpretation of their meanings through context clues and word analysis, prefixes, suffixes, root (focus on words used in skill area)

Communication skills may include:

- good listening skills
- effective listening skills (eliciting feedback, developing objectivity, learning to empathize
- kinds of communication barriers
- clear logical reasoning
- identification and evaluation of propaganda techniques
- formal report/speech

Writing skills may include:

- methods of paragraph development – chronological, order of importance, spatial order, comparison or contrast
- paragraphs with – topic sentences and supporting sentences, unity and coherence,
- linking expressions and connectives,
- sentence length and structure
- different types of reports

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- grammar and usage
- types of sentences
- parts of sentences
- types of paragraph
- mechanics, vocabulary and spelling
- writing styles (technical or non-technical)
- communication skills
- information systems
- reports including graphs, charts, tables

Skills
The ability to:

- communicate concepts in writing
- identify main points
- expand main points
- apply language and communication skills in the work place

EVIDENCE GUIDE

Competency is to be demonstrated by the effective use of communication skills in accordance with the range listed in the range of variables statement, relevant to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units applicable to the individual's work.

During assessment the individual will:

- demonstrate the ability to apply language and communication skills
- demonstrate effective writing style
- demonstrate the ability to identify main points
- demonstrate the ability to expand main points
- communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment
- use accepted engineering communication techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination both.

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.

MEMFAB0041A: Carry out mechanical cutting operations – (basic)

Competency Descriptor: This unit deals with the skills and knowledge required to effectively carry out mechanical cutting as applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Determine job requirements	1.1 Job specification and requirements are determined from job sheets and/or instructions.
	1.2 Appropriate method/machine is selected to meet specifications.
	1.3 Machine is loaded and adjusted appropriately for operation and is consistent with standard operating procedures.
2. Select/set up machine tooling	2.1 Selected most appropriate tooling.
	2.2 Installed tooling correctly using standard operating procedures.
	2.3 Machine is set up and adjusted using standard operating.
3. Operate mechanical cutting machine	3.1 Appropriate stops and guards are set and adjusted as required.
	3.2 Material is secured and correctly positioned using measuring equipment as necessary.
	3.3 Machine is started and stopped safely to standard operating procedures.
	3.4 Machine is operated to cut/hole material to specifications using standard operating procedures.
	3.5 Lubricant used as required.
	3.6 Appropriate safety precautions are taken.

4.	Check material for conformance to specification	4.1	Material is checked against specification.
		4.2	Machine and/or tooling is adjusted as required
		4.3	Material is cut and/or holed to within workplace tolerances.
		4.4	Material used in most economical way.
		4.4	Codes and standards are observed.

RANGE STATEMENT

This unit may cover the operation of a number of the following activities:

- sawing
- shearing
- cropping
- holing /boring

Materials may include:

- ferrous metals
- non-ferrous metals
- non-metallic products

Examples of machines that could be covered include:

- guillotines
- croppers
- cold saws
- band saws
- automatic saws

Work is undertaken under supervision or as part of a team environment to predetermined:

- standards of quality
- safety
- workshop procedure

This unit includes the set up and operation of a range of:

- mechanical cutting equipment
- holing /holing equipment

Typical applications of this unit may include cutting for:

- manufacture
- production
- cutting of materials selected from stores in a maintenance environment
- fabrication

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S legislation and regulations
- cutting equipment
- cutting processes operations or activities
- hand tools and equipment
- materials relative to cutting processes
- materials preparation
- manual handling
- measurement
- drawings, sketches and instructions

Skills
The ability to:

- work safely to instructions
- interpret relative drawings and instructions
- use power tools and hand tools
- select material
- measure relative to cutting processes
- communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated safely and effectively when cutting material in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to setting up mechanical cutting equipment and during the cutting process
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in setting up cutting equipment
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material
- interactively communicate with others to ensure safe operations
- demonstrate effective cutting to produce designed cut material

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the mechanical cutting of materials or other units requiring the exercise of the skills and knowledge covered by this unit.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMMAH0081A: Perform housekeeping duties

Competency Descriptor: This unit deals with the skills and knowledge required to effectively perform housekeeping duties. It applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Plan and prepare work	1.1	OH&S requirements associated with application tasks and workplace environment are recognized and adhered to.
		1.2	Appropriate personal protective equipment is selected, correctly fitted and used.
		1.3	Quality Assurance requirements associated with company's operations is recognized and adhered to.
		1.4	Tools and equipment for handling materials/goods, non-toxic waste is selected and is consistent with job requirements.
		1.5	Tools and equipment for handling materials/goods is checked for serviceability and any faults reported to supervisor.
2.	Correctly manual handle, sort and stack engineering /construction material	2.1	Common engineering materials is recognized and selected for sorting and stacking/stockpiling to supervisor's instructions and/or specifications.
		2.2	Handling characteristics of materials are identified and appropriate handling techniques applied.
		2.3	Specific handling requirements for hazardous materials are applied.
		2.4	Materials are stored, stacked/stockpiled and protected clear of traffic ways so they can be easily identified and retrieved.

		2.5	Appropriate signage and barricades are erected where applicable in order to isolate stored materials from workplace traffic or access.
		2.6	Correct manual handling techniques are used.
3.	Prepare for mechanical handling of materials	3.1	Materials are stacked/banded for mechanical handling in accordance with type of material and plant/equipment to be used.
		3.2	Rigger is assisted with the loading, unloading, moving, locating and/or installing materials.
		3.3	Materials are safely handled with assistance of pallet trolley, forklift or hoist.
4.	Handle and remove waste safely	4.1	Waste materials are handled correctly and safely according to OH&S and requirements of regulatory authorities.
		4.2	Hazardous materials are identified for separate handling.
		4.3	Non-toxic materials are removed using correct procedures.
		4.4	Dust suppression procedures are used to minimise health risk to work personnel and others.
5.	Clean up	5.1	Tools and equipment are cleaned, maintained, and stored.
		5.2	Unused materials are safely stacked/stockpiled stored.
		5.3	Waste materials are disposed of safely.
		5.4	Site is cleaned and cleared of debris and unwanted material.

RANGE STATEMENT

Competency is to be demonstrated by the effective use of techniques relating to instructions, information sources and meeting procedures listed within the range statement relative to the work orientation.

Protection of stacked/stored materials may include:

- covering
- tying or banding
- barricades
- signs
- locked away (hazardous materials)

Dust suppression procedures may include:

- spraying with water
- covering
- use of vacuum cleaner

Engineering materials include but are not limited to:

- bricks and concrete masonry
- mortar components – cement, coarse aggregate, sand
- timber
- structural steel sections/components
- concrete
- scaffolding components, pipe sections
- plywood and particle board
- metal sheeting
- steel reinforcement
- insulation
- glass
- paints and sealants
- plaster sheeting

Tools and equipment includes but is not limited to:

- Brooms
- hoses
- shovels
- rakes
- wet and dry industrial vacuum cleaners
- wheelbarrows
- pallet trolley
- materials hoists
- forklifts
- buckets

Removal of materials to include processes of recycling and salvage where applicable.

OH&S requirements to be in accordance with (company/industry) guidelines and regulations.

Work to be undertaken as part of a team or individually under supervision of appropriately certificated persons where applicable.

Reporting of faults may be verbal or written.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant codes and regulations
- hand tools and equipment
- materials
- materials handling
- Quality Assurance
- range of communication mediums (verbal and non-verbal)

Skills
The ability to:

- work safely to instructions
- use hand and portable tools
- handle materials
- identify/select material
- measure
- communicate effectively
- dispose of material safely
- use disposal equipment and tools as required

EVIDENCE GUIDE

Competency is to be demonstrated by the effective handling and storing/stacking of appropriate construction materials listed within the range of variables statement, relevant to the work orientation.

(1) Critical Aspects and Evidence

It is essential that competence is observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations and Industry guidelines applicable to workplace operations
- indicate compliance with organisational policies and procedures including Quality Assurance requirements
- carry out correct procedures prior to and during application of materials handling processes
- demonstrate safe and effective operational use of tools and equipment
- demonstrate safe application in the process of cleaning up
- interactively communicate with others to ensure safe and effective operations

(2) Method of Assessment

Competency shall be assessed while work is being done under direct supervision with regular checks, but may include some autonomy when working as part of a team.

Competency in this unit may be determined concurrently, based on integrated project work.

Assessment may be by intermittent checking at the various stages of the job application in accordance with the performance criteria, or may be at the completion of each process.

(3) Context of Assessment

Competency shall be assessed in the workplace or simulated workplace environment in accordance with work practices and safety procedures.

MEMMAH0071A: Perform manual handling and lifting

Competency Descriptor: This unit deals with the skills and knowledge required to effectively manually handle materials as applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Material handling

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Lift materials manually	1.1 Material weight is determined correctly utilising most appropriate technique.
	1.2 Lifting techniques are undertaken to safe work standards, standard operating procedures. (Type of movement, methods of movement, storage condition, height and position).
2. Move/shift materials manually	2.1 Appropriate equipment is selected where required.
	2.2 Material is placed safely and securely on moving equipment.
	2.3 Material is relocated ensuring safety of personnel and security of material.
	2.4 Material is unloaded from moving equipment and placed in a safe and secure manner.

RANGE STATEMENT

Work undertaken under supervision or in a team environment. Material weight is determined utilising scales or interpreting signage. Maximum manual lifting weight limited to safe work standards. All work and work practices undertaken to regulatory and standard requirements and standard operating procedures where applicable.

Moving/shifting equipment may include but not limited to:

- hand trolleys
- wheelbarrows
- motorised/hand pallet trucks (not sit on),
- hand carts
- dedicated production or process lifting equipment
- baskets
- spreader bars
- cradles or the like attached to lifting equipment
- rope

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S guidelines and regulations
- basic reading
- basic numeracy
- material classification
- manual handling technique(s)/methods
- handling processes
- material identification, transportation and storage
- handling tools and equipment
- materials preparation
- manual handling
- weight determination
- drawings, sketches, signage and instructions

Skills
The ability to:

- work safely to instructions
- communicate effectively
- interpret related drawings signage and instructions
- use handling tools and equipment
- identify/select material
- identify/select handling method
- handle material, tools and equipment
- determine weights
- identify/select materials relative to transportation and storage methods
- manual handle material/equipment efficiently

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively manually handling materials in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to handling materials
- demonstrate safe and effective operational use of lifting equipment, tools, and attachments
- demonstrate correct procedures in manual handling
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material
- interactively communicate with others to ensure safe operations
- demonstrate effective handling technique to produce designed outcome

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling recording and reporting associated with manual handling or other units requiring the exercise of the skills and knowledge covered by this unit.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMSUF0061A: Prepare for the application of protective coatings

Competency Descriptor: This unit deals with the skills and knowledge required for effectively carrying out preparation for application of protective coatings and applies to individuals working in metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Plan for process	1.1 Quality Assurance requirements of company's/manufacturer's protective coating operations are recognised and adhered to.
	1.2 Preparation and planning requirements are identified from drawings and/or plans.
	1.3 Occupational Health and Safety (OH&S) requirements are determined and adhered to in accordance with application tasks and workplace environment.
	1.4 Safety hazards are identified and correct procedures adopted to minimise risk to self and others.
	1.5 Materials are selected according to supervisor's instructions and safely handled, stored and ready for application.
	1.6 Appropriate personal protective equipment are selected, correctly fitted and used.
	1.7 Tools and equipment are selected and is consistent with job requirements.
	1.8 Tools and equipment are checked for serviceability and any faults reported to supervisor.
	1.9 Fixing/fasteners/jigs selected are consistent with job requirements and checked for serviceability.
2. Prepare materials selected for protective coating process	2.1 Activities for material preparation are identified from specifications or supervisor's instructions.
	2.2 Fasteners/fixing are prepared for installation.
	2.2 Material preparation is carried out to satisfy requirements of fabrication/manufacturing process.

3.	Prepare work area suitable for protective coating process	3.1	Activities to be carried out in work area are identified from surfaces to be finished and height to be accessed.
		3.2	Work area is prepared for protective coating process to supervisors instructions.
4.	Use tools, plant and equipment appropriate for protective coating	4.1	Regular hand and power tools suitable for the application process is identified with job requirements.
		4.2	Hand and power tools are used safely and effectively to carry out processes.
5.	Assist with initial preparation of surfaces for protective coating	5.1	Sound surfaces are prepared by sanding, blasting, brushing and/or washing
		5.2	Unsound surfaces are prepared by scraping and/or sanding.
6.	Assist with preparing surfaces for final finish	6.1	Stopping/filling materials are applied to a flush and even finish.
		6.2	Surface is sanded by hand/tools.
		6.3	Primer/sealer/undercoats are applied to surface by brush and/or roller.
7.	Clean up	7.1	Materials are stacked /stored for re-use or disposal.
		7.2	Work area is cleared.
		7.3	Tools and equipment are cleaned and stored in a cool place.
		7.4	Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements.

RANGE STATEMENT

This unit applies to the work undertaken in a team environment for the preparation and subsequent application of protective for metal engineering and maintenance trade areas.

Process includes:

- worksite preparation
- surface preparation
- application of prime and intermediate coatings

Tools and equipment may include but not limited to:

- scrapers
- filling
- knives/blades
- putty knives
- duster brushes
- hand sanders
- mechanical sanders
- paint stirrers
- drop sheets
- wire brushes
- hammer
- nail punches
- paint pans/buckets
- spray paint equipment and accessories
- brush-ware accessories
- roller frames
- covers
- roller accessories
- ladders
- trestles
- planks
- hop-ups
- aluminium mobile scaffolding

Materials may include:

- preparatory products
- paints – solvent-borne (alkyd, urethane, urethane/alkyd, urethane oil or modified alkyd resins) and latex (PVA, PVA/acrylic, acrylic and styrene acrylic)

Surfaces to be treated may include common profiles encompassing:

- ply
- building boards (including MDF and particle board)
- fibre cement products, iron and steel
- zinc coated and zinc alloy coated steel products
- masonry products
- clay bricks
- concrete blocks
- concrete surfaces
- cement render
- set plaster
- plaster glass products
- paper-faced gypsum plaster board
- previously coated/treated surfaces
- fabricated steel products

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements
- portable power tools
- hand tools and equipment
- materials relevant to application of protective coating
- materials handling
- measurement and calculation
- interpreting simple diagrams
- fixing and fasteners consistent with painting and decorating requirements
- workplace communication requirements

Skills
The ability to:

- work safely to instructions
- use power and hand tools
- handle material
- select material
- communicate effectively
- measure relative to the process
- prepare for the application of protective coating

EVIDENCE GUIDE

Competency is to be demonstrated by the safe and effective preparation of materials using the processes listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- indicate compliance with organizational policies and procedures including Quality Assurance requirements
- carry out correct procedures carried out prior to and during application of construction process
- use tools, plant and equipment safely and effectively
- Processes comply with preparation of surfaces for protective coating

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMFAB0051A: Perform brazing and/or silver soldering

Competency Descriptor: This unit deals with the skills and knowledge required to effectively perform brazing and /or silver soldering as applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Prepare materials and equipment	1.1 Job requirements determined from specifications and/ or instructions.
	1.2 Materials correctly prepared using appropriate tools and techniques.
	1.3 Materials correctly assembled/aligned to meet specifications as required.
	1.4 Distortion prevention measures identified and appropriate action taken as required.
	1.5 Heating equipment assembled and set up safely and correctly in accordance with standard operating procedures.
	1.6 Correct and appropriate consumables selected and prepared.
	1.7 Test run undertaken and verified as required.
2. Braze and/or silver solder	2.1 Correct and appropriate process selected to meet specifications.
	2.2 Materials preheated as required.
	2.3 Consumables applied using correct and appropriate techniques.
	2.4 Jointing material applied correctly and in appropriate quantities to meet job/specifications.
	2.5 Correct temperatures using appropriate techniques.

3. Inspect joints	3.1 Excess jointing materials removed using correct and appropriate techniques.
	3.2 Inspection of joints undertaken using standard operating procedures and meeting specifications.
	3.3 Inspection results reported/recorded using standard operating procedures as required.

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RANGE STATEMENT

Work undertaken in a production, engineering or maintenance environment using predetermined standards of quality, safety and work procedures. Work may be undertaken under supervision or within a team environment. All work undertaken to standard requirements.

Appropriate assembly of heating equipment may include:

- cylinders
- connections
- hoses
- tips
- nozzles

Heating medium and appropriate consumables can include:

- oxyacetylene
- fuel gas
- fluxes (resin or powder)
- all types of silver solder and brazing rods

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S legislation and regulations
- metal properties and classification
- heating medium/technique
- brazing/soldering processes
- oxy-fuel equipment identification, transportation and storage
- hand tools and equipment
- materials /consumables relative to brazing and silver soldering procedures
- materials preparation
- manual handling
- measurement
- drawings, sketches and instructions

Skills
The ability to:

- work safely to instructions
- communicate effectively
- interpret related drawings and instructions
- use brazing and soldering equipment
- identify/select material
- identify/select brazing soldering processes
- handle material, tools and equipment
- measure relative to brazing and or silver soldering processes
- identify/select materials relative to the brazing and or soldering process
- prepare materials relative to the brazing and or soldering process
- braze and or silver solder efficiently

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively performing routine oxyacetylene welding (fuel gas welding) in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to setting up oxy acetylene equipment and during the brazing and or silver soldering process
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in setting up and shutting down oxy acetylene equipment
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material
- interactively communicate with others to ensure safe operations
- demonstrate effective brazing and or silver soldering technique to produce designed outcome

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.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMFAB0151A: Prepare for oxyacetylene/metal arc welding processes

Competency Descriptor: This unit deals with the skills and knowledge required to effectively prepare the process for carrying out oxyacetylene/metal arc welding processes and applies to individuals working in metal engineering and maintenance industry.

Competency Field: Metal Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Plan for installation process	1.1 Quality Assurance requirements of engineering /maintenance operations are recognized and adhered to.
	1.2 Preparation and planning requirements are identified from drawings/work location and/or supervisor's instructions.
	1.3 OH&S requirements are identified and adhered to in accordance with application tasks and workplace environment.
	1.4 Safety hazards are identified and correct procedures adopted to minimise risk to self and others.
	1.5 Materials are selected, safely handled and stored/located ready for application.
	1.6 Appropriate personal protective equipment are selected, correctly fitted and used.
	1.7 Tools and equipment selected are consistent with the job requirements,
	1.8 Tools and equipment selected are checked for serviceability and any faults reported to supervisor.
	1.9 Materials/components selected consistent with the job requirements where applicable and checked for damage.
2. Prepare equipment selected for welding process	2.1 Activities for equipment preparation are identified from specifications or supervisor's instructions.
	2.2 Equipment preparations are carried out to satisfy requirements of welding process.

3.	Prepare material selected for welding process	3.1	Activities for material preparation are identified from specifications or supervisor's instructions.
		3.2	Material preparation is carried out to satisfy requirements of welding process.
4.	Prepare work area suitable for welding process	4.1	Activities to be carried out in work area are identified from welding technique, method of welding and access to area.
		4.2	Work area is prepared for welding process according to supervisor's instructions.
5.	Set up tools, plant and equipment appropriate for welding process	5.1	Regular tools/measuring devices suitable for application processes are identified to job requirements.
		5.2	Regular tools/measuring devices are set up safely and effectively to carry out processes where applicable.
6.	Select materials, cut and prepare sections	6.1	Materials are obtained as per instruction.
		6.2	Correct manual handling techniques is used to move and place materials.
		6.3	Materials are safely moved to work area.
		6.4	Appropriate techniques used to accurately cut/bend/prepare/secure components to same length or given instruction.
7.	Distribute components	7.1	Components are distributed and stacked to suit job location and sequence.
8.	Clean up	8.1	Materials are stacked/stored for re-use or disposed of.
		8.2	Work area is cleared.
		8.3	Tools and equipment are cleaned, maintained and stored.

RANGE STATEMENT

This unit applies to the preparation processes carried out in preparing for welding processes using oxyacetylene and or metal arc welding techniques as per instructions.

Safety:

- personal safety
- hand tool safety
- welding safety
- manual lifting and handling

Source of information:

- Specific work instructions/equipment manual
- health and safety requirements

Tools/equipment to include:

- power tools
- oxyacetylene welding and cutting equipment
- Angle grinders, pedestal grinders, surface grinders, rotary wire brushes
- hand and drill press
- cold chisel & files
- ball pein hammer
- arc welding equipment
- safety equipment
- work benches
- hack saw
- screwdrivers
- spirit level
- vices
- marking out tools
- chipping hammer

Types of hazards:

- faulty equipment
- premises,
- tools - obstructions
- hazardous substances
- faulty storage
- electrical wiring

Material to include:

- sheet metal
- steel plates
- pipes
- tubing

Work areas:

- fabrication layout
- maintenance
- welding
- finishing

Protective clothing:

- coverall
- goggles
- gloves
- Safety boots
- safety helmet

Type of site and working conditions to include:

- workshop and on site
- at height as per industry standards
- in confined space
- indoors and out doors

Work is to be undertaken either as part of a team or individually, under supervision with instruction being as part of the supervisor's directions either verbal or written.

Reporting of faults may be verbal or written.

OH&S requirements to be in accordance with the statutory regulations.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements
- drawings and specifications
- measuring devices
- hand tools and equipment
- materials relative to welding process
- materials handling
- measurement relative to welding process
- welding techniques consistent with oxyacetylene/metal arc welding processes
- workplace communications

Skills
The ability to:

- work safely to instructions
- use hand tools
- use measuring devices
- handle material
- select material
- communicate effectively
- measure relative to process
- prepare for oxyacetylene/metal arc welding processes

EVIDENCE GUIDE

Competency is to be demonstrated by carrying out the safe and effective preparation for oxyacetylene/metal arc welding processes accordance with performance criteria using any of the range of materials and processes listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- indicate compliance with organisational policies and procedures including Quality Assurance requirements
- carry out correct procedures prior to and during application of oxyacetylene/metal arc welding processes
- demonstrate safe working practices at all times
- demonstrate the ability to prepare for oxyacetylene/metal arc welding processes
- demonstrate the ability to apply appropriate principles/techniques to welding environment
- demonstrate the ability to carry out specific measurement and preparation procedures
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- use accepted engineering techniques, practices, processes and workplace procedures
- demonstrate safe and effective operational use of tools, measuring devices and equipment
- interactively communicate with others to ensure safe and effective workplace operations

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activity.

(3) Context of Assessment

Competency should be assessed in the workplace or simulated workplace environment in accordance with work practices and safety procedures.

MEMMRD0101A: Evacuate and dehydrate refrigeration systems

Competency Descriptor: This unit deals with the skills and knowledge required to effectively evacuate and dehydrate refrigeration systems and applies to all individuals working in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Assess refrigeration system operation	1.1 Basic refrigeration system operating principles and terminology are understood.
	1.2 All relevant information is obtained and correctly interpreted prior to the commencement of work on the refrigeration system.
	1.3 Refrigeration system checks are undertaken safely in accordance with standard operating procedures.
	1.4 Pressures and temperatures are correctly determined and recorded.
	1.5 The refrigeration system is checked for current operating condition.
2. Reclaim refrigerant and evacuate system	2.1 Equipment selected for use is appropriate for the evacuation method to be applied.
	2.2 Connections between the testing apparatus and the system are correctly located, sound and leak proof.
	2.3 The refrigeration system is evacuated in accordance with standard operating procedures, codes and regulations.
	2.4 Measurements taken during the process are carefully analysed and recorded as required.
	2.5 The refrigerant evacuated from the refrigeration system is contained/disposed of in accordance with the relevant codes and regulations.
3. Clean up	3.1 Materials/supplies/equipment are stacked /stored for re-use or disposal.
	3.2 Work area is cleared.

3.3 Tools and equipment are cleaned and stored in a cool place.

3.4 Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements and company's operating procedures.

RANGE STATEMENT

Work is undertaken under supervision or in a team environment using predetermined standards of safety, quality and workshop procedures.

Refrigeration systems may be associated with refrigeration and air conditioning applications including commercial, industrial and transport.

All work is to be undertaken in accordance with all relevant standard and regulatory requirements. Refrigerants include CFCs, HFCs, ammonia, etc.

Methods may include:

- triple vacuum method
- deep vacuum method

Working activities may include:

- connect manifold and gauges
- evacuate system to desired micron reading
- perform standing vacuum

Tools and equipment may include;

- vacuum pump
- high vacuum gauge
- recovery machine
- moisture indicator
- recovery/recycling machine

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools/equipment for evacuating and dehydrating refrigeration system
- standard characteristics of basic refrigeration system components
- standard evacuating and dehydrating methods
- standard refrigeration system components
- standard operational test for refrigeration system
- manufacturers standard specification
- standard application/ refrigeration system
- reading
- writing basic English basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select correct equipment/tools
- apply quality assurance
- perform evacuating and dehydrating of refrigeration system

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively evacuating and dehydrating refrigeration system in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to set up tool and equipment to evacuate system
- demonstrate correct procedures in evacuating and dehydrating refrigeration system
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0111A: Carry out routine servicing of coils, filters and room air conditioners

Competency Descriptor: This unit deals with the skills and knowledge required to effectively carry out routine servicing of coils, filters and room air conditioners and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Undertake preventive maintenance checks on domestic air conditioning/refrigeration equipment	1.1	Visual inspection is carried out according to refrigeration/air conditioning principles, procedures and safety requirements.
		1.2	Preventative maintenance tasks are performed under supervision and in accordance to manufacturers' specifications using refrigeration/air conditioning techniques/practices.
		1.3	Equipment components identified correctly.
		1.4	The characteristics and operation of basic component is understood.
2.	Carry out routine servicing of coils	2.1	All joints in the piping connections to the coil are checked for tightness and leakage.
		2.2	All return bends and other joints in the makeup of the coil are checked for leakage.
		2.3	Leaks found are promptly reported to the appropriate personnel.
		2.4	Coils are cleaned according to the maintenance schedule and by an appropriate means.
3.	Carry out routine servicing of filters	3.1	Dirty cells/filters are thoroughly washed, allowed to dry, and properly treated before reuse.

		3.2	Oil used to treat the cells/filters is appropriate.
		3.3	Cells/filters designed for hose cleaning are maintained according to the manufacturer's recommendations
		3.4	Filters are treated as specified in the maintenance procedures.
4.	Carry out routine servicing of room air conditioners	4.1	Unit is removed carefully and is not damaged in the process.
		4.2	All safety precautions are observed during cleaning of the unit.
		4.3	Airflow through the unit is not restricted.
		4.4	Filters and coils are kept clean during the operating season.
		4.5	The refrigerant charge is monitored, and leaks detected are promptly reported to the appropriate personnel.
		4.6	The drip pan of the unit, coils, and fan blades are all cleaned according to the requirements of the maintenance schedule.
		4.7	Fan motors are checked for free turning, and service cord and connections are examined as required.
5.	Report faulty domestic refrigeration/air conditioning components	5.1	Faulty components found during servicing are identified, confirmed by inspection and are promptly reported to the appropriate personnel.
6.	Return to service domestic refrigeration/air conditioning equipment	6.1	Components are reassembled and tested for correct operation and assessed against specification.
		6.2	Correct operation of the equipment is verified using domestic refrigeration/air conditioning principles and system application techniques.
		6.3	Maintenance records/service reports are completed by appropriate designated means.
7.	Clean up	7.1	Materials/supplies/equipment are stacked /stored for re-use or disposal.

7.2 Work area is cleared.

7.3 Tools and equipment are cleaned and stored in a cool place.

7.4 Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements and company's operating procedures.

RANGE STATEMENT

This unit applies to servicing of domestic and light commercial refrigeration and air conditioning equipment and components.

Work is carried out under supervision or in a team environment.

Interpret drawings and diagrams of refrigeration and air conditioning equipment, and identify basic components of air conditioning system

Types of room air conditioners

- Window,
- floor or console

Means of cleaning:

- mechanical
- chemical

Work activities:

- disconnect and remove unit
- clean all coils
- clean condensate drains and check for easy run off
- clean filters
- check for noise or excessive vibration on unit
- check sight glass
- check thermostats
- record motor voltages
- tighten electrical connections
- check fan blades
- check for refrigerant leaks

Types of filters:

- cell type where the filtering medium is thrown away
- cell type where the medium is cleaned cell by cell and reused
- continuous-cleaning type
- electrostatic filter

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools/equipment for servicing of coils, filters and room conditioners
- principle of refrigeration and air-conditioning
- sensible and latent heat
- the concept of energy and types of energy
- principle of heat conversion
- the concept of heat and methods of heat transfer
- types of refrigeration and air-conditioning systems
- manufacturers standard specification
- standard application/ refrigeration system
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- identify components
- apply quality assurance
- perform routine servicing of coils, filters and room conditioners

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively perform routine servicing of coils, filters and room conditioners in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to set up tool and equipment to service components
- demonstrate correct procedures in servicing coils
- demonstrate correct procedures in servicing filters
- demonstrate correct procedures in room air conditioners
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMINS0061A: Prepare for piping and tubing installation

Competency Descriptor: This unit deals with the skills and knowledge required to effectively prepare the process for carrying out installation of piping and tubing and applies to individuals working in metal engineering and maintenance industry.

Competency Field: Metal Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Plan for installation process	1.1 Quality Assurance requirements of engineering /maintenance operations are recognized and adhered to.
	1.2 Preparation and planning requirements are identified from drawings/work location and/or supervisor's instructions.
	1.3 OH&S requirements are identified and adhered to in accordance with application tasks and workplace environment.
	1.4 Safety hazards are identified and correct procedures adopted to minimise risk to self and others.
	1.5 Materials are selected according to supervisor's instructions, safely handled and stored for application.
	1.6 Appropriate personal protective equipment are selected, correctly fitted and used.
	1.7 Tools and equipment selected is consistent with the job requirements.
	1.8 Tools and equipment is checked for serviceability and any faults reported to supervisor
	1.9 Materials/components selected are consistent with the job requirements and checked for damage.

2.	Prepare materials selected for installation process	2.1	Activities for material preparation are identified from specifications or supervisor's instructions.
		2.2	Material preparation is carried out to satisfy requirements of installation process.
3.	Prepare work area suitable for installation process	3.1	Activities to be carried out in work area are identified from installation technique, method of installation and access to area.
		3.2	Work area is prepared for installation process according to supervisor's instructions.
4.	Use tools, plant and equipment appropriate for installation process	4.1	Regular tools/measuring devices are suitable for application and process identified.
		4.2	Regular tools/measuring devices are used safely and effectively to carry out processes where applicable.
5.	Prepare background of surfaces/environment for piping and tubing installation	5.1	Surfaces/environment is identified for preparation.
		5.2	Surface where appropriate is chassed/chopped/prepared.
		5.3	Excavations are carried out where appropriate.
6.	Select materials and cut components	6.1	Materials are obtained as per instruction.
		6.2	Correct manual handling techniques are used to move and place materials.
		6.3	Materials are safely moved to work area.
		6.4	Appropriate techniques used to accurately cut/bend/fabricate/secure components to same length and to given instruction.
7.	Distribute components	7.1	Components are distributed and stacked to suit job location and sequence.

8.	Clean up	8.1 Materials are stacked/stored for re-use or disposed of.
		8.2 Work area is cleared.
		8.3 Tools and equipment are cleaned, maintained and stored.

RANGE STATEMENT

This unit applies to the preparation processes carried out in preparing for the installation of piping and tubing as per instructions.

Background surfaces for installation of piping and tubing include but not limited to:

- concrete
- concrete block work
- brickwork/stonework
- pavements
- underground

Installation process includes:

- preparation of pipes and tubing
- preparation of surfaces
- finish of surfaces
- workplace preparation

Personal protective equipment may include:

- overalls
- waterproof pants and jacket
- boots
- water (rubber) boots
- gloves
- dust masks/respirators
- hard hat/cap
- safety goggles

Working conditions may include but are not limited to:

- domestic/commercial new and existing
- at height as per industry standards
- in confined space
- temperature variation
- damp and wet conditions
- indoors and out doors

Tools and equipment to include:

- hand and power hack saws
- stock dies
- pipe threading machine
- pipe wrenches
- pipe cutters
- cold chisels
- soldering and brazing equipment
- wenches
- tube cutter
- flaring tool
- screwdrivers
- shovels
- pickaxes
- hand drills
- pipe reamers
- swaging tools
- files
- heavy duty hammer drill
- hammers

Identification and application of tools for:

- marking out
- measuring
- cutting
- shaping
- drilling
- installing
- threading
- tapping
- finishing
- dismantling
- assembling
- reaming

Fabrication techniques may include but not limited to:

- marking out
- cutting
- bending
- clamping
- plugging
- drilling/punching
- screwing/bolting
- cutting mitres
- adhesion
- threading

Representative range of applications may include such things as

- fixtures
- equipment
- valves
- regulators
- metering devices

Installation techniques:

- surface mount
- underground
- PVC piping
- metal
- on masonry
- on steel
- in pavements
- with clamps
- with saddles
- on/in walls
- in floors
- overhead
- access ways
- wood

Work is to be undertaken either as part of a team or individually, under supervision with instruction being as part of the supervisor's directions either verbal or written.

Reporting of faults may be verbal or written.

OH&S requirements to be in accordance with the regulations.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements
- drawings and specifications
- measuring devices
- hand tools and equipment
- materials relative to installation process
- materials handling
- measurement relative to installation process
- installation techniques consistent with piping and tubing installation
- workplace communications

Skills
The ability to:

- work safely to instructions
- use hand tools
- use measuring devices
- handle material
- select material
- communicate effectively
- measure relative to process
- prepare for piping and tubing installation

EVIDENCE GUIDE

Competency is to be demonstrated by carrying out the safe and effective preparation for piping and tubing installation in accordance with performance criteria using any of the range of materials and processes listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- demonstrate the ability to prepare for piping and tubing installation
- demonstrate the ability to apply appropriate principles/techniques to installation environment
- indicate compliance with organisational policies and procedures including Quality Assurance requirements
- demonstrate the ability to carry out specific measurement and preparation procedures
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- use accepted engineering techniques, practices, processes and workplace procedures
- carry out correct procedures prior to and during application of installation processes
- demonstrate safe and effective operational use of tools, measuring devices and equipment
- interactively communicate with others to ensure safe and effective workplace operations

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activity.

(3) Context of Assessment

Competency should be assessed in the workplace or simulated workplace environment in accordance with work practices and safety procedures.

MEMMRD0081A: Remove dismantle, assemble and replace basic engineering components

Competency Descriptor: This unit deals with the skills and knowledge required to effectively remove dismantle, assemble and replace engineering components and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Check engineering components	1.1	System components are identified correctly.
		1.2	The characteristics and basic operational function of each system component are understood.
		1.3	The operational function of each component are inspected and tested by supervisor.
2.	Remove/replace engineering components	2.1	Engineering components are inspected by supervisor and task requirements analysed.
		2.2	Appropriate tools and equipment are selected and component/s are prepared for removal/replacement.
		2.3	Components are removed/replaced using standard operating procedures, tools and equipment.
		3.4	Engineering components are clearly marked to aid reassembly.
3.	Dismantle engineering components	3.1	Engineering components are inspected by supervisor and task requirements analysed.
		3.2	Appropriate tools and equipment are selected and component/s prepared for dismantling.
		3.3	Components are dismantled using standard operating procedures, tools and equipment.
		3.4	Engineering components are clearly marked to aid reassembly.
4.	Replace faulty components	4.1	Specifications for components are obtained from appropriate source and verified by supervisor.
		4.2	Damaged or faulty components are assessed by supervisor against specifications.

		4.3	Faulty components are identified for repair, replacement or adjustment.
5.	Select replacement components	5.1	Where applicable, replacement and/or repaired parts are selected for reassembly.
6.	Assemble basic engineering components into assemblies or sub-assemblies	6.1	Appropriate techniques are applied in the preparation, assembly and adjustment of components.
		6.2	Correct lubrication, packing and sealing materials are applied correctly and in conformance to job specifications and supervisor instructions.
		6.3	Final component is assembly inspected, tested and adjusted as necessary for compliance with operational specifications.
		6.4	Final component is returned to use according to standard operating procedure.
7.	Clean up	7.1	Materials/supplies are stacked /stored for re-use or disposal.
		7.2	Work area is cleared.
		7.3	Tools and equipment are cleaned and stored in a cool place.
		7.4	Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements and company's operating procedures.

RANGE STATEMENT

Work undertaken under supervision or in a team environment using predetermined standards of quality, safety and workshop procedures.

This unit involves the dismantling, inspection, replacement, assembling of engineering components.

All specifications interpreted from manufacturers' manuals, engineering drawings, detailed/technical sketches and associated data sheets.

Tasks are undertaken utilising engineering principles, designated procedures, appropriate tools, equipment and safe workshop practices.

Replacement parts are proved by supervisor and selected from manufacturers' catalogues, etc.

Appropriate techniques utilised in the assembly of component parts using fastening equipment and methods which ensure conformance to specifications, operational performance, quality and safety; this may include the straightforward removal and replacement of pre-manufactured bearings and seals.

Appropriate lubrication, packing, sealing materials are selected and applied in conformance to standard operating procedure.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools for removal, replacing, dismantling and assembling engineering system components
- standard characteristics of basic engineering system components
- standard removal/replacing tasks
- standard engineering system components
- standard operational test for basic engineering systems
- manufacturers standard specification
- standard application/operation of pneumatic system components
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select seals
- apply quality assurance
- perform removal and replacement of engineering system components

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively removing, dismantling, assembling and replacing engineering components in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in removing/replacing engineering components
- demonstrate correct procedures in dismantling and assembling engineering components
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMCOR0012A: Plan a complete activity

Competency Descriptor: This unit deals with the skills and knowledge required to effectively plan a complete activity to required objectives/guidelines and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Identify activity requirements	1.1	Instructions as to objectives and performance required are identified.
		1.2	Relevant specifications for activity outcomes are obtained, understood and where necessary clarified.
		1.3	Activity outcomes are identified.
		1.4	Activity requirements, including overall timeframe for activity, quality requirements and criteria for acceptable completion are identified.
2.	Plan process to complete activity	2.1	Based on instructions as to objectives, performance requirements and specifications, the individual components of the activity are identified and prioritised.
3.	Modify plan	3.1	Plan if necessary may be modified to overcome unforeseen difficulties or developments that occur as work progresses.

RANGE STATEMENT

Instructions may include timeframe, quality requirements, outcome requirements and performance requirements. Instructions carried out in accordance with established procedures. However, the activities may require a response and modification of procedures or choice of different procedures to deal with unforeseen developments.

The activity may require prioritising of the individual components to facilitate the meeting of the objectives. Examples of activities to be planned may include: fault diagnosis and repair of an item of equipment, a modification of an established sequence of assembly tasks.

Activities are normally performed by the individual undertaking the planned activity and associated reports are completed as required. Instructions refer to either formal or informal information about the task required.

Planning will be related to familiar work tasks and environments and be performed to standard operating procedures.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- quality systems in a workplace
- typical loss and damage control systems
- environmental standard framework and environmental licence provisions
- work planning processes
- OH&S regulations/requirements
- equipment, material and personal safety requirements processes at the worksite
- enterprise quality systems and processes
- operations environmental procedures and key constraints
- operations environment control measures
- research and interpretative skills
- plain English literacy and communication techniques
- technical literacy and communication skills
- basic problem solving skills

Skills
The ability to:

- to locate, interpret and apply relevant operational quality and environmental information
- question and actively listen, for example when obtaining information of quality and environmental working practices
- communication in plain English skills in relation to dealing with others involved in the work
- to interpret and apply common industry terminology, and interpret symbols used for quality and environmental signage
- to assess quality and environmental issues
- to plan a complete activity

EVIDENCE GUIDE

Competency is to be demonstrated by individuals planning a complete activity in accordance with the performance criteria and as related to the work environment.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with other units addressing the safety, quality, communication, materials handling recording and reporting associated with hand forging or other units requiring the exercise of skills and knowledge covered by this unit.

During assessment the individual will:

- take responsibility for the quality of their own work
- carry out instructions in accordance with established procedures
- plan a complete task in accordance with standard principles
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit should be assessed on the job. 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.

MEMCOR0042A: Interpret standard specifications and manuals

Competency Descriptor: This unit deals with the skills and knowledge required to effectively interpret quality specifications and manuals to achieve required objectives/guidelines and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Identify and access all documentation	1.1	Documentation covering all of the tiers of quality within the company/industry are identified and used.
2.	Interpret documentation	2.1	Quality specification for specific processes and related systems are interpreted.
		2.2	The company quality improvement system related to the formal documentation are understood and used according to standard operating procedures.
3.	Explain documentation	3.1	Documentation relating to quality control/assurance is explained to appropriate personnel.
		3.2	Instructions based on documentation are given to appropriate personnel.
4.	Monitor quality processes/systems	4.1	Quality improvement systems are monitored and maintained.

RANGE STATEMENT

This standard covers a wide range of processes/systems and enterprises. It covers the interpretation of all of the tiers of quality documentation from the national factory act through to manuals, procedures and work instructions.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- design theory and its application to the workplace
- common engineering terminology and maintenance safety requirements
- relevant OH&S regulations/requirements
- equipment, material and personal safety requirements
- engineering drawing procedures and interpretative techniques
- literacy and communication techniques
- technical literacy and communication skills
- basic problem solving skills

Skills
The ability to:

- to locate, interpret and apply relevant operational quality and environmental information
- question and actively listen, for example when obtaining information of quality and environmental working practices
- communication in relation to dealing with others involved in the work
- to interpret and apply common industry terminology, and interpret symbols used for quality and environmental signage
- to assess quality and environmental issues
- to interpret quality specifications and manuals

EVIDENCE GUIDE

Competency is to be demonstrated by individual interpreting quality specifications and manuals in accordance with the performance criteria and as related to the work environment.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the supervision and maintenance of the application of quality procedures or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- take responsibility for the quality of their own work
- Interpret quality specifications and manuals to achieve required objectives
- perform interpretation accurately
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities

(3) Context of Assessment

This unit should be assessed on the job. 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.

MEMCOR0052A: Operate in an autonomous team environment

Competency Descriptor: This unit deals with the skills and knowledge required to effectively operate in an autonomous team environment to achieve required objectives and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Determine work roles of team members	1.1	Team role and scope are determined and understood using standard operating procedure.
		1.2	Role of self and team members are understood and where appropriate clarified by all team participants.
2.	Participate in team planning	2.1	Appropriate methods are used to plan team activity or a number of related team activities.
		2.2	Planning activity is undertaken on an individual or shared basis, incorporating individual's technical skills, knowledge and competence.
		2.3	Effective and appropriate contributions are made to the total planning process.
3.	Operate as team member	3.1	Effective and appropriate forms of communication are used to liaise with team members.
		3.2	Contributed to the determination of time lines, quality standards and production requirements for the team.
		3.3	Real or perceived issues are resolved by effective and appropriate contributions from team member.
		3.4	Effective and appropriate contributions are made by team member to achieve team objectives, based on member's own technical skills, knowledge and competence.
4.	Monitor and review team performance	4.1	Participated effectively in the planning and development of team review process.
		4.2	Appropriate data is collected on an individual and team basis using standard operating procedure.

		4.3 Data collected, is analysed and used by team and individual team members to evaluate team performance and determine future strategies.
5.	Implement team performance improvements	5.1 Performance improvement processes appropriate to team activities are implemented on a collective and individual basis using standard operating procedure.

RANGE STATEMENT

This unit applies the skills necessary for effective participation by an individual in an autonomous team environment. Team parameters, constraints and objectives are determined by sources external to the team. Where as a result of team discussions or planning, team parameters require adjustment, then appropriate authorisation and approvals are established using standard operating procedures. Individual team participants would be already competent with technical aspects of team activities.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- operation work procedures
- group dynamics and the impact of working effectively with others on individual and group performance
- enterprise work systems, equipment, management and facility operating systems
- enterprise policies and procedures and standard requirements in regard to workplace ethics
- basic analytical, problem solving, negotiation and conflict management techniques in relation to working with others
- plain English and communication techniques

Skills
The ability to:

- communicate in relation to reading and understanding workplace documents
- do basic analytical, problem solving, negotiation and conflict management tasks in relation to working with others

EVIDENCE GUIDE

Competency is to be demonstrated by

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with working in an autonomous team environment or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- take responsibility for the quality of their own work
- operate in an autonomous team environment to achieve required objectives
- demonstrate safe working practices at all times
- communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- plan tasks in all situations and review task requirements as appropriate
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit should be assessed on the job. 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. The individual would already be competent with the technical aspects of team activities.

MEMCOR0122B: Write technical reports (basic)

Competency Descriptor: This unit applies to the skills and knowledge necessary to write reports effectively in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Communication

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Apply grammar and usage	1.1	Knowledge of the types and functions of sentences are demonstrated.
		1.2	Different kinds of phrases are identified.
		1.3	Sentences are constructed using different subordinates clauses.
		1.4	Sentences are constructed showing correct use of agreement between subject and verb.
		1.5	Sentences are constructed showing agreement between pronouns and the antecedents.
		1.6	The correct forms of verbs are identified and appropriately used.
		1.7	Different tenses are identified and appropriately used.
		1.8	Knowledge of the correct use of adjectives is demonstrated.
		1.9	Sentences are constructed showing verbs in their active and passive voice.
		1.10	Sentences faults are identified and corrected.
2.	Apply mechanics vocabulary and spelling	2.1	Knowledge of rules governing the use of capitalization, punctuation and abbreviation is demonstrated.
		2.2	Punctuation marks are used correctly in written exercises.
		2.3	Abbreviations are identified and used as related to skill area.

		2.4	Words are spelt and their meanings interpreted through context clues and industry standards.
3.	Write technical Reports	3.1	Reports are written using appropriate terminology/relevant jargons where required.
		3.2	Reports are written using paragraph development techniques.
		3.3	Reports are coherent, adequately developed and based on an analysis or research undertaken.
		3.4	Main points are identified and expanded in report.
		3.5	Conclusions are based on the facts and recommendations are made if required.
		3.6	Reports are completed within specified time.
		3.7	References are acknowledged as required.

RANGE STATEMENT

Report is used to denote any required written communication that goes beyond a simple recording of facts (such as completion of a pro forma shift production schedule) to include level of analysis and/or research.

Reports may be of a technical nature and should be based on the writer having technical knowledge.

Conclusions and/or recommendations where required are based on research or analysis of data

Reports include graphs, charts, tables, etc. as required.

The analysis and conclusions should be consistent with the level of skill and knowledge of an employee working at that level. Simple analysis and work would be required.

Grammar and usage may include:

- types and functions of sentences
- phrases and their functions
- subordinate clauses (adverbial adjectival, noun)
- subject and verb (focus on compound subjects, indefinite pronoun as subject collective noun as subject)
- pronouns and their antecedents
- verbs – action, linking, regular, irregular
- tenses- present, past, future, present perfect, past perfect, future perfect
- adjectives and adverbs
- sentence faults – fragments and run-on

Mechanics, vocabulary and spelling may include:

- rules governing the use of capitalization, punctuation and abbreviation
- punctuation marks: end marks, commas, semi-colon and colon, quotation marks, dashes and parentheses, hyphen, apostrophes
- Abbreviations – symbols, measurements, time, number
- Spelling of words and interpretation of their meanings through context clues and word analysis, prefixes, suffixes, root (focus on words used in skill area)

Communication skills may include:

- good listening skills
- effective listening skills (eliciting feedback, developing objectivity, learning to empathize
- kinds of communication barriers
- clear logical reasoning
- identification and evaluation of propaganda techniques
- formal report/speech

Writing skills may include:

- methods of paragraph development – chronological, order of importance, spatial order, comparison or contrast
- paragraphs with: topic sentences and supporting sentences, unity and coherence,
- linking expressions and connectives,
- sentence length and structure
- different types of reports

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- grammar and usage
- mechanics, vocabulary and spelling
- writing styles (technical or non-technical)
- communication skills
- information systems
- reports including graphs, charts, tables

Skills
The ability to:

- communicate concepts in writing
- identify main points
- expand main points
- write technical and non-technical reports

EVIDENCE GUIDE

Competency is to be demonstrated by the effective use of report writing skills in accordance with the range listed in the range of variables statement, relevant to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units applicable to the individual's work.

During assessment the individual will:

- demonstrate the ability to write technical reports
- demonstrate effective writing style
- demonstrate the ability to identify main points
- demonstrate the ability to expand main points
- communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment
- use accepted technical communication techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination both.

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.

MEMCOR0152A: Use graphical techniques and perform simple statistical computations (basic)

Competency Descriptor: This unit deals with the skills and knowledge required to use statistics to aid in making decisions, drawing conclusion and making reports and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Reads and constructs graphs from given or determined data	1.1	Complex information is extracted from graphical representation
		1.2	Data is analysed with respect to emerging trends
		1.3	Graphs are constructed as required from data and drawn with respect to scale and accepted method
		1.4	Significant features of graphical representation are understood such as limit lines, gradients (straight line graphs), intercepts, maximum and minimum values
		1.5	Constructs a wide variety of graphs as required including histograms, control charts, straight line graphs and parabolic graphs
2.	Performs basic statistical calculations	2.1	Calculates mean, median and mode from given data
		2.2	Calculates standard deviation and understands the significance of 1, 2 and 3 sigma limits

RANGE STATEMENT

Graphs and charts may be applied to information from various work contexts, quality processes, production and market trends and other engineering applications. A range of devices may be used to assist with calculations. Given relevant data the individual should be able to use statistics to aid in making decisions, drawing conclusion and making reports.

Activities may include but not limited to:

- using graphical methods to organise data (straight line graph, bar chart, pie chart)
- reading and interpreting graphic data
- determining quantities from graphical information
- developing data collection instrument for statistical analysis
- compiling and tallying scare from raw data collected
- formatting raw data into statistical information using tables

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- numbers and basic arithmetic operations
- drawings and specifications
- graphical methods
- graphic data
- data collection instruments for statistical analysis
- basic statistics (charts, tables scales and graphs)
- compiling and tallying score from raw data
- formatting raw data into statistical into statistical information using tables
- data relative to the metal engineering and maintenance trade processes
- applications relevant to engineering skills trades e.g. pressure, volume, temperature, mass efficiency circuit computations, perimeters and areas etc

Skills
The ability to:

- read and interpret drawings
- measure and calculate manually
  use graphical methods to organise data (straight line graph, bar chart, pie chart)
  read and interpreting graphic data
  determin quantities from graphical information
  develop data collection instrument for statistical analysis
  compile and tally scare from raw data collected
- format raw data into statistical information using tables
- interpret measurements and calculations
- relate to and or perform calculations on related applications
- communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated by individual performing computations in accordance with the performance criteria and as related to the work environment.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the computations being performed or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- take responsibility for the quality of their own work
- perform computations in accordance with standard principles
- perform computations accurately
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMCAC0012A: Perform technical computations - general

Competency Descriptor: This unit deals with the skills and knowledge required to perform related computations and effectively carry out measurements of work to required tolerance, and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Calculations and Computations

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Apply the fundamentals of general mathematics	1.1	Concepts of whole numbers are understood and calculations are performed involving practical applications.
		1.2	Concepts of common fractions are understood and calculations are performed involving practical applications.
		1.3	Concepts of decimal fractions are understood are understood and calculations are performed involving practical applications.
		1.4	Concepts of percentages are understood are understood and calculations are performed involving practical applications.
		1.5	Concepts of graphs: bar and line are understood are understood and calculations are performed involving practical applications.
2.	Apply the fundamentals of measurements	2.1	Concepts of precision, accuracy and tolerance are understood and calculations are performed involving practical applications.
		2.2	Concepts of measurement units are understood and calculations are performed involving practical applications.
		2.3	Application of steel rules and vernier callipers are understood and calculations are performed involving practical applications.

		2.4	Applications of micrometers are understood and calculations are performed involving practical applications.
		2.5	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.
3.	Apply the fundamentals of algebra	3.1	Concepts of algebra operations are understood and calculations are performed involving practical applications.
		3.2	Concepts of simple equations are understood and calculations are performed involving practical applications.
		3.3	Concepts of ratio and proportion are understood and calculations are performed involving practical applications.
		3.4	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.
4.	Apply the fundamentals of plane geometry	4.1	Concepts of plane geometry are understood and calculations are performed involving practical applications.
		4.2	Concepts of angular measure are understood and calculations are performed involving practical applications.
		4.3	Concepts and applications of triangles are understood and calculations are performed involving practical applications.
		4.4	Concepts and applications of polygons are understood and calculations are performed involving practical applications.
		4.5	Concepts and applications of circles are understood and calculations are performed involving practical applications.
		4.6	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.
5.	Apply the fundamentals of trigonometry	5.1	Concepts of trigonometric functions are understood and calculations are performed involving practical applications.
		5.2	Concepts of trigonometric functions with right angles are understood and calculations are performed involving practical applications.
		5.3	Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.

6.	Use the principles of computed measure to solve problems	6.1 Concepts of computed measure are understood and computations are performed involving the calculation of areas of common polygons using practical applications.
		6.2 Concepts of computed measure are understood and computations are performed involving the calculation of areas of circles, sectors, segments and ellipses using practical applications.
		6.3 Concepts of computed measure are understood and computations are performed involving the calculation of prisms and cylinders volumes, surface areas and weights using practical applications.
		6.4 Numerical answers are provided with appropriate units to a degree of accuracy commensurate with related application.

RANGE STATEMENT

Calculations may be performed using pen and paper or on a calculator. All problems should have appropriate applications depending on the workplace. Interpretation of charts and graphs would usually extend to simple histograms, control charts, pie charts, line graphs etc. Data may be generated from readings taken or computer generated. Applications can include computation of pressure, volume, temperature, heat, speed, density, mass, force, efficiency etc.

Fundamentals of general mathematics may include:

- combined operations with whole numbers in practical applications
- word problem solving with practical applications
- use of common fractions in practical applications
- combined operations of common fractions in practical applications
- computing with calculator
- finding percent in practical applications
- reading combined data line graphs
- drawing line graphs (broken, straight and curved)
- combined operations of decimal fractions in practical operations

Steel rules, vernier callipers and micrometer applications may include:

- measurements that do not fall on rule graduations
- reading decimal-inch measurements on steel rule
- reading metric measurements on steel rule
- reading measurements on an English vernier calliper
- reading measurements on an metric vernier calliper
- reading measurements on an English micrometers
- reading measurements on an metric micrometers

Fundamentals of trigonometry may include:

- introduction to trigonometric functions
- ratio of right triangle sides
- determining angles of given functions and functions of given angles
- trigonometric functions with right triangles
- variation of functions
- functions of complementary angles
- determining unknown for angles
- trigonometric functions – ratio method

Areas for discussion may include but not limited to:

- fraction, decimals and percentages
- costing and pricing
- ratio and proportion
- measurement
- performing algebraic operation
- statistics
- geometry
- trigonometry

Fundamentals of plane geometry may include but not limited to:

- axioms and postulates
- points and lines
- angular geometry principles
- triangles
- isosceles and equilateral triangles practical applications
- Pythagorean theorem practical applications
- polygons and quadrilaterals
- polygon interior and exterior angles practical application
- trapezoid median practical application

Computed measure may include:

- area of common polygons (rectangles, parallelograms, trapezoids and triangles)
- areas of circles, sectors, segments and ellipses
- prisms and cylinders (volumes, surface areas and weights)
- computing altitudes and bases of prisms and cylinders
- surface areas of right prisms and cylinders

Fundamentals of algebra may include:

- evaluation of algebraic expression
- signed numbers
- combined operations of signed numbers
- basic algebraic operations
- solution of equation by principle of equality
- writing equations from word situations

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- numbers and basic arithmetic operations
- drawings and specifications
- basic operations in simple geometry,
- algebra
- costing and pricing
- ratio and proportion
- basic statistics (charts, tables scales and graphs)
- interpretation of measurement and calculations
- trigonometry
- computed measure
- plane geometry
- statistics
- mathematical applications to the metal engineering and maintenance trade processes
- applications relevant to engineering skills trades e.g. pressure, volume, temperature, mass efficiency circuit computations, perimeters and areas etc.

Skills
The ability to:

- read and interpret mathematical ideas
- measure and calculate manually
- interpret measurements and calculations
- relate to and or perform calculations on related applications
- apply the fundamentals of general mathematics
- apply the fundamentals of measurements
- apply the fundamentals of algebra
- apply the fundamentals of plane geometry
- apply the fundamentals of trigonometry
- use the principles of computed measure to solve problems
- use accepted engineering techniques, practices, processes and workplace procedures communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated by individual performing computations in accordance with the performance criteria and as related to the work environment.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the computations being performed or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- take responsibility for the quality of their own work
- perform computations in accordance with standard principles
- perform computations accurately
- apply the fundamentals of general mathematics
- apply the fundamentals of measurements
- apply the fundamentals of algebra
- apply the fundamentals of plane geometry
- apply the fundamentals of trigonometry
- use the principles of computed measure to solve problems
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities.

Evidence of competence may be obtained through a variety of methods including:

- observation
- written questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of installation activities to which applicant has contributed, or worked on
- training courses in general math
- examples of authenticated assessments and/or assignments from formal education courses self assessment reports

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. An individual working alone should demonstrate the competencies covered by this unit or as part of a team. The assessment environment should not disadvantage the candidate.

MEMCOM0012A: Apply language and communication skills (I)

Competency Descriptor: This unit applies to the attitudes, skills and knowledge necessary to write reports effectively in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Communication

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA	
1. Apply grammar and usage	1.1	Knowledge of the types and functions of sentences are demonstrated.
	1.2	Different kinds of phrases are identified.
	1.3	Sentences are constructed using different subordinates clauses.
	1.4	Sentences are constructed showing correct use of agreement between subject and verb.
	1.5	Sentences are constructed showing agreement between pronouns and the antecedents.
	1.6	The correct forms of verbs are identified and appropriately used.
	1.7	Different tenses are identified and appropriately used.
	1.8	Knowledge of the correct use of adjectives is demonstrated.
	1.9	Sentences are constructed showing verbs in their active and passive voice.
	1.10	Sentences faults are identified and corrected.
2. Apply mechanics vocabulary and spelling	2.1	Knowledge of rules governing the use of capitalization, punctuation and abbreviation is demonstrated.
	2.2	Punctuation marks are used correctly in written exercises.
	2.3	Abbreviations are identified and used as related to skill area.
	2.4	Words are spelt and their meanings interpreted through context clues and industry standards.

3.	Communicate concepts in writing	3.1	Concepts are written using appropriate terminology/industry jargon where required.
		3.2	Concepts are written using paragraph development techniques.
		3.3	Concepts are coherent, adequately developed and based on any analysis or research undertaken.
		3.4	Main points identified and expanded.
		3.5	Conclusions are based on the facts and recommendations are made if required.
		3.6	Activities are completed within specified time.
		3.7	References are acknowledged as required.
4.	Communicate effectively	4.1	Identified and discuss the importance of good listening skills in communication.
		4.2	Different kinds of communication barriers are identified and discussed.
		4.3	Principles of effective communication are outlined.
		4.4	Clear and logical reasoning is practiced.
		4.5	Formal reports and speech are presented.
		4.6	Interviews are presented with emphasis on communication skills.
		4.7	Presentations are made using technical representations.
5.	Use information systems	5.1	Multi-media centres are used for communication.
		5.2	Computers are used in information storage and retrieval to perform communication activities.
		5.3	Information systems are used to access and communicate information.

RANGE STATEMENT

Report is used to denote any required written communication that goes beyond a simple recording of facts (such as completion of a pro forma shift production schedule) to include level of analysis and/or research.

Reports may be of a technical nature and it should be based on the writer having technical knowledge.

Conclusions and/or recommendations where required are based on research or analysis of data

Reports include graphs, charts, tables, etc. as required.

The analysis and conclusions should be consistent with the level of skill and knowledge of an employee working at that level. Simple analysis and work would be required.

Grammar and usage may include:

- types and functions of sentences
- phrases and their functions
- subordinate clauses (adverbial adjectival, noun)
- subject and verb (focus on compound subjects, indefinite pronoun as subject collective noun as subject)
- pronouns and their antecedents
- verbs – action, linking, regular, irregular
- tenses- present, past, future, present perfect, past perfect, future perfect
- adjectives and adverbs
- sentence faults – fragments and run-on

Mechanics, vocabulary and spelling may include:

- rules governing the use of capitalization, punctuation and abbreviation
- punctuation marks: end marks, commas, semi-colon and colon, quotation marks, dashes and parentheses, hyphen, apostrophes
- Abbreviations: symbols, measurements, time, number
- spelling words and interpretation of their meanings through context clues and word analysis, prefixes, suffixes, root (focus on words used in skill area)

Communication skills may include:

- good listening skills
- effective listening skills (eliciting feedback, developing objectivity, learning to empathize
- kinds of communication barriers
- clear logical reasoning
- identification and evaluation of propaganda techniques
- formal report/speech

Writing skills may include:

- methods of paragraph development – chronological, order of importance, spatial order, comparison or contrast
- paragraphs with – topic sentences and supporting sentences, unity and coherence,
- linking expressions and connectives,
- sentence length and structure
- different types of reports

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- grammar and usage
- types and function of sentences
- forms of different kinds of verbs
- kinds and functions of phrases and clauses
- parts of sentences
- sentence construction
- types of paragraph
- methods of paragraph development
- mechanics, vocabulary and spelling
- writing styles (technical or non-technical)
- business letters, job related reports and summarizing information
- communication skills
- information systems

Skills
The ability to:

- communicate concepts in writing
- identify main points
- expand main points
- apply language and communication skills in the workplace

EVIDENCE GUIDE

Competency is to be demonstrated by the effective use of communication skills in accordance with the range listed in the range of variables statement, relevant to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units applicable to the individual's work.

During assessment the individual will:

- demonstrate the ability to apply language and communication skills
- demonstrate effective writing style
- demonstrate the ability to identify main points
- demonstrate the ability to expand main points
- communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment
- use accepted engineering communication techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- present evidence of credit for any off-job training related to this unit

Assessor must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.

All tasks involved must be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination both.

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.

MEMINS0182A: Install valves, regulators and metering devices

Competency Descriptor: This unit deals with the skills and knowledge required to effectively install valves regulators and metering devices associated with refrigeration, plumbing and air conditioning systems or other related area in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA	
1. Plan and prepare for installation	1.1	Installation is planned and prepared to ensure OH&S policies and procedures are followed.
	1.2	The work is appropriately sequenced in accordance with requirements.
	1.3	Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
	1.4	Pipework are checked against job requirements.
	1.5	Pipework are obtained in accordance with established procedures and to comply with requirements.
	1.6	Location in which valves, regulators or metering devices are to be installed is determined from job requirements.
	1.7	Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.
	1.8	Tools, equipment and testing devices needed to carry out the installation work are obtained in accordance with established procedures.
	1.8	Tools, equipment and testing devices are checked for correct operation and safety.
	1.9	Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements.

2.	Install valves, regulators and metering devices	2.1	OH&S policies and procedures for installing pipework are followed.
		2.2	Valves, regulators or metering devices are installed in accordance with requirements, without causing damage or distortion to the surrounding environment or services.
		2.3	Pipework are terminated and connected in accordance with requirements.
		2.4	Unplanned events or conditions are responded to in accordance with established procedures.
.		2.5	Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented.
		2.6	On-going checks of the quality of the work are undertaken in accordance with established procedures.
		2.7	Work is completed within acceptable time.
3.	Test system	3.1	Correct testing procedures are used
4.	Clean up area	4.1	All waste material is removed and dispose of.
		4.2	Area related to work activities is cleaned.
		4.3	Tools and equipment are cleaned, maintained and stored.
5.	Inspect and notify completion of work	5.1	Final inspections are undertaken to ensure the installed valves, regulators and metering devices conforms to requirements.
		5.2	Work completion is notified in accordance with established procedures.

RANGE STATEMENT

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation.

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in standards, regulations, procedures, technology and the like related to the scope and application of this unit

Source of information:

- Working drawings/sketches
- Oral/written work instructions

Locations/conditions:

- trenches
- confined spaces
- elevated positions
- hot cold
- damp and wet situations

Plumbing systems:

- hot and cold water
- chemicals
- steam
- compressed air
- hydrants - fire lines

Devices:

- Valves
- Regulators and metering devices for hot and cold water
- Chemicals steam
- Compressed air

Tools and equipment to include:

- hand and power hack saws
- pipe dies
- pipe threading machine
- pipe wrenches
- pipe cutters
- wenches
- screwdrivers
- masonry trowel
- shovels
- cold chisels
- hammers
- soldering and brazing equipment
- pickaxes
- hand drills
- pipe reamers
- swaging tools
- files
- flaring tool
- tube cutters

Materials and supplies:

- range of pipes/tubing and fittings – steel
- copper
- iron
- plastic
- brass alloys up to 100mm

Valves, regulatory and metering devices:

- gate valves
- globe valve
- check valves
- ball valves
- float valves
- butterfly
- saunders valve
- pressure relief
- safety valve
- pressure gauges

Safety:

- personal and public safety
- machine power and hand tool safety

Appropriate personnel:

- apprentices
- supervisor

Work processes:

- reading and interpreting drawings and other relevant information
- determining and organizing job requirements
- identifying and selecting tools and equipment
- preparing pipe ends for installation
- installing valve, regulators and metering devices to pipe-work installations
- install testing devices

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- safety and work procedures:
- standards of quality
- installation tools and equipment
- installation techniques
- valves regulatory and metering devices
- use and selection of appropriate tools, materials and supplies

Skills
The ability to:

- handle ladders
- identify potential workplace hazards; preventative measures
- work with hand and power tools
- read and interpret sketches drawings manuals etc.
- measure accurately
- communicate effectively
- install valves, regulators and metering devices appropriately
- test system to ensure valves are functional and being installed properly

EVIDENCE GUIDE

This Evidence guide is intended to include components defined within the Range statement

(1) Critical Aspects of Evidence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit in the related category and specialisation which is to be exhibited across a representative range of applications; autonomously and to requirements.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace for each of the categories and areas of specialisation undertaken from those listed in the Range statement or Evidence guide.
- demonstrating an understanding of the underpinning knowledge and skills identified for the categories and related specialisation undertaken in the section, of this unit titled 'Underpinning knowledge'.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to install valves regulators and metering devices
- communicate information about tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- plan tasks in all situations and review task requirements as appropriate
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor.
- identify supervisors/colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities

(3) Context of Assessment

Competency shall be assessed on the job, off the job or a combination of both in accordance with workplace procedures

MEMMRD0262A: Maintain and repair domestic and commercial air conditioning systems and components

Competency Descriptor: This unit applies to the skills and knowledge necessary to maintain and repair domestic and commercial air conditioning and refrigeration systems and components in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Undertake preventive maintenance checks/adjustment on systems and components	1.1 The temperature, quality, properties and flow of air delivered by the air conditioning/refrigeration system are checked for conformance to specification.
	1.2 The noise/vibration levels of the air conditioning system components are checked for conformance to specification.
	1.3 Preventative maintenance tasks are performed according to manufacturer's specifications using refrigeration and air conditioning principles and techniques.
2. Undertake fault finding on systems and components	2.1 System components are identified correctly.
	2.2 The characteristics and operation of each component understood.
	2.3 The operational function of each component is inspected and tested.
	2.4 Correct operation of each component assessed against system specification.
3. Repair/replace faulty components	3.1 Faulty components are localised and malfunction confirmed by inspection and testing using air conditioning principles, procedures and safety requirements.
	3.2 The refrigerant is removed safely from the system and contained in accordance with standard operating procedures and regulatory requirements where appropriate.
	3.3 Faulty components are dismantled and repaired to manufacturer's specifications as required.
	3.4 Replacement parts selected from manufacturer's catalogues according to required specifications.

4.	Return to service system and components	4.1	Components are reassembled and tested for correct operation and assessed against specification.
		4.2	The system is charged with correct refrigerant safely in accordance with standard operating procedures and regulatory requirements where appropriate.
		4.3	Using air conditioning principles, correct operation of the equipment is verified.
		4.4	Maintenance records/service reports completed by appropriate designated means.
5.	Clean up	5.1	Materials/supplies/equipment are stacked /stored for re-use or disposal.
		5.2	Work area is cleared.
		5.3	Tools and equipment are cleaned and stored in a cool place.
		5.4	Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements and company's operating procedures.

RANGE STATEMENT

This unit applies maintenance and repair of domestic and commercial air conditioning and refrigeration systems and components, which may include:

- heating systems
- direct expansion refrigeration systems
- simple air distribution systems
- typically used for comfort air conditioning.

Work is carried out autonomously or in a team environment and includes:

- interpreting drawings and diagrams of commercial air conditioning systems.
- utilising fault-finding procedures
- service manifolds
- test equipment to identify and diagnose faults in systems to isolate faulty components and rectify common faults return to service
- test systems, and complete service reports

Maintenance of system and components may include:

- company equipment and materials
- routine servicing of compressors
- routine servicing of condensers
- routine servicing of coolers/evaporators
- routine servicing of cooling towers
- routine servicing of dampers
- routine servicing of drives
- routine servicing of fans
- routine servicing of filters
- routine servicing of humidifiers and dehumidifiers
- routine servicing of pumps

Repairs of system and components may include:

- repairing and rectifying faults in system
- routine repairing of compressors
- removing and replacing of condensers
- routine repairing of coolers/evaporators
- routine repairing of cooling towers
- routine servicing of dampers
- routine repairing of drives
- routine repairing of fans
- removing and replacing of filters
- routine repairing of humidifiers and dehumidifiers
- routine repairing of pumps

Work may also include retrofitting existing commercial air conditioning systems with alternative refrigerants and reconditioning components and using a range of test and measuring instruments.

Types of compressors may include:

- positive displacement
- reciprocating (open-type, semi-hermetic, hermetic),
- rotary (rolling piston, rotating blades)
- helical (screw)
- kinetic
- centrifugal

Tools/equipment may including

- soldering equipment
- hand tools
- drills – hand held portable electric
- brushes
- thermometers
- hygrometers
- micrometers
- callipers
- multimeters

Types of condensers may include:

- air-cooled
- evaporative
- liquid-cooled (double pipe, open vertical shell-and-tube
- horizontal shell-and-tube shell-and-coil)

Types of coolers may include:

- shell-and-tube
- shell-and-coil
- direct expansion
- flooded-type
- tube-in-tube
- baudelot

Type of valves may include:

- automatic expansion valve
- thermostatic expansion valve
- capillary tube
- high side float
- low side float
- check valve
- solenoid valve

Types of fans may include:

- propeller
- centrifugal
- bower
- forward-curved
- backward-inclined
- axial type

Types of cooling towers may include:

- atmospheric
- forced
- induced-draft

Types of dampers may include:

- automatic
- fire
- relief
- splitter and hand

Types of filters may include:

- cell type where the filtering medium is thrown away
- cell type where the medium is cleaned cell by cell and reused,
- continuous-cleaning type, electrostatic filter

Types of humidifiers:

- central station spray
- spray heads at outlets of supply air duct
- devices for breaking water into fine particles
- steam spray
- water pans with steam coil or electric heater

System parameters may include:

- pressure
- flow
- temperature
- vibration
- noise
- system noise
- electrical current
- filter condition

Tests/checks may include:

- pressure
- pressure/temperature relationship
- chemical

Nature of fault may include:

Refrigeration:

- including low suction pressure
- high suction pressure
- high head pressure
- low head pressure
- improper load on evaporator
- poor load distribution
- plugged distributor or coil circuits
- restricted or plugged liquid line, undersized refrigerant lines, clogged condenser
- defective condenser fan or drive
- air in the system
- compressor burn out,
- unit location

Electrical:

- disconnect switch open
- main overloads tripped
- blown fuse
- overload cut-out burn out
- open control contacts
- loose connection or broken wire
- improper wiring
- improper control settings
- incorrect voltage
- shorted coil
- condenser fan overload
- condenser fan or blower motor burn out

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools/equipment for evacuating and dehydrating refrigeration system
- standard characteristics of basic refrigeration system components
- standard evacuating and dehydrating methods
- functions of a compressor
- types of compressors and their principle of operation
- construction of compressors
- purpose of refrigerant oil and its requirements
- functions of a condenser
- types of condensers and their principle of operation
- construction of condensers
- functions of a cooler/evaporator
- types of cooler/evaporator and their principle of operation
- construction of cooler/evaporator
- standard domestic and commercial air conditioning and refrigeration systems and components
- standard operational test for domestic and commercial air conditioning and refrigeration systems and components
- refrigeration system components
- techniques in maintaining domestic and commercial air conditioning and refrigeration systems and components
- techniques in repairing domestic and commercial air conditioning and refrigeration systems and components
- manufacturers standard specification
- standard application/refrigeration system
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select correct equipment/tools
- apply quality assurance
- perform evacuating and dehydrating of refrigeration system
- carry out maintenance of system components
- repair and rectify faults
- maintain domestic and commercial air conditioning and refrigeration systems and components
- repair domestic and commercial air conditioning and refrigeration systems and components

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively maintain and repair domestic and commercial air conditioning and refrigeration systems and components in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to set up tool and equipment to maintain and repair domestic and commercial air conditioning and refrigeration systems and components
- demonstrate correct procedures in maintaining domestic and commercial air conditioning and refrigeration systems and components
- demonstrate correct procedures in repairing domestic and commercial air conditioning and refrigeration systems and components
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0272A: Maintain and repair industrial refrigeration systems and components

Competency Descriptor: This unit applies to the skills and knowledge necessary to maintain and repair industrial refrigeration systems and components in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Undertake preventive maintenance checks/adjustment on industrial refrigeration systems and components	1.1 The temperature and properties of the controlled medium/s is checked for conformance to specification.
	1.2 The noise/vibration levels of the industrial refrigeration system components are checked for conformance to specification.
	1.3 Preventative maintenance tasks and plant room safety equipment checks are performed according to manufacturers' specifications using refrigeration principles techniques/practices.
2. Undertake fault finding on industrial refrigeration systems and components	2.1 System components identified correctly.
	2.2 The characteristics and operation of each component is understood.
	2.3 The operational function of each component is inspected and tested.
	2.4 Correct operation of each component assessed against specification.
3. Repair/replace faulty industrial refrigeration components	3.1 Faulty components are localised and malfunction confirmed by inspection and testing using industrial confirmed by inspection and testing using industrial requirements.
	3.2 The refrigerant is removed safely from the system and contained in accordance with standard operating procedures and regulatory requirements where appropriate.

		3.3	Faulty components are dismantled and repaired to manufacturers' specifications as required.
		3.4	Replacements parts selected from manufacturers catalogues according to required specifications.
4.	Return to service industrial refrigeration system and components	4.1	Components are reassembled and tested for correct
		4.2	The system is charged with correct refrigerant safely in accordance with standard operating procedures and regulatory requirements where appropriate.
		4.3	Using industrial refrigeration principles and system application techniques correct operation of the equipment is verified.
		4.4	Maintenance records/service reports completed by appropriate designated means.
5.	Clean up	5.1	Materials/supplies/equipment are stacked /stored for re-use or disposal.
		5.2	Work area is cleared.
		5.3	Tools and equipment are cleaned and stored in a cool place.
		5.4	Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements and company's operating procedures.

RANGE STATEMENT

The unit applies to the maintenance and repair of industrial refrigeration systems that may include large capacity (ammonia) plant typically used for product/process temperature/environment control.

Work is carried out autonomously or in a team environment, and includes:

- interpreting drawings and diagrams of industrial refrigeration systems
- utilising fault finding procedures
- service manifolds and test equipment to identify and diagnose faults in systems
- isolate faulty components
- rectify faults
- return to service
- test the systems and complete service reports.

The work may also include retrofitting existing industrial refrigeration systems and reconditioning components.

Maintenance of system and components may include:

- routine servicing of refrigeration systems
- routine servicing of rooftop units
- routine servicing of room air conditioners
- routine of self-contained units
- routine servicing of mini-splits
- routine servicing of commercial split systems

Work activities may include but not limited to:

- clean all coils
- clean condensate drains and check for easy run off
- clean filters
- check for noise or excessive vibration on unit
- check for refrigerant leaks
- repair refrigerant leaks
- check liquid line filters
- check sight glass
- check and clean motor starter contacts
- check thermostats
- record motor voltages
- tighten electrical connections
- check fan blades
- check compressor terminals
- check circuit boards

Refrigeration system problems may include but not limited to:

Refrigeration/Electrical:

- motor compressor assembly
- will not run, no hum
- will not run, hums, cycles on overload
- starts and runs, cycles on overload cut-out
- starts and runs after several attempts
- starts, cuts out on main overload protection
- runs but noisy
- start relay
- contacts do not open
- contacts will not close
- burns out
- start capacitor
- burns out
- capacitor tests OK, no effects
- run capacitor
- burns out
- tests OK, no effect
- fan motor
- will not run
- will not run, burns, cuts out on overload
- runs, cycles on overload
- relay or contactor
- will not pull in, no hum
- will not pull in, hums

Refrigeration/Mechanical:

- entire system
- will not run
- runs but for short cycles
- runs continuously
- is noisy
- evaporator temperature too high
- evaporator temperature too low
- suction line sweats heavily or ices up
- liquid line extremely hot
- liquid line sweats or frosts
- occasionally operates on OFF cycle

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools/equipment for evacuating and dehydrating refrigeration system
- standard characteristics of basic refrigeration system components
- standard evacuating and dehydrating methods
- standard refrigeration system components
- standard operational test for refrigeration system
- refrigeration system problems
- techniques in maintaining industrial refrigeration systems and components
- techniques in repairing industrial refrigeration systems and components
- manufacturers standard specification
- standard application/ refrigeration system
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select correct equipment/tools
- apply quality assurance
- perform evacuating and dehydrating of refrigeration system
- maintain industrial refrigeration systems and components
- repair industrial refrigeration systems and components

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively maintain and repair industrial refrigeration systems and components in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to set up tool and equipment to maintain and repair industrial refrigeration systems and components
- demonstrate correct procedures in maintaining industrial refrigeration systems and components
- demonstrate correct procedures in repairing industrial refrigeration systems and components
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0592A: Test, evacuate and charge refrigeration systems

Competency Descriptor: This unit deals with the skills and knowledge required to effectively test evacuate and charge refrigeration systems and applies to all individuals working in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Assess refrigeration system operation	1.1 Basic refrigeration system operating principles and terminology are understood.
	1.2 All relevant information is obtained and correctly interpreted prior to the commencement of work on the refrigeration system.
	1.3 Refrigeration system checks are undertaken safely in accordance with standard operating procedures.
	1.4 Pressures and temperatures are correctly determined and recorded.
	1.5 The refrigeration system is checked for current operating condition.
2. Test system and components	2.1 Equipment selected for use is appropriate for the testing method to be applied
	2.2 Equipment selected for use is appropriate for the type of refrigerant in the system
	2.3 Connections between the testing apparatus and the system are correctly located, sound and leak proof.
	2.4 The appropriate test is conducted on both sides of the equipment/compressor
	2.5 All leaks are correctly detected and their sources correctly identified
3. Evacuate and charge system	3.1 Equipment selected for use is appropriate for the evacuation method to be applied
	3.2 Equipment selected for use is appropriate for the charging method to be applied

	3.3	Connections between the testing apparatus and the system are correctly located, sound and leak proof.
	3.4	The refrigeration system is evacuated in accordance with standard operating procedures, codes and regulations.
	3.5	The refrigeration system is charged in accordance with standard operating procedures, codes and regulations.
	3.6	Measurements taken during the process are carefully analysed and recorded as required.
	3.7	The refrigerant evacuated from the refrigeration system is contained/disposed of in accordance with the relevant codes and regulations.
4. Clean up	4.1	Materials/supplies/equipment are stacked /stored for re-use or disposal.
	4.2	Work area is cleared.
	4.3	Tools and equipment are cleaned and stored in a cool place.
	4.4	Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements, industry standards and company's operating procedures.

RANGE STATEMENT

Work is undertaken under supervision or in a team environment using predetermined standards of safety, quality and workshop procedures.

Refrigeration systems may be associated with refrigeration and air conditioning applications including commercial, industrial and transport.

All work is to be undertaken in accordance with all relevant standard and regulatory requirements. Refrigerants include CFCs, HFCs, ammonia, etc.

Methods may include:

- vacuum pump
- Triple vacuum method
- Deep vacuum method

Tools and equipment may include:

- vacuum pump
- high vacuum gauge
- recovery machine
- moisture indicator
- recovery/recycling machine
- pressure gauges

Working activities may include:

- connect manifold and gauges
- testing system
- evacuate system to desired micron reading
- perform standing vacuum
- charging system

Test methods may include:

- leak testing with soap solutions
- leak testing with halide torch
- leak testing with litmus paper

Purging/evacuating method may include:

- deep vacuum
- triple evacuation method

Charging tools:

- charging cylinder
- digital scales
- vacuum pump
- vacuum indicator
- compound gauge
- amprobe
- mobile vacuum and charging station

Charging method:

- weight the charge in
- volume charging
- charging using a sight glass
- charging using a charging chart
- using a frost line

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools/equipment for evacuating and dehydrating refrigeration system
- basic tools/equipment for testing refrigeration system
- basic tools/equipment for charging refrigeration system
- standard characteristics of basic refrigeration system components
- standard testing, evacuating and charging methods
- standard refrigeration system components
- standard operational test for refrigeration system
- manufacturers standard specification
- standard application/ refrigeration system
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select correct equipment/tools
- apply quality assurance
- perform testing of refrigeration system
- perform evacuating and dehydrating of refrigeration system
- perform charging of refrigeration system

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively evacuating and dehydrating refrigeration system in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to set up tool and equipment to evacuate system
- demonstrate correct procedures in testing refrigeration system
- demonstrate correct procedures in evacuating and dehydrating refrigeration system
- demonstrate correct procedures in charging refrigeration system
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMFAB0071A: Undertake fabrication, forming, bending and shaping (basic)

Competency Descriptor: This unit deals with the skills and knowledge required to effectively undertake fabrication, forming, bending and shaping as applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Select and set up forming/shaping equipment for a specific operation	1.1	Most appropriate tools and equipment are selected.
		1.2	Equipment are correctly set up and adjusted for operation.
		1.3	Allowances for shrinkage, thickness, inside/outside measurements are correctly made.
2.	Operate forming/shaping equipment	2.1	Machine is safely started and shut down to standard operating procedure.
		2.2	Material and safety guards are correctly positioned.
		2.3	Equipment are correctly operated and adjusted.
3.	Form and shape material	3.1	Material is levelled, straightened, rolled, pressed or bent to specifications/drawings.
		3.2	Correct hot or cold-forming procedures are followed.
		3.3	Final form/shape is checked for compliance to specification and adjusted as necessary to standard operating procedure.

RANGE STATEMENT

Work may be undertaken under supervision or as part of a team. Predetermined standards of quality and safety are observed and work is carried out following standard operating procedures.

A variety of tools and equipment may be used including:

- presses
- shapers
- vices
- benders
- drop hammers

Materials may include:

- ferrous and non ferrous
- non-metalic substances

A wide range of shapes and products are formed which may include but not limited to:

- pipe-work chamfers
- cylinders
- cones
- angles
- hoppers
- ductwork
- “square to round" "transitions"
- "lobster backs"
- all forms of tubular shapes
- hand rails,
- reticulation pipe-work, mufflers etc.

Forming, shaping and bending operations may be conducted on:

- plate
- section or sheet
- tube
- pipes
- components

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S legislation and regulations
- fabrication, forming, bending and shaping technique
- fabrication, forming, bending and shaping equipment
- hand tools and equipment
- materials /consumables relative to fabrication, forming, bending and shaping procedures
- materials preparation
- manual handling
- measurement
- technical drawings, sketches and instructions

Skills
The ability to:

- work safely to instructions
- interpret related drawings and instructions
- use power tools and hand tools
- select material and equipment
- measure relative to fabrication, forming, bending and shaping processes
- communicate effectively
- fabricate, form, bend and shape efficiently

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively undertaking fabrication, forming, bending and shaping operations in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking fabrication, forming, bending and shaping processes
- demonstrate correct procedures in setting up
- demonstrate safe and effective operational use of tools, plant and equipment
- forming, bending and shaping equipment
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material and tools
- interactively communicate with others to ensure safe operations
- demonstrate effective fabrication, forming, bending and shaping technique to produce designed outcome

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the forming and shaping of fabricated components or other units requiring the exercise of the skills and knowledge covered by this unit.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. The competencies covered by this unit would be demonstrated by an individual working under supervision or as part of a team. The assessment environment should not disadvantage the candidate.

MEMMRD0041A: Remove/install standard mechanical seals

Competency Descriptor: This unit deals with skills and knowledge required to competently remove/install standard mechanical seals and applies to individuals in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Determine mechanical seal requirements	1.1	Principles of mechanical seals are understood.
		1.2	Operational function of mechanical seals and components are understood.
		1.3	For new mechanical seal installation, specifications are interpreted from engineering drawings etc.
2.	Dismantle mechanical seal installations	2.1	Mechanical seal assembly are examined and appropriate dismantling techniques, tools and equipment are selected.
		2.2	Mechanical seal assembly is dismantled using correct and appropriate engineering techniques and safe workshop procedures.
		2.3	All components and parts are examined for wear to determine need for repair or replacement.
		2.4	Where applicable, serviceable items are repaired by appropriate means.
		2.5	Primary sealing elements and secondary seals are removed for replacement where required.
3.	Select replaceable items	3.1	Replaceable items are selected using manufacturer's catalogues; spare parts lists, engineering specifications or sample.

4.	Reassemble mechanical seal installations	4.1	Mechanical seal components are fitted together including seal head, secondary seals, seat assembly shaft and housing.
		4.2	Mechanical seal assembly is tensioned and adjusted to manufacturer's specifications.
		4.3	Mechanical seal assembly is tested using appropriate methods for compliance with specifications.

RANGE STATEMENT

Work undertaken under supervision using predetermined standards of quality, safety and workplace procedures.

Tasks involve the checking, installation, removal and replacement of a range of mechanical seals including carbon, stellite, neoprene and other associated materials.

Skills covered by this unit include the knowledge of appropriate applications for a range of mechanical seals and the ability to remove, select, repair or replace all component parts of the seal. All removal and installation practices to be undertaken in conformance to safe workplace practices and procedures, using correct tools and equipment.

Seal replacements selected from manufacturer's catalogues, spare parts lists or engineering specifications. Included is the fitting of mechanical seals in new installations according to specifications interpreted from engineering drawings.

Lubrication requirements attended to according to supplier's instructions and recommendations or specifications.

Mechanical seal assembly tested using appropriate methods for compliance with specifications and operational performance.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools for mechanical seals removal/installation
- standard removal/installation tasks
- standard mechanical seals
- standard operational test for mechanical seals
- standard application of mechanical seals
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select seals
- apply quality assurance
- perform removal and installation of mechanical seals

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively removing and installing mechanical seals in accordance with the range listed within the range of variables statement.

(1) Critical Aspect of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to removal and installation of mechanical seals
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in removing mechanical seals
- demonstrate correct procedures in installing mechanical seals
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0061A: Remove and replace basic pneumatic system components

Competency Descriptor: This unit deals with skills and knowledge required to competently remove and replace pneumatic system components and applies to mechanical maintenance personnel.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Check pneumatic system components	1.1 System components are identified correctly.
	1.2 The characteristics and basic operational function of each component is understood.
	1.3 The operational function of each component is inspected and tested by supervisor.
	1.4 Correct operation of each component assessed against specifications.
2. Identify, remove/replace faulty pneumatic system components	2.1 Faulty system components are identified and malfunction confirmed by supervisors report or inspection and testing.
	2.2 Faulty system components are removed and replaced to manufacturer's/site specifications.
	2.3 Replacement parts are selected from manufacturer's specifications
	2.4 System components are tested for correct operation assessed against specifications.
	2.5 Correct operation of the pneumatic system is confirmed to standard operating procedure.
	2.6 Appropriate follow up procedures are adopted according to standard operating procedure.
	2.7 Where appropriate, service reports are completed using standard operating procedures.

3.	Clean up	3.1 Materials/supplies are stacked /stored for re-use or disposal.
		3.2 Work area cleared.
		3.3 Tools and equipment are cleaned and stored in a cool place.
		3.4 Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements company's operating procedures.

RANGE STATEMENT

Work undertaken under supervision using predetermined standards of safety, quality and work procedures.

Pneumatic system components identified, inspected and assessed using fluid power principles to predetermined specifications interpreted from data sheets and maintenance diagrams.

Removal and replacements to site or manufacturers specifications.

Pneumatic system components may include high pressure seals, linear, rotary actuators, directional control valves, proportional valves, timers, counters, sensors, pneumatic motors, pressure control valves, lines, hoses and other associated equipment.

Location/condition may include:

- workshops
- plants
- in the field
- confined spaces
- elevated positions
- damp and wet situations

Protective clothing may include:

- safety boots
- safety helmet
- welding helmet
- coverall
- leggings
- gloves

Hand tools may include but not limited to:

- hacksaws
- hammers
- punches
- screwdrivers
- sockets
- wrenches
- scrapers
- chisels
- gouges
- files of all cross-sectional shapes and types

Applications may include hand tools used for

- adjusting,
- dismantling
- assembling
- finishing
- cutting
- scraping
- cleaning,
- lubricating,
- tightening
- simple tool repairs
- hand sharpening
- adjustments

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools for removal/replacing pneumatic system components
- standard characteristics of basic pneumatic system components
- standard removal/replacing tasks
- standard pneumatic system components
- standard operational test for pneumatic systems
- manufacturers standard specification
- standard application/operation of pneumatic system components
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select seals
- apply quality assurance
- perform removal and replacement of pneumatic system components

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively removing and replacing pneumatic system components in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to removal and replacement of pneumatic system components
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in removing pneumatic system components
- demonstrate correct procedures in installing pneumatic system components
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0071A: Remove and replace basic hydraulic system components

Competency Descriptor: This unit deals with the skills and knowledge required to effectively maintain hydraulic system components and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Identify and check hydraulic system components	1.1	System components are identified correctly.
		1.2	The characteristics and basic operational function of each system component are understood.
		1.3	The operational function of each component is inspected and tested by supervisor.
2.	Remove and replace faulty hydraulic system components	2.1	Faulty system components are identified and malfunction confirmed by supervisors report or inspection and testing.
		2.2	Faulty system components are removed and replaced to manufacturer's/site specifications.
		2.3	Replacement parts are selected from manufacturer's catalogues according to required specifications.
		2.4	System components are reassembled and tested for correct operation and assessment against specifications.
		2.5	Correct operation of the hydraulic system is confirmed to designated operating procedure.
		2.6	Appropriate follow up procedures are adopted according to standard operating procedure.
		2.7	Where appropriate, service reports are completed using standard operating procedures.
3.	Clean up	3.1	Materials/supplies are stacked /stored for re-use or disposal.
		3.2	Work area is cleared.

3.3 Tools and equipment are cleaned and stored in a cool place.

3.4 Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements and company's operating procedures.

RANGE STATEMENT

Work undertaken under supervision using predetermined standards of safety, quality and work procedures.

Hydraulic system components identified, inspected and assessed using fluid power principles to predetermined specifications interpreted from data sheets and maintenance diagrams.

Removal and replacements carried out to site or manufacturer's specifications.

Hydraulic system components may include high pressure seals, linear, rotary actuators, directional control valves, proportional valves, timers, counters, sensors, pumps, pressure control valves, lines, hoses and other associated components.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools for removal/replacing hydraulic system components
- standard characteristics of basic hydraulic system components
- standard removal/replacing tasks
- standard hydraulic system components
- standard operational test for hydraulic systems
- manufacturers standard specification
- standard application/operation of pneumatic system components
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select seals
- apply quality assurance
- perform removal and replacement of pneumatic system components

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively removing and replacing hydraulic system components in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to removal and replacement of hydraulic system components
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in removing hydraulic system components
- demonstrate correct procedures in replacing hydraulic system components
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMPO0021A: Perform general machining operations

Competency Descriptor: This unit deals with the skills and knowledge required to effectively perform general machining operations as applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Determine job requirements	1.1	Job specification requirements are determined from job sheets and/or instructions.
		1.2	Appropriate method/machine/tools are selected to meet specifications
		1.3	Parts and material are obtained and checked
		1.4	Work area is prepared
		1.5	Machine is loaded and adjusted appropriately for operation consistent with standard operating procedures.
2.	Follow sequence of operations	2.1	Sequence of operations are followed including job set up for maximum efficiency and to meet job specifications
		2.2	Machine operating instructions are followed (start-up, normal close down, emergency close down, operating sequence)
		2.3	Appropriate material is selected and datum established a required
3.	Select and mount tools	3.1	Appropriate tools for the job is selected, sharpened and shaped as required
		3.2	Tools are mounted and positioned correctly
4.	Perform machining operations	4.1	Basic marking out techniques is used where required
		4.2	Machining parameters are set for job requirements and maximum tool life

		4.3	Work is held or correctly clamped without damage to product.
		4.4	Machining is performed in a safe manner utilising all guards, safety procedures and personal protective clothing and equipment
5.	Measure components	5.1	Components are checked with appropriate instruments or gauges to ensure compliance with specifications
6	Adjust and maintain machine	6.1	Routine maintenance and adjustments are carried out as required which may include slide and collar adjustment, cleaning and lubrication.
7.	Clean up	7.1	Materials are stacked/stored for re-use or disposed of.
		7.2	Work area is cleared.
		7.3	Tools and equipment are cleaned, maintained and stored.

RANGE STATEMENT

Machining is undertaken on one or more of a range of standard machine tools.

Work is undertaken under supervision to predetermined specifications and standards of quality and safety.

Machines may include lathes, mills, planers, shapers, drills, slotters, surface grinders, etc.

Materials may include standard ferrous and non-ferrous materials.

Operations and set up carried out on those machines are straightforward and may include parallel cutting, slotting, planing, drilling, knurling, cutting flats, non-precision surface grinding operations etc.

Surface grinding operations covered by this unit are those requiring magnetic chucks and grinding of flat surfaces.

Machining parameters include speeds, feeds, stops, coolant and cutting lubricants etc.

Source of information:

- appropriate job specification
- oral information/instructions
- Written and diagrammatic
- process sheets
- job cards
- operation sheets
- drawings
- specifications
- schedules

Safe working practices and

- Safety equipment
- protective clothing
- job instruction
- company/statutory regulations
- health and safety instruction

Work environment:

- workshop situations
- plant locations

Instruments:

- measuring tapes
- steel ruler
- vernier callipers
- feeler gauges
- slip gauges
- internal, external, depth and height instruments
- range of micrometer instruments

Working hold devices Including:

- jigs/fixtures
- vices
- chuck/collets
- mounting direct to table,
- automatic or manual operation

Hand tools and equipment to include:

- laying out tools
- hacksaws
- range of machining files
- vices
- wire brushes
- try- squares
- bench and pedestal grinders,
- taps
- dies
- stud extractors
- drifts
- spanners, screwdrivers
- hammers
- mallets
- pliers
- tongue wrenches
- hand drills
- punches
- allen keys
- pipe wrenches
- centre punches, scribes, chisels, centre gauges
- measuring (verniers, callipers, drill bits)
- bench and pedestal grinders
- conventional milling machine
- conventional metal turning lathes

Activities may include:

- Preparing to undertake machining operation
- Carrying out benchwork fitting operations
- Cut and shape material to finished size using hand tools
- Sharpen hand tools using off hand grinding machine
- Using common machine setting tools
- Milling Materials/Components On Horizontal Milling Machines
- Setting up Metal Lathe Machines
- Turning Metal Materials/Components on Capstan,Centre or Turret Lathe

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S guidelines and regulations
- materials (ferrous and non-ferrous) bench, pedestal and surface grinders conventional milling machine
- conventional metal turning lathes
- general machining processes operations or activities
- hand tools, measuring instruments and equipment
- materials relative to cutting processes
- materials preparation
- manual handling
- engineering measurement
- related calculations
- drawings, sketches and instructions

Skills
The ability to:

- work safely to instructions
- interpret relative drawings and instructions
- use common engineering power tools and hand tools
- use standard engineering measuring instruments
- select/prepare material
- measure relative to machining processes
- perform calculations relative to machining process
- communicate effectively
- use accepted engineering techniques, practices, processes and workplace procedures
- perform general machining operations

EVIDENCE GUIDE

Competency is to be demonstrated safely and effectively when performing general machining operations in accordance with the range listed within the range of variables statement

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to performing general machining operations and during the machining process
- demonstrate safe and effective operational use of measuring instruments, tools, plant and equipment
- demonstrate correct procedures in using milling machinery
- demonstrate the correct procedures in using metal turning machinery
- demonstrate the ability to shape materials/components on milling machines
- demonstrate the ability to turn and shape materials/components on metal turning lathes
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material
- interactively communicate with others to ensure safe operations
- demonstrate effective machining to produce designed cut/shape material

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the machining of materials or other units requiring the exercise of the skills and knowledge covered by this unit.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMMPO0011A: Perform daily operational maintenance of machines/equipment

Competency Descriptor: This unit deals with skills and knowledge required to competently perform daily operational maintenance of machines/equipment and applies to and applies to individuals in the industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Undertake programmed safety and maintenance checks	1.1	Checks are undertaken safely and to prescribed procedure.
		1.2	Status/report are recorded on check sheet or reported orally.
2.	Undertake programmed maintenance	2.1	Removal/replacement of consumable and components are undertaken to prescribed procedure and instructions are followed.
		2.2	Fluids and lubricants are replaced and/or topped up to prescribed schedule.

RANGE STATEMENT

Work undertaken under supervision or in a team environment to predetermined specifications.

Machines/equipment range includes manuals, semi-automatic and automatic machines of a stand-alone continuous production or process nature.

Consumable replacements include air filter, oil wipers, grease containers, tool tips, indicator globes, fluids and lubricants, guides and limit switch actuators.

Adjustments are of a limited nature and include safety guards, stops, wear pads and tool holders, nipping up of glands and adjustment of scrapers and aprons etc.

Hand tools may include but not limited to:

- hacksaws
- hammers
- punches
- screwdrivers
- sockets
- wrenches
- scrapers
- chisels
- gouges
- wood planes
- files of all cross-sectional shapes and types

Applications may include hand tools used for

- adjusting
- dismantling
- assembling
- finishing
- cutting
- scraping
- cleaning
- lubricating
- tightening
- simple tool repairs
- hand sharpening
- adjustments

Location/condition may include:

- workshops
- plants
- in the field
- confined spaces
- elevated positions
- damp and wet situations

Protective clothing may include:

- safety boots
- safety helmet
- welding helmet
- coverall
- leggings
- gloves

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic measuring devices
- standard machines/equipment range
- standard consumable replacements
- standard machine/equipment adjustments
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use power tools and hand tools
- use measuring devices
- adjust measurements
- handle materials
- select material
- apply quality assurance
- perform operational maintenance of machines/equipment

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively performing routine operational maintenance of machines/equipment in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to performing routine operational maintenance of machines/equipment
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in performing programmed maintenance checks
- demonstrate correct procedures in starting and stopping machines/equipment
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMPO0081A: Use workshop machines for basic operations

Competency Descriptor: This unit deals with the skills and knowledge required to effectively use workshop machines for basic operations and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Determine job requirements	1.1	Job requirements are interpreted.
		1.2	Appropriate machine is selected to meet requirements.
2.	Set up machine	2.1	Tools are selected where appropriate.
		2.2	Cutting tools are sharpened as required.
		2.3	Tools are correctly installed using standard operating procedures.
		2.4	Appropriate guards are set and adjusted as required.
3.	Operate machine	3.1	Material to be machined is positioned and secured
		3.2	Machine is operated appropriately to suit job and material requirements.
4.	Check finished component	4.1	Machined component are checked against requirements and predetermined finish.

RANGE STATEMENT

Work undertaken under supervision or in a team environment using predetermined standards of quality, safety and workshop procedures. This unit covers basic machining in a maintenance or jobbing environment. The machines include but are not limited to lathe, radial arm drill, etc., and covers the sharpening of tools as required.

Instruments:

- tapes
- ruler
- vernier
- callipers
- feeler gauges
- slip gauges
- range of micrometer instruments

Working hold devices including:

- jigs/fixtures
- vices
- chuck/collets
- mounting direct to table,
- automatic or manual operation

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S regulations
- metal properties and classification
- common machine setting/holding tools
- metal lathe machines (capstan, center or turret)
- basic machining techniques
- setting basic metal machines
- machining processes
- hand tools and equipment
- materials preparation
- manual handling and lifting
- measurement
- drawings, sketches and instructions

Skills
The ability to:

- work safely to instructions
- communicate effectively
- interpret related drawings and instructions
- use basic machining equipment
- identify/select material/equipment
- identify/select machining processes
- handle material, tools and equipment
- measure relative to machining processes
- identify/select materials suitable for machining processes
- prepare materials relative to the machining process
- perform basic machining processes efficiently

EVIDENCE GUIDE

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the manual metal arc welding all process or other competencies requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to perform basic machining processes efficiently
- communicate information about tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- plan tasks in all situations and review task requirements as appropriate
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMFAB0141A: Develop geometric shapes – (basic)

Competency Descriptor: This unit deals with the skills and knowledge required to effectively develop basic geometric shapes and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Transfer dimensions from a sketch or simple drawing to work piece	1.1	Specifications and work requirements are identified and understood using correct and appropriate calculations.
		1.2	Development is carried out to specifications or standard operating procedures using appropriate tools and equipment.
		1.3	Datum points are correctly established.
2.	Make templates as required	2.1	Appropriate template material is chosen.
		2.2	Templates are produced to specification.
		2.3	Correct storage procedures are followed including labelling and identification to standard operating procedures.
3.	Develop patterns as required	3.1	Parallel line, radial line and triangulation development methods are chosen and applied.
		3.2	Allowances for fabrication and assembly are correctly transferred.
4.	Identify relevant codes, standards and symbols	4.1	Relevant standards/codes and symbols are identified.
		4.2	Requirements of standards/codes are applied to materials and processes.
5.	Collect quantities of materials from storage area	5.1	Materials are correctly identified.
		5.2	Quantities are estimated from sketches and simple drawings.

5.3 Material wastage is minimised.

RANGE STATEMENT

This unit applies to marking out of general fabrications using geometric development. Work is undertaken under supervision using predetermined standards of quality, safety and workshop procedures.

The task may be performed in the workshop or site. Marking out is undertaken using appropriate tools and equipment, and templates and patterns are produced as required.

Marking out covers but not limited to:

- engineering components
- jigs and fixtures
- castings
- templates
- dies and tooling

Equipment may include but not limited to:

- marking out tables
- surface tables
- rotary tables
- dividing heads etc.
- vee blocks
- cylinder squares
- sine bars and the like
- vernier height gauges
- protractors
- straight edge
- set squares
- marking out tools

Sketches or simple drawings may include:

- circles
- regular polygons with four, seven and eight sides
- pentagon inscribed within measured circle
- ellipse
- triangles with specified angles
- arcs thru three points; tangent to two circles

Relevant codes/standards and symbols may include:

- object line
- hidden line
- centre line
- section line
- dimension
- extension line
- cutting line
- short break line
- phantom line

Patterns and templates made from:

- wood
- paper (firm)
- plastics

Measurement systems:

- inch/foot system
- metric(SI) system

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- tools
- drawing interpretation
- basic numeracy
- marking off/out techniques
- materials relevant to the engineering process
- basic operations in simple geometry measurement and calculations
- basic development processes

Skills
The ability to:

- work safely to instructions
- use marking out tools and equipment
- handle materials
- select tools/equipment
- select material
- transfer measurements apply quality assurance
- read and interpret drawings and specifications
- measure and calculate manually
- record measurement

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively by marking out of general fabrications using geometric development in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the fabrication process or other competencies requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to develop basic geometric shapes relative to the fabrication process
- communicate information about fabrication processes, being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all related tasks in accordance with standard operating procedures
- perform tasks efficiently and to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

Competency shall be assessed on the job, off the job or a combination of both in accordance with workplace procedures.

MEMFAB0061A: Perform manual heating and thermal cutting

Competency Descriptor: This unit deals with the skills and knowledge required to effectively perform manual heating and thermal cutting and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Assemble/disassemble plant, equipment for manual heating and thermal cutting	1.1 Appropriate cutting process and/or procedure for material are selected.
	1.2 Accessories and equipment correctly selected and assembled.
2. Operate heating and thermal cutting equipment	2.1 All safety procedures observed.
	2.2 Equipment start up procedures followed correctly to standard operating procedures.
	2.3 Equipment adjustments made correctly using standard operating procedures.
	2.4 Appropriate cutting allowances made.
	2.5 Material used in the most economical way.
	2.6 Defects recognised and corrective action taken to standard operating procedures.
	2.7 Material heated and cut to specification shape/size/length to accepted workplace standards.

RANGE STATEMENT

Work is undertaken under supervision or as part of a team. Predetermined standards of quality and safety are observed and work is carried out following standard operating procedures.

- Manual, straight line cutting standards observed.
- Manual or automatic processes used to cut and heat to specifications

Cutting may include flame gouging by hand. All work carried out to standard and regulatory requirements.

Cutting may be applied to material of various thicknesses and types including ferrous, non-ferrous and non-metallic materials by a variety of methods which may include fuel gas oxy fuel gas and air fuel gas.

Cutting may include use of hand held and self-propelled straight line cutters.

Heating may be applied to material of various thicknesses and types including ferrous, non-ferrous and non-metallic materials by a variety of methods which may include fuel gas, oxy fuel gas and air fuel gas.

Preparation of materials would be minimal and may include but not limited to:

- preheating
- setting up jigs,
- setting up fixtures
- setting up clamps

Materials welded may include:

low carbon steel
cast iron

Setting up may include the correct connection of:

- hoses
- blowpipes
- regulators
- settings of gas mixtures

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S legislation and regulations
- heating medium/technique
- heating/cutting processes
- oxy-fuel equipment identification, transportation and storage
- hand tools and heating/cutting equipment
- materials/consumables relative to oxy-fuel heating and thermal cutting procedures
- materials preparation
- manual handling
- measurement
- drawings, sketches and instructions

Skills
The ability to:

- work safely to instructions
- communicate effectively
- interpret relative drawings and instructions
- use power tools and hand tools
- set up heating cutting equipment
- use heating cutting equipment
- identify/select material
- identify/select heating/cutting processes
- measure relative to heating and thermal cutting processes
- heat/cut efficiently

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively performing routine manual heating and thermal cutting in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to setting up equipment and during the heating and cutting process
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in setting up and shutting down equipment
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material
- interactively communicate with others to ensure safe operations
- demonstrate effective heating and thermal cutting techniques to produce designed outcome

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with manual heating and thermal cutting or other units requiring the exercise of the skills and knowledge covered by this unit.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMFAB0121A: Perform basic welding using oxyacetylene welding process (OAW) - fuel gas welding

Competency Descriptor: This unit deals with the skills and knowledge required to effectively perform basic welding using oxyacetylene welding (OAW) and applies to individuals working in the metal engineering and maintenance

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Prepare materials for welding	1.1 Weld requirements are identified from specifications and/or drawings.
	1.2 Material is correctly prepared using appropriate tools and techniques.
	1.3 Materials are assembled/aligned to specifications where required.
2. Assemble and set up welding equipment	2.1 Welding equipment is assembled and set up safely and correctly in accordance with standard operating procedures.
	2.2 Test runs are undertaken and verified in accordance with specifications.
3. Select welding equipment, settings and consumables	3.1 Welding settings and consumables are selected against job requirements, welding procedures, specifications and/or technical drawings.
4. Identify distortion prevention measures	4.1 Distortion prevention measures are identified.
	4.2 Appropriate action is taken to minimise and rectify distortion.
5. Weld joints to standard or equivalent	5.1 Welds are deposited correctly in flat and vertical position to specifications and industry standard (or equivalent).
	5.2 Correct action is undertaken to minimise distortion.
	5.3 Joints are cleaned to specifications using correct and appropriate tools and techniques.

6.	Inspect welds.	6.1	Weld joints are visually inspected against specifications.
		6.2	Weld defects are identified.
7.	Correct faults	7.1	Remedial action taken as required.
		7.2	Correct remedial action taken and appropriate techniques and tools used.

RANGE STATEMENT

Oxyacetylene welding (OAW) would be carried out using a range of material for heavy or light fabrication. The person would work under supervision or within a team environment using predetermined standards of quality, safety, work and welding procedures and the skills applied to a range of fabrication activities. Weld quality must meet required industry standards or equivalent outcomes.

Preparation of materials would include preheating, setting up of jigs, fixtures, clamps etc.
Remedial action using thermal processes may include oxyacetylene and arc air equipment. Grinding devices may also be used.

Setting up may include:

- the correct connection of hoses,
- blowpipes,
- regulators etc. and correct settings of gas mixtures

Work activities:

- measuring
- marking
- grinding
- lifting
- welding
- cutting
- aligning
- shaping
- filing
- general machining

Location/condition:

- workshop
- plant
- fieldwork at ground level
- elevated positions
- dry
- humid and wet conditions
- construction environment
- agricultural environment
- food processing environment

Specification:

- welding procedure
- weld profile regular in width
- even/regular ripple formation
- uniform in appearance
- free from excessive undulations
- smooth stop/starts, tack incorporated
- adequate penetration
- no excess undercut
- no craters

Types of welding:

- fillet weld
- lap weld
- butt weld
- single and multi-run

Welding position:

- flat
- vertical
- horizontal
- overhead

Materials:

- low carbon steel (mild steel) up to 10 gauge
- low carbon steel plate up to 5mm
- steel and galvanised pipes up to 50mm

Appropriate assembly of heating equipment may include:

- cylinders
- connections
- hoses
- tips
- nozzles

Heating medium and appropriate consumables can include:

- oxyacetylene
- fuel gas
- fluxes (resin or powder)
- all types of silver solder and brazing rods

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S guidelines and regulations
- metal properties and classification
- heating medium/techniques
- welding techniques
- welding processes
- oxy-fuel equipment identification, transportation and storage
- hand tools and equipment
- materials /consumables relative to oxyacetylene welding procedures
- materials preparation
- manual handling and lifting
- measurement
- drawings, sketches and instructions

Skills
The ability to:

- work safely to instructions
- communicate effectively
- interpret related drawings and instructions
- use oxyacetylene welding equipment
- identify/select material
- identify/select welding processes
- handle material, tools and equipment
- measure relative to welding soldering processes
- identify/select materials relative to the welding process
- prepare materials relative to the welding process
- weld using oxyacetylene process efficiently

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively weld using oxyacetylene welding (fuel gas welding) in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the oxyacetylene welding process or other competencies requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to identify/select materials relative to the oxyacetylene welding process
- communicate information about oxyacetylene welding processes, being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all related tasks in accordance with standard operating procedures
- perform oxyacetylene welding tasks efficiently and to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMFAB0111A: Perform basic welding using manual metal arc welding process (MMAW)

Competency Descriptor: This unit deals with the skills and knowledge required to effectively perform welding using basic manual arc welding processes and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Prepare materials for welding	1.1 Weld requirements are identified from specifications and/or drawings.
	1.2 Material is correctly prepared using appropriate tools and techniques.
	1.3 Materials are assembled/aligned to specification where required.
2. Select welding machine settings and electrodes	2.1 Welding machine and electrodes are identified against pre determined welding procedures and specifications and/or technical drawings.
3. Assemble and set up welding equipment	3.1 Welding equipment is assembled and set up safely and correctly in accordance with standard operating procedures.
	3.2 Test runs undertaken and verified in accordance with specifications.
4. Identify distortion prevention measures	4.1 Distortion prevention measures are identified.
	4.2 Appropriate action taken to minimise and rectify distortion.
5. Weld materials by correct process to quality described in General Purpose or equivalent	5.1 Welds are deposited correctly in flat, horizontal and vertical can position and to specifications.
	5.2 Distortion, preventative action taken where required.
	5.3 Joints are cleaned to specifications using correct and appropriate tools and techniques.

6.	Inspect welds	6.1	Weld joints are visually inspected against specifications.
		6.2	Weld defects are identified.
7.	Correct faults	7.1	Defects are removed with minimum loss of sound metal using correct and appropriate techniques and tools.

RANGE STATEMENT

Manual metal arc welding (MMAW) would be carried out using a range of material for heavy or light fabrication.

Hand tools to include:

- chipping hammer
- ball pein hammer
- wire brushes
- measuring tape
- steel rule
- files
- cold chisels
- tin snips
- centre punch
- scriber
- pliers
- adjustable wrenches
- allen keys
- vice grips
- slip joint pliers
- vice grip clamp
- divider
- compass
- screwdrivers

Protective clothing and equipment:

- safety boots
- coverall
- goggles
- dust mask
- safety helmet
- leggings
- welding helmet

Work activities may include:

- measuring
- marking
- cutting
- filing
- levelling
- hammering
- squaring
- straightening metal

Preparation of materials may include:

- preheating
- setting up of jigs
- fixtures
- clamps etc.

Materials used may include carbon steel Material:

- low carbon steel plate up to 10 gauge
- low carbon steel plate up to 7mm
- steel and galvanised pipes up to 50mm

Joint preparation:

- lap joints
- vee joints
- butt joints
- tee joints

Location/condition:

- workshops
- plants
- in the field
- confined spaces
- elevated positions
- damp and wet situations

Welding type may include:

- fillet weld
- lap weld
- butt weld

Welding position may include:

- flat
- vertical up and down horizontal

Weld procedures may include

- amperage setting
- earthing
- electrode flux condition etc.

Condition for satisfactory weld:

- pre-heating
- arc strike/travel/length
- electrode angle
- arc dynamic/electrical stability

Machine attachments:

- welding leads
- grounding clamp
- electrode holder

Welding machines:

- AC and DC arc welding plant - electrical and portable engine driven

The person would work under supervision or within a team environment using predetermined standards of quality, safety, work and welding procedures and the skills applied to a range of fabrication activities.

Remedial action using thermal processes may include oxyacetylene and air arc equipment.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S legislation and regulations
- metal classification
- welding technique
- welding processes
- manual welding equipment identification, transportation and storage
- hand tools and equipment
- materials /consumables relative to perform routine manual arc and/or gas metal arc welding
- manual handling and lifting
- measurement
- drawings, sketches and instructions

Skills
The ability to:

- work safely to instructions
- communicate effectively
- interpret related drawings and instructions
- use power tools and hand tools
- identify/select material
- identify/select welding processes
- handle material, tools and equipment
- measure relative to welding processes
- identify/select materials relative to manual arc and/or gas metal arc welding
- perform manual arc and/or gas metal arc welding

EVIDENCE GUIDE

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the manual metal arc welding all process or other competencies requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to perform manual arc and/or gas metal arc welding in the flat, horizontal and vertical position and to specifications
- demonstrate correct procedures in setting up and shutting down manual arc welding equipment
- communicate information about tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMINS0011A: Install, terminate and connect electrical wiring

Competency Descriptor: This unit deals with the skills and knowledge required to install, terminate and connect electrical wiring applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Prepare for electrical wiring installation, termination and connection	1.1 All work is undertaken safely and to workplace procedures and standard requirements.
	1.2 Materials are checked for correct specifications.
	1.3 Preparation of work is undertaken or checked/inspected for correct location and specifications eg: cable trays, brackets, trenches etc.
2. Install electrical wiring	2.1 Installations are made to specifications, manufacturer's requirements and to safety and industry regulations.
	2.2 All conduit and wiring are fixed to specifications.
	2.3 All cables, wires, conductors and installations are marked/tagged and labelled to specification.
	2.4 All completed installations are tested for compliance.
	2.5 All reports, documentation are completed correctly to required specifications.
3. Connect electrical wiring	3.1 Terminations/connections are made to specifications manufacturers' requirements and to safety and industry requirements.
	3.2 All brackets, clamps, holders etc. are adjusted and fixed to specifications.
	3.3 All cables, wires, conductors and connections etc. are marked/tagged and labelled to specification.
	3.4 All completed wiring and connections are tested for compliance with specifications.
	3.5 All reports and documentation are completed correctly to required specifications.

RANGE STATEMENT

This unit applies to installing, joining terminating and connecting electrical wiring. Work generally undertaken as part of team or under supervision. Work is to be undertaken in accordance with relevant regulations and/or legislation. .

Termination and connection includes the utilisation of a range of methods including:

- clamping
- pin connection
- soldered joints
- crimping
- plugs sockets
- clamping of cables and wires, sealing entry points where required

Installation may include but not limited to:

- surface mount
- flush mount
- in PVC conduits up to 32mm
- in metal not exceeding 25mm
- using mechanical connectors

All testing undertaken on completed circuits using appropriate methods include but not limited to:

- continuity and resistance checks
- insulation test
- polarity test
- specifications obtained from electrical/electronic circuit drawings and data sheets

Electrical services include but not limited to:

- power supplies
- control, wiring
- 0 - 220V ac/dc

Types of joint may include:

- twist joints
- straight twist joints
- tee twist joints
- tee joints
- married joints
- straining point joints
- mechanical joints

Tools and equipment to include:

- combination pliers
- long nose pliers
- side cutting pliers
- solder ions
- crimping tools

Connection of wiring includes but is not limited to:

- termination and connection of cords
- termination and connection of cables
- excluding specialist cables, of all types, sizes and materials

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- safety and work procedures
- industry standards JS21
- standards of quality
- installation tools and equipment
- materials used in installation
- connection of wiring
- bonding methods
- types of joints
- termination and connection methods
- installation methods

Skills
The ability to:

- work safely to instructions
- select and use appropriate tools and equipment
- use soldering tools and equipment
- handle materials
- select material and supplies
- join electrical wiring
- terminate electrical wiring
- apply quality assurance

EVIDENCE GUIDE

Competency is to be demonstrated by effectively terminating and connecting electrical wiring in accordance with the range listed in the range of variables statement, relevant to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling recording and reporting associated with the termination and connection of electrical wiring, or other units requiring the exercise of the skills and knowledge covered by this unit.

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.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to select and use appropriate tools and equipment
- demonstrate the ability to terminate and connect electrical wiring
- communicate information about tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- perform all related tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures
- any relevant codes, standards, manuals and reference materials

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication

- answer questions put by the assessor
- identify supervisors/colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

Competency shall be assessed on the job, off the job or a combination of both in accordance with workplace procedures.

MEMMRD0161A: Disconnect and reconnect fixed wired electrical machinery, appliances and fixtures

Competency Descriptor: This unit deals with skills and knowledge required to competently disconnect and reconnect fixed wired electrical machinery appliances and fixtures and applies to individuals in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA	
1. Prepare to disconnect electrical equipment	1.1	Disconnection is planned to ensure OH&S policies and procedures are followed.
	1.2	Appropriate personnel are consulted to ensure work is co-ordinated effectively with others involved in the work site.
	1.3	Electrical characteristics of electrical equipment and electrical supply are determined and recorded in accordance with established procedures.
	1.4	The point of isolation of electrical equipment to be disconnected is determined.
	1.5	Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
2. Disconnect electrical equipment	2.1	OH&S policies and procedures are followed.
	2.2	Electrical equipment is isolated in accordance with established procedures. (see range statement).
	2.3	Conductor connection sequence is recorded and labelled in accordance with established procedures.
	2.4	Electrical equipment is disconnected from fixed wiring without damage to other components.

		2.5	Disconnected conductors/cables are terminated in accordance with requirements to ensure they are safe and present no potential hazard.
3.	Prepare to reconnect electrical equipment	3.1	Reconnection is planned to ensure OH&S policies and procedures are followed.
		3.2	Appropriate personnel are consulted to ensure work is co-ordinated effectively with others involved in the work site.
.		3.3	Replacement electrical equipment is selected on the basis of rating and characteristics being the same as that of the original electrical equipment.
		3.4	Appropriate personnel are consulted in the event that appropriate replacement electrical equipment is not available.
		3.5	Original and/or replacement electrical equipment is tested to ensure it is safe to connect to the electrical supply and use.
		3.6	Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
4.	Reconnect electrical equipment	4.1	OH&S policies and procedures are followed.
		4.2	Measurements are taken to ensure circuit to which electrical equipment is to be connected remains isolated in accordance with established standards.
		4.3	The continuity of protective earthing conductor is tested to determine whether it is sufficiently low.
		4.4	The resistance between the protective earthing conductor and the neutral conductor is tested to determine whether it is sufficiently low.
		4.5	The insulation resistance of active conductors is tested to confirm that it is greater than 1MΩ.
		4.6	An appropriate qualified person is engaged to rectify any non-compliance condition revealed by the testing.

		4.7	Continuity between exposed conductive parts of the electrical equipment and the main earth or metal switchboard enclosure is confirmed.
		4.8	Electrical equipment is connected to comply with requirements.
		4.9	Connections to the electrical equipment are checked to confirm they are correct.
5.	Test the reconnected electrical equipment for safe operation	5.1	OH&S policies and procedures, and established procedures for the reinstatement of isolated circuits and electrical equipment are followed.
		5.2	Arrangements are made with appropriate personnel to test the operation of the electrical equipment.
		5.3	Operational non-conformances are identified and reported in accordance with established procedures.
		5.4	Status report(s) are completed and notified in accordance with established procedures.

RANGE STATEMENT

This unit applies to the disconnecting and reconnecting of fixed wired electrical equipment using engineering principles, tools, equipment and procedures to standard requirements.

The following aspects must be demonstrated:

- prepare to disconnect electrical equipment
- disconnect electrical equipment
- prepare to reconnect electrical equipment
- test the reconnected electrical equipment for safe operation
- provide status reports
- testing to ensure safety, including earth continuity and insulation integrity
- OH&S practice
- determining electrical characteristics of equipment
- identifying point of installation
- isolating equipment
- disconnection techniques
- selecting replacement equipment
- reconnection techniques
- applying techniques, procedures, information and resources relevant to performance

Electrical characteristics refers to:

- voltage
- current rating
- power rating
- direction of rotation
- phase sequence/polarity
- name plates information and duty

Electrical equipment refers to

- composite equipment
- pre-assembled
- control devices
- electrical heaters
- motors
- lighting

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- hazards in the (electrical) work environment: shock hazards; fire hazards; chemical hazards
- hazardous areas
- special situations
- procedures for dealing with fires associated with electrical equipment
- procedures for dealing with related situations
- basic electrical circuit(s): source; control; protection; load
- circuit diagrams: symbols; conventions; interpretations; free sketches
- circuit connections and functions: open circuit; closed circuit; short circuit
- basic electrical measurement: use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; using ohms law
- fundamental electrical concepts: effects of current; practical resistors; sources of emf; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors; magnetism
- insulation resistance measurement and requirements
- earthing principles and systems
- methods for testing insulation resistance; continuity of prospective earthing conductor; continuity between exposed conductive parts and the earthing system
- cable types and conductor termination methods and techniques: conductors solid, stranded and flexible; colour codes
- single and three phase systems and loads: number of active and live conductors required; line and phase voltage; typical loads
- general appliances: appliance identification; appliance ratings
- single and three phase induction motors: motor identification; motor ratings; direction of rotation
- single and three phase heaters: types of heaters; heater identification; heater ratings
- electrical distribution arrangement: power systems; within a premises; purpose of switchboards/distribution boards (residual current devices)
- circuit isolation and protection devices
- isolation procedures: work clearance; testing for voltage; lock-off and tagging; techniques, regulation, codes of practice and procedures
- disconnection procedures, practices and requirements
- replacement equipment
- reconnection procedures, practices and requirements

Skills
The ability to:

- work safely to instructions
- use tools and plant
- use of ladders and elevated work platforms
- ensuring equipment is safe to connect to supply
- return equipment to service

EVIDENCE GUIDE

Competency shall be demonstrated in relation to the endorsement for which competency is sought. The following critical aspects of competency shall be demonstrated:

- preparation to disconnect electrical equipment;
- disconnecting of electrical equipment;
- preparation to reconnect electrical equipment;
- reconnection of electrical equipment; and
- testing of the reconnected electrical equipment for safe operation

(1) Critical Aspects of Evidence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit across a representative range of specified electrical equipment in the scope of work and for which endorsement of competency for the specified electrical equipment is being sought; under supervision and to requirements
- To requirements means meeting all relevant safe working practices, manufacturers specifications, codes of practice, regulatory requirements and industry standards
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace for the endorsement sought and scope of work in the Range Statement
- demonstrating an understanding of the underpinning knowledge and skills identified for the scope of work undertaken in the section of this unit titled Underpinning knowledge

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.

During assessment the individual will:

- Demonstrate safe working practices at all times.
- Demonstrate the ability to disconnect and reconnect fixed wired electrical equipment.
- Communicate information about tasks being undertaken to ensure a safe and efficient working environment.
- Take responsibility for the quality of their own work.
- Perform all tasks in accordance with standard operating procedures.
- Perform all tasks to specification.
- Use accepted engineering techniques, practices, processes and workplace procedures to return equipment to service.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication,

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be demonstrated by an individual working under supervision or as part of a team.

The assessment environment should not disadvantage the candidate.

MEMMRD0181A: Attach flexible cables & plugs to electrical machinery appliances and fixtures

Competency Descriptor: This unit deals with skills and knowledge required to competently attach flexible cables & plugs to electrical equipment and fixtures and applies to individuals in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Plan and prepare to attach flexible cable(s) and plug(s)	1.1 Work is planned and prepared to ensure OH&S policies and procedures are followed, and the work is appropriately sequenced in accordance with requirements.
	1.2 Condition and ratings under which the flexible cable(s) and plug(s) is to operate is determined from requirements and in consultation with appropriate personnel followed by written instruction.
	1.3 Flexible cable(s) and plug(s) are selected to comply with standards and requirements for the condition and rating to be determined.
	1.4 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.
	1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.6 Flexible cable(s) is prepared without damage to insulation and conductors and in accordance with requirements.
2. Attach flexible cable(s) and plug(s)	2.1 OH&S policies and procedures are followed.
	2.2 Single insulated metal-framed equipment is earthed in accordance with requirements.
	2.3 The integrity of double insulated equipment is maintained in accordance with requirements.

		2.4	Conductors are connected to terminals in accordance with requirements to ensure the required polarity is effected.
3.	Test equipment for operation and safety	3.1	Appropriate tests of the cables(s) and plug(s) connected to the electrical equipment are conducted in accordance with requirements and to established procedures to ensure safe installation and operation.
4.	Provide status report(s)	4.1	Status report(s) are completed and notified in accordance with established procedures.

RANGE STATEMENT

This unit applies to the attaching of flexible cable & plugs to electrical equipment using engineering principles, tools, equipment and procedures to regulatory requirements

The following aspects must be demonstrated:

- prepare to disconnect electrical equipment
- disconnect electrical equipment
- prepare to reconnect electrical equipment
- test the reconnected electrical equipment for safe operation
- provide status reports
- testing to ensure safety, including earth continuity and insulation integrity
- OH&S practice
- determining electrical characteristics of equipment
- identifying point of installation
- isolating equipment
- disconnection techniques
- selecting replacement equipment
- reconnection techniques
- applying techniques, procedures, information and resources relevant to performance

Electrical characteristics refers to:

- voltage
- current rating
- power rating
- direction of rotation
- phase sequence/polarity
- name plates information and duty

Electrical equipment refers to

- composite equipment
- pre-assembled
- control devices
- electrical heaters
- motors
- lighting

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- hazards in the (electrical) work environment: shock hazards; fire hazards; chemical hazards
- procedures for dealing with fires associated with electrical equipment
- procedures for dealing with PCBs
- fundamental electrical concepts: current; voltage; resistance
- circuit isolation and protection devices
- isolation procedures: work clearance; testing for voltage; lock-off and tagging; techniques, regulation, codes of practice and procedures Up to 1,000Volts A.C./1,500Volts D.C.
- appliance/electrical equipment applications:
- basic principles of appliance/electrical equipment (non mathematical); appliance/electrical
- equipment identification; appliance/electrical equipment ratings;
- basic principles of operation of control equipment and protection devices; fault conditions and symptoms;
- test equipment;
- safe testing procedure, including continuity; fault types in appliances/electrical equipment; fault-finding procedures (prescriptive)
- circuit connections and functions: open circuit; closed circuit; short circuit
- basic voltage, current and resistance measurement and calculation
- insulation resistance measurement and requirements
- cable types and conductor termination methods and techniques:
- colour codes
- cable ratings Up to 1,000Volts A.C. 1,500Volts D.C. flexible cords/cables for use with single phase appliances/apparatus:
- types and loading
- service duty Up to 1,000Volts A.C. 1,500Volts D.C.
- plugs for use with single phase applications/apparatus:
- types and loading;
- IP rating
- continuity testing
- connection requirements and techniques
- safety testing

Skills
The ability to:

- work safely to instructions
- use tools and plant
- use of ladders and elevated work platforms
- ensuring equipment is safe to connect to supply
- return equipment to service
- position and fix fixtures in place
- connect wires to terminals, plugs and electrical equipment

EVIDENCE GUIDE

Competency is to be determined on evidence of having consistently performed across a representative range of specified electrical equipment for the endorsement and scope of work for which competency is being sought; autonomously and to requirements.

(1) Critical Aspects of Evidence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit across a representative range of specified electrical equipment in the scope of work and for which endorsement of competency for the specified electrical equipment is being sought; under supervision and to requirements. To requirements means meeting all relevant safe working practices, manufacturers specifications, codes of practice and regulatory requirements, Standards both Jamaican and International and OH&S Standards
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace for the endorsement sought and scope of work in the Range Statement
- demonstrating an understanding of the underpinning knowledge and skills identified for the scope of work undertaken in the section of this unit titled Underpinning knowledge

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

During assessment the individual will:

- Demonstrate safe working practices at all times
- Demonstrate the ability to attach flexible cable & plugs to electrical equipment to 1,000 Vac/1,500 Vdc
- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment
- Take responsibility for the quality of their own work
- Plan tasks in all situations and review task requirements as appropriate
- Perform all tasks in accordance with standard operating procedures
- Perform all related tasks to specification

Use accepted engineering techniques, practices, processes and workplace procedures.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be demonstrated by an individual working under supervision or as part of a team. The assessment environment should not disadvantage the candidate.

MEMASY0071A: Assemble pipes and fittings

Competency Descriptor: This unit deals with the skills and knowledge required to effectively assemble pipes and fittings and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Read and understand job sheets	1.1	Job sheets/instruction are correctly interpreted and followed.
2.	Select and use pipe cutting and assembly tools	2.1	Tools are correctly selected and used.
3.	Select and use pipes, tools and fittings assembly equipment	3.1	Assembly equipment is selected in accordance with instructions on job sheet.
		3.2	Equipment is used in a safe manner according to standard operating procedure.
4.	Assemble fabrications	4.1	Assembly is produced following correct sequence of operations
		4.2	Assemblies/fabrications/fittings are joined according to specification using appropriate techniques.
		4.3	Assembly is tested/checked for compliance with job sheet requirements using standard operating procedures.
5.	Protect assembly from damage	5.1	Assemblies/fabrications/fittings are handled and stored in a safe manner least likely to cause damage using standard operating procedures.

RANGE STATEMENT

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation.

Work processes may include but not limited to:

- identifying and selecting materials, fixtures and supplies
- identifying and selecting tools and equipment
- identifying and selecting pipes and fittings
- measuring, cutting and preparing plastic pipes for joining
- applying solvent cement weld to plastic pipes and fittings and joining pipes
- cleaning tools and work area
- preparing pipe ends for installation
- installing valves, regulators and metering devices
- positioning and installing kitchen/bath room fixtures plumbing fixtures
- soldering copper pipe fittings
- measuring and cutting steel pipes
- threading steel pipes
- joining steel/copper pipes
- welding steel/copper pipes
- brazing steel/copper pipes
- testing pipe joints
- excavating trenches
- chasing, boring and drilling concrete
- roughen-in pipe-work
- erecting and/or installing piers brackets and other supports
- flaring copper tubes

Preparation of materials would be minimal and may include but not limited to:

- preheating
- setting up jigs,
- setting up fixtures
- setting up clamps
- cleaning up material
- joint preparation

Location/condition may include but not limited to:

- workshops
- domestic complexes
- plants and commercial complexes
- in the field
- confined spaces
- elevated positions
- damp and wet situations
- on wall surfaces

Roughen-in may include but not limited to:

- kitchen fixtures
- bathroom fixtures
- laundry equipment
- specified chemical systems
- compressed air line
- specified steam line
- farming complex

Joining of pipes may be done by but not limited to:

- screwed method
- welding
- brazing
- soldering
- flanged method
- compression method
- solvent weld – (P.V.C cement)
- seaming
- bonding
- riveting

Tools and equipment may include but not limited to:

- hand and power saws
- pipe cutters
- threading machine
- pipe reamers
- pipe dies/taps
- tape measure
- jigs and fixtures
- ladders/scaffolding
- welding/brazing/soldering equipment
- masonry tools
- hammers/screwdrivers/hand tools
- hand brush
- pipe bending spring
- pipe vices/wrenches/tripod/benders

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S legislation and regulations
- assembly methods
- assemble equipment
- hand tools and equipment
- jigs, fixtures, tools and measuring equipment relative to repairing, replacing and modifying fabrications
- materials preparation
- manual handling
- measurement
- drawings, sketches and instructions
- types and use of tools

Skills
The ability to:

- work safely to instructions
- plan to undertake a routine assembly task
- interpret relative drawings and instructions
- select and use tools and fittings related to assembly process
- select pipes and fixtures for the assembly process
- measure relative to the assembly processes
- communicate effectively
- assemble pipes and fittings efficiently

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively assembly pipes and fittings in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to assembling pipes and fittings and during the process
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in assembling pipes and fittings
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material
- interactively communicate with others to ensure safe operations
- demonstrate effective skills to produce designed outcome

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the assembly of pipes and fittings or other units requiring the exercise of the skills and knowledge covered by this unit.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify supervisors/colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both. 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.

MEMINS0041A: Install & maintain piping & tubing

Competency Descriptor: This unit deals with the skills and knowledge required to effectively Install and terminate piping and tubing associated with domestic plumbing installation systems or other related area in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Plan and prepare for installation	1.1 Installation is planned and prepared to ensure OH&S policies and procedures are followed.
	1.2 The work is appropriately sequenced in accordance with requirements
	1.3 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
	1.4 Piping, and tubing is checked against job requirements.
	1.5 Piping and tubing is obtained in accordance with established procedures and to comply with requirements.
	1.6 Location in which piping and tubing is to be installed is determined from job requirements.
	1.7 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.
	1.8 Tools, equipment and testing devices needed to carry out the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.9 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements.
2. Install piping and tubing	2.1 OH&S policies and procedures for installing piping and tubing are followed.
	2.2 Piping and tubing are installed in accordance with requirements, without damage or distortion to the surrounding environment or services.

		2.3	Piping and tubing are terminated and connected in accordance with requirements.
		2.4	Unplanned events or conditions are responded to in accordance with established procedures.
.		2.5	Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented.
		2.6	On-going checks of the quality of the work are undertaken in accordance with established procedures.
3.	Test for leaks	3.1	Leaks are tested for using appropriate devices and procedures.
4.	Inspect and notify completion of work	4.1	Final inspections are undertaken to ensure the installed piping and tubing conforms to requirements.
		4.2	Work completion is notified in accordance with established procedures.

RANGE STATEMENT

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation.

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in regulations, procedures, technology and the like related to the scope and application of this unit

Use identification and application of tools for

- marking out
- measuring
- cutting
- shaping
- drilling
- brazing
- threading
- tapping
- finishing
- dismantling/assembling
- flaring
- soldering

Representative range of applications may include such things as:

- water supply
- steam
- air
- oil
- refrigeration
- other fluids
- equipment
- tools
- accessories
- components

Fabrication techniques may include but not limited to:

- marking out
- cutting
- bending
- flaring
- brazing
- drilling
- punching
- soldering
- cutting mitres
- welding

Installation techniques:

- surface mount
- in wall
- underground/overhead
- in floorings/in ceilings
-

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- safety and work procedures:
- standards of quality
- installation tools and equipment
- materials used in installation
- materials used for piping and fittings
- fabrication techniques
- installation techniques
- maintenance techniques for different materials and nature of work
- assembly/disassembly techniques
- leak detection techniques
- types of joining compounds

Skills
The ability to:

- identify potential workplace hazards; preventative measures
- work with tools and equipment
- read and interpret simple freehand sketches
- measure accurately
- communicate effectively
- install and maintain piping and tubing efficiently

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively install and maintain piping and tubing for domestic plumbing installations in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit in the related category and specialisation which is to be exhibited across a representative range of applications; under supervision and to requirements
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace for each of the categories and areas of specialisation undertaken from those listed in the Range statement or Evidence guide
- demonstrating an understanding of the underpinning knowledge and skills identified for the categories and related specialisation undertaken in the section, of this unit titled 'Underpinning knowledge'

During assessment the individual will:

- demonstrate safe working practices at all times;
- demonstrate the ability to install and maintain piping
- communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- take responsibility for the quality of their own work;
- perform all tasks in accordance with standard installation and maintenance procedures;
- perform all related tasks to specification;
- use accepted engineering techniques, practices, processes and workplace procedures.

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor.
- Identify supervisors/colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities

(3) Context of Assessment

Competency shall be assessed on the job, off the job or a combination of both on and off the job in accordance with workplace procedures

ITIC0R0011A: Carry out data entry and retrieval procedures

Competency Descriptor: This unit deals with the skills and knowledge required to operate computer to enter, manipulate and retrieve data and to access information and communicate via the Internet.

Competency Field: Information Technology and Communications - Operations

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Initiate computer system	1.1	Equipment and work environment are correctly checked for readiness to perform scheduled tasks.
		1.2	The hardware components of the computer and their functions are correctly identified.
		1.3	Equipment is powered up correctly.
		1.4	Access codes are correctly applied.
		1.5	Appropriate software is selected or loaded from the menu.
2.	Enter data	2.1	Types of data for entry correctly identified and collected.
		2.2	Input devices selected and used are appropriate for the intended operations.
		2.3	Manipulative procedures of Input device conform to established practices.
		2.4	Keyboard/mouse is operated within the designated speed and accuracy requirements.
		2.5	Computer files are correctly located or new files are created, named and saved.
		2.6	Data is accurately entered in the appropriate files using specified procedure and format.
		2.7	Data entered is validated in accordance with specified procedures.
		2.8	Anomalous results are corrected or reported in accordance with specified procedures.

		2.9	Back-up made in accordance with operating procedures.
3.	Retrieve data	3.1	The identity and source of information is established.
		3.2	Authority to access data is obtained where required.
		3.3	Files and data are correctly located and accessed.
		3.4	Integrity and confidentiality of data are maintained.
		3.5	The relevant reports or information retrieved using approved procedure.
		3.6	Formats to retrieved report or information conform to that required.
		3.7	Copy of the data is printed where required.
4.	Amend data	4.1	Source of data/information for amendment is established.
		4.2	Data to be amended is correctly located within the file.
		4.3	The correct data/Information is entered, changed or deleted using appropriate input device and approved procedures.
		4.4	The Integrity of data is maintained.
5.	Use document layout and data format facilities	5.1	Requirements for document are verified where necessary.
		5.2	The given format and layout are appropriately applied.
		5.3	Facilities to achieve the desired format and layout are correctly identified, accessed and used.
		5.4	Data manipulating facilities are used correctly.
		5.5	Format reflects accuracy and completeness.
6.	Monitor the operation of equipment	6.1	The system is monitored to ensure correct operation of tasks.
		6.2	Routine system messages are promptly and correctly dealt with.
		6.3	Non-routine messages are promptly referred in accordance with operating requirements.

		6.4	Error conditions within level of authority are dealt with promptly, and uncorrected errors are promptly reported.
		6.5	Output devices and materials are monitored for quality.
7.	Access and transmit information via the Internet	7.1	Access to the Internet is gained in accordance with the provider's operating procedures.
		7.2	Evidence of the ability to negotiate web sites to locate and access specified information and other services is efficiently demonstrated.
		7.3	E-Mail is sent and retrieved competently.
8.	Close down computer system	8.1	The correct shut down sequence is followed.
		8.2	Problem with shutting down computer is reported promptly.
		8.3	All safety and protective procedures are observed.
		8.4	The system integrity and security are preserved.
9.	Maintain computer equipment	9.1	Cleaning materials and/or solutions used meet specified recommendation.
		9.2	The equipment is cleaned as directed.
		9.3	Wear and faults identified are promptly reported to the appropriate personnel.

RANGE STATEMENT

This unit applies to activities associated with essential operations linked to using and maintaining basic computer equipment.

Equipment:

- install supplied computer
- install supplied peripherals

Work environment:

- equipment
- furniture
- cabling
- power supply

Input devices:

- keyboard
- mouse
- scanner
- microphone
- camera

Data:

- textual
- numerical
- graphical

Software systems to include for:

- word processing
- spread sheet
- internet access

Files save on:

- network
- magnetic media
- personal PC

File operations:

Naming, updating, archiving, traversing field and records in database, use of search, sort, print

Maintenance:

- cleaning: enclosures, screen, input devices, output devices
- checking cables, etc

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
knowledge of:

- safety for working with and around computers
- computer hardware and software systems
- procedure for initiating and closing down computer
- the operation of the data entry
- management system
- methods of locating files
- organisation's standards applicable to
- accessing files
- files operations and their applications
- file operation in database setting
- creating, locating and saving files
- using input devices
- using data checking devices
- formatting functions of software
- layout function of software
- graphic productions and manipulation
- regard for accuracy and security of information
- functions on the internet

Skills
The ability to:

- identify computer hardware
- manipulate data input devices
- access data
- use file operations
- key-in and format reports and letters
- retrieve data
- amend data
- print data
- save data
- search and receive data from the internet
- send and receive E-Mail

EVIDENCE GUIDE

Competency is to be demonstrated by the ability to accurately carry out basic data entry and retrieval operations on a computer system in accordance with the performance criteria and the range listed within the range of variables statement.

(1) Critical Aspects and Evidence

It is essential that competence be observed in the following aspects:

- Initiate the use on the equipment.
- Use document layout and data format facilities.
- Locate and access data.
- Use file operations.
- Manipulate input devices.
- Key-in and format reports.
- Access to the internet.

(2) Method of Assessment

Competency shall be assessed while work is undertaken under direct supervision with regular checks, but may include some autonomy when working as part of a team.

Competencies in this unit may be determined concurrently. Assessment must be in accordance with the performance criteria.

(3) Context of Assessment

This unit may be assessed on or off the job. Assessment should include practical demonstration either in the workplace or through a simulation. A range of methods to assess underpinning knowledge should support this.

MEMCOR0101A: Prepare basic engineering drawing

Competency Descriptor: This unit deals with the skills and knowledge required to effectively prepare basic engineering drawing, and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Identify drawing requirements	1.1	Requirements and purpose of drawing are determined from customer and/or work specification and associated documents.
		1.2	Identified and collected all data necessary to produce the drawing.
		1.3	Drawing requirements are confirmed with relevant personnel and timeframes for completion established.
2.	Prepare or make changes to engineering drawing	2.1	Drafting equipment selected is appropriate to the drawing method chosen.
		2.2	Drafting principles is applied to produce a drawing that is consistent with standard operating procedures within the enterprise.
		2.3	All work safely is undertaken to prescribed procedure.
		2.4	Completed drawing is approved in accordance with standard operating procedures.
3.	Prepare engineering parts list	3.1	Components and parts are identified and organised by component type and/or in accordance with organisation/customer requirements.

4.	Issue drawing	4.1 Completed drawings and or parts lists are in accordance with standard operating procedures.
		4.2 Copied/issued approved drawings and or parts lists to relevant personnel in accordance with standard operating procedures.
		4.3 Approved drawings and or parts lists are stored and catalogued in accordance with standard operating procedures.

RANGE STATEMENT

Drawing records may include:

- cataloguing
- issuing security classifications
- filing
- preparing
- distribution lists
- drawings

Alphabet of line:

- object line
- hidden line
- centre line
- section line
- dimension
- extension line
- cutting line
- short break line
- phantom line

Copies may be issued as:

- hard copy
- photographic
- slide or transparency form
- presentation
- a single drawing and/or
- with other drawings
- support documentation as a package

Consultations may include reference to appropriate personnel including:

- technical supervisory
- manufacturers
- suppliers
- contractors
- customers

Geometric construction to include:

- circles
- regular polygons with four, seven and eight sides
- pentagon inscribed within measured circle
- ellipse
- triangles with specified angles
- arcs thru three points; tangent to two circles

Specifications may be obtained from:

- design information
- customer deals/concepts/expectations/requirements
- sketches
- preliminary layouts

This unit applies to any of the full range of engineering disciplines:

- mechanical
- electrical/electronic
- fabrication

Pictorial (3-D) drawing to include:

- isometric corner with left and right side lines each 30 degrees up from horizontal and third line at a vertical, with all three lines joining in a common intersection
- full scale (1:1) basic isometric drawing

Dimension reading:

- dimensioning styles and methods: co-ordinate, linear/datum
- dimensioning 2-D drawing
- dimensioning complex shapes: spheres, cylinders, tapers, pyramids

Drawing instruments and supplies:

- drafting kit/instruments
- blue prints
- drawings/modules/photographs

Multi-view (orthographic 2-D) drawings:

- full scale (1:1) orthographic 3-view drawing using third angle projection with top
- front and right side view – show all hidden features and centre lines

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- types and use of drawing instruments and supplies
- identification of alphabet of lines, line type variation, order of usage and application on drawings
- types of scale and proportion and how they are used for measurement
- symbols, dimensions and terminology
- types of engineering drawings and their applications
- constructing plane geometry, loci and ellipse

Skills
The ability to:

- estimate measurements
- read and interpret working drawings
- prepare basic engineering drawing
- measure accurately
- communicate effectively

EVIDENCE GUIDE

Competency is to be demonstrated by developing and effectively preparing basic engineering drawings in accordance with the performance criteria and the range listed within the range statement.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the preparation of basic engineering drawings or other units requiring the exercise of the skills and knowledge covered by this unit.

It is essential that competence is observed in the following aspects:

- prepare and understand various types of drawings
- prepare alphabet of lines, scales, lettering, dimensions, symbols, abbreviations and key features
- prepare title panel and reference date of drawings
- prepare basic engineering drawings

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

Competency should be assessed in a classroom environment in accordance with work practices and safety procedures.

MEMMRD0032A: Perform fault diagnosis, installation and removal of bearings

Competency Descriptor: This unit deals with skills and knowledge required to competently perform fault diagnosis installation and removal of bearings and applies to and applies to individuals in the industry.

Competency Field: Metal Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Perform routine bearing checks during operation and non-operation	1.1	Bearing installation is inspected and task requirements are determined by most appropriate means.
		1.2	Bearing installation is checked during operation using standard procedures of listening, feeling, observing and/or correct and appropriate test equipment.
		1.3	Seal condition is checked for seal and wear leaks using correct and appropriate means.
		1.4	Lubricating devices are checked for correct operation using correct and appropriate tools and techniques.
2.	Diagnose bearing faults	2.1	Visual and sensory inspection of bearing arrangement performed.
		2.2	Where appropriate, given manufacturer's specifications and diagnostic equipment, bearings tested for correct operation or malfunction using acceptable techniques tools and procedures.
		2.3	Using appropriate knowledge of engineering principles, faulty bearings identified for replacement.
		2.4	Where appropriate, causes of failure identified using correct and appropriate techniques and equipment.
		2.5	Where appropriate corrective action taken to avoid reoccurrences.
3.	Identify bearing requirements for replacement or installation	3.1	Bearing installation inspected and task requirements determined.

		3.2	Using appropriate knowledge of bearings and engineering principles, operational function of bearings to be installed or replaced is determined and understood.
		3.3	Correct and appropriate bearing removal techniques and tools determined.
		3.4	Bearings removed from shafts or bearing housings using correct and appropriate technique, minimising damage to component.
		3.5	Condition of serviceable items such as shafts and housings inspected using correct and appropriate measuring and test equipment.
		3.6	Serviceable items repaired using correct and appropriate engineering, techniques, tools and equipment.
4.	Install plain bearings	4.1	Standard replaceable items for plain, wrapped, flanged, split bush and thrust bearings selected from manufacturer's parts lists, catalogues or engineering drawings.
		4.2	Correct and appropriate installation techniques and tools selected.
		4.3	Bearing sized to correct clearance using correct and appropriate technique, tools and equipment.
		4.4	Lubrication requirements catered for to meet specification and/or application requirements.
		4.5	Bearing fitted using correct and appropriate installation techniques, tools and equipment.
		4.6	Bearing tensioned down and run following standard operating procedures or manufacturer's recommendations.
		4.7	Final clearance, adjustments and lubrication checked and correct and appropriate action taken where required.
5.	Install anti-friction bearings	5.1	Standard replaceable ball and roller anti-friction bearings selected from manufacturer's catalogues, spare parts lists or interpreted from engineering drawing to meet specifications.

5.2 Bearing inside/outside diameters determined from specifications or manufacturer's catalogue and checked using appropriate measuring instruments.

5.3 Shafts and housings size checked for correct fit and clearances using appropriate measuring instruments.

5.4 Correct and appropriate installation techniques selected.

5.5 Using appropriate engineering principles bearings fitted to shafts or housings using correct and appropriate tools, equipment, techniques to meet specifications.

5.6 Bearing sealed and capped where appropriate, to specifications.

RANGE STATEMENT

Work undertaken autonomously using predetermined standards of quality, safety and workshop procedures involving the installation and replacement of plain, ball and roller bearings.

Rotational plain bearings include:

- plain bush
- wrapped bush
- flanged bush
- split bush
- self-lubricating and thrust bearings for radial
- thrust and combination radial and thrust loading applications

Tasks include may include:

- routine bearing checks during operation
- non-operation bearing fault diagnostics
- bearing removal
- replacement
- installation and lubrication using acceptable engineering principles, correct tools and equipment

Ball and roller bearings may include, but are not limited to:

- self-aligning ball bearings with cylindrical bore
- taper bore (and adaptor sleeve)
- taper bore (and unthreaded adaptor sleeve)
- single row deep groove ball bearings
- magneto bearings (separable ball bearings)
- single row angular contact ball bearings
- double row angular contact ball bearings
- linear ball bearings
- needle roller bearings
- taper roller bearings
- single thrust ball bearings
- double thrust ball bearings
- single thrust ball bearings with spherical housing washer and seating ring
- spherical roller thrust bearings
- radial bearings with cylindrical
- tapered bore (and adaptor or withdrawal sleeve) and associated bearings for radial
- axial and combination radial and axial applications.

Spherical roller bearings, including:

- narrow type and C design
- spherical roller bearings (NV, N NS Type) double row cylindrical roller bearings

Methods may include:

- the use of press
- dowel
- keys
- keeper plate
- heat
- shrink and associated methods
- the use of hydraulic and mechanical mounting and dismounting tools is included

All bearing replacements selected from spare parts lists, manufacturer's catalogues, engineering drawings and data sheets.

All lubrication requirements attended to according to bearing manufacturer's specifications, standard operating procedures and lubricant supplier's instructions.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic tools for removal, replacing, dismantling and assembling engineering system components
- standard characteristics of basic engineering system components
- standard removal/replacing tasks
- standard engineering system components
- standard operational test for basic engineering systems
- manufacturers standard specification
- standard application/operation of pneumatic system components
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use hand tools
- handle materials
- select seals
- apply quality assurance
- perform removal and replacement of bearings
- perform the installation of bearings

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively removing, dismantling, assembling and replacing engineering components in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to diagnose bearing problems
- demonstrate correct procedures in removing/replacing bearings
- demonstrate correct procedures in installing bearings
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of installation activities to which applicant has contributed, or worked on
- training courses on performing fault diagnosis, installation and removal of bearings
- examples of authenticated assessments and/or assignments from formal education courses
- self assessment reports
- simulation

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0062A: Perform levelling and alignment of machines and engineering components

Competency Descriptor: This unit deals with skills and knowledge required to competently perform levelling and alignment of machines and engineering components and applies to individuals in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Undertake levelling and alignment measurements/readings	1.1	Principles of levelling and alignment are understood and utilised.
		1.2	Task requirements are determined by inspection of equipment to be levelled and/or components to be aligned.
		1.3	Correct appropriate levelling and/or alignment procedure are selected.
		1.4	Correct and appropriate levelling or alignment devices/equipment are selected and set up to standard operating procedures or manufacturer's recommendation.
		1.5	Measurements/readings taken accurately and recorded correctly to standard operating procedures.
2	Perform levelling and/or alignment tasks	2.1	Correct and appropriate engineering principles, techniques, tools and equipment selected.
		2.2	Levelling realignment calculations performed using correct and appropriate method for levelling/alignment application.
		2.3	Equipment levelled to specifications using correct and appropriate technique.
		2.4	Levelling and alignment task completed to specifications.

RANGE STATEMENT

Work undertaken autonomously or in a team environment using predetermined standards of quality, safety and workshop procedures involving the levelling of equipment and the alignment of component parts.

The use of appropriate engineering principles, techniques, tools and equipment is integral to all application tasks.

Included is the setting up and use of alignment measuring devices and precision levelling devices.

Level or out of alignment calculation performed using most appropriate means for the type of application being performed.

Level and alignment specifications obtained from engineering drawings, data sheets or manufacturers specifications.

All adjustments performed according to designated procedures in conformance to specifications

Background surfaces for the leveling and alignment of machines and engineering components may include:

- concrete
- concrete block work
- brickwork/stonework
- pavements
- underground

Levelling process includes:

- preparation of pipes and tubing
- preparation of surfaces
- finish of surfaces
- workplace preparation

Personal protective equipment may include:

- overalls
- waterproof pants and jacket
- boots
- water (rubber) boots
- gloves
- dust masks/respirators
- hard hat/cap
- safety goggles

Working conditions may include but are not limited to:

- domestic/commercial new and existing
- at height as per industry standards
- in confined space
- temperature variation
- damp and wet conditions
- indoors and out doors

Included is the use of a variety of tools and equipment not limited to:

- precision levels
- spirit levels
- line levels
- optical levels
- electronic levels
- laser levels
- dial indicators
- special type dial indicator fixtures
- magnetic bases
- feeler gauges
- bench centres
- vee blocks
- plumb and line
- folding wedges
- straight edges
- shim pack materials
- dumpy levels and other associated levelling and alignment equipment

Representative range of applications may include such things as

- fixtures
- equipment
- valves
- regulators
- metering devices
- refrigeration units
- machinery
- plant
- warehousing
- power plants

Installation techniques:

- surface mount
- underground
- PVC piping
- metal
- on masonry
- on steel
- in pavements
- with clamps
- with saddles
- on/in walls
- in floors
- overhead
- access ways
- wood

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- basic measuring devices
- standard machines/equipment range
- levelling principles
- levelling techniques
- alignment principles
- alignment techniques
- standard consumable replacements
- standard machine/equipment adjustments
- reading
- writing basic English
- basic numeracy

Skills
The ability to:

- follow safely to instructions
- use power tools and hand tools
- use measuring devices
- adjust measurements
- handle materials
- select material
- apply quality assurance
- perform operational maintenance of machines/equipment

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively performing routine operational maintenance of machines/equipment in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to performing routine operational maintenance of machines/equipment
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate correct procedures in performing leveling of machines and engineering components
- demonstrate correct procedures in performing alignment of machines and engineering components
- give particular attention to safety and elimination of hazards
- demonstrate safe handling of material
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0122A: Maintain/repair/replace pneumatic system components and system

Competency Descriptor: This unit deals with the skills and knowledge required to maintain/repair replace pneumatic system components and systems and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Undertake preventative maintenance checks/adjustments on pneumatic systems	1.1 System components, assemblies or sub-assemblies are identified and prepared for inspection/preventative maintenance.
	1.2 Visual inspection and testing with appropriate test equipment is carried out according to fluid power principles, procedures and safety requirements.
	1.3 Scheduled preventative maintenance tasks are performed including obvious repairs and adjustments according to manufacturer's specification using fluid power techniques/practices.
2. Undertake fault finding on pneumatic systems	2.1 Designated pneumatic system components are identified and a visual inspection of the system is carried out for the collection of fault finding data.
	2.2 System operator consulted where appropriate and additional data collected is needed.
	2.3 Maintenance reports and preventative maintenance schedules checked and reviewed for additional fault finding data.
	2.4 Checks and tests are undertaken using fluid power principles, appropriate test equipment and techniques.
	2.5 Faults and malfunctions are identified and verified.
	2.6 Faults and malfunctions documented or reported by appropriate means to designated personnel and actioned.
3. Repair and/or overhaul pneumatic power system	3.1 System or sub-assembly isolated safely and residue pressure discharged in accordance with prescribed procedures and fluid power principles.

		3.2	Isolated system or sub-assembly tagged according to designated means.
		3.3	Component or sub-assembly removed from system using correct removal principles and techniques.
		3.4	Components or sub-assemblies dismantled, examined and verified for replacement, overhaul or repair, using correct and appropriate techniques and procedures.
		3.5	Replacement items selected from manufacturers catalogues to meet specifications.
		3.6	Faulty items repaired/overhauled, using correct and appropriate principles, techniques and procedures.
		3.7	Component or sub assembly items refitted to equipment and tested for correct operation assessed against specifications.
4.	Recommission pneumatic system	4.1	System or sub-assembly recommissioned according to prescribed procedures, to specifications.
		4.2	Using fluid power principles and system application techniques correct operation of the system is verified.
		4.3	Maintenance records/service reports updated and completed by appropriate designated means.

RANGE STATEMENT

Work undertaken autonomously or in a team environment.

This unit relates to the use of pneumatic test equipment including leak testers, escape rate gauges, hand held pressure testers and other appropriate equipment.

The use of hand tools, power tools and specialist tools is included.

Work tasks include the preventative maintenance, testing diagnostic fault finding, adjustment, repair, replacement and overhauling of pneumatic systems to predetermined standards of quality, safety and work practices and procedures.

Pneumatic components identified, inspected and correct operational function assessed using fluid power principles to predetermined specifications, interpreted from data sheets, manufacturer's catalogues, circuit diagrams and engineering drawings.

Preventative maintenance schedules undertaken on a periodic basis and appropriate documentation maintained.

Tests, checks, adjustments, repair, replacement and overhaul undertaken on pneumatic assemblies/sub-assemblies, stationary/mobile equipment, pneumatic power tools to site or manufacturer's specifications.

Appropriate follow up procedures instigated, adopted and appropriate documentation maintained. Where required, work is undertaken to legislative and standard requirements.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- JS21 1992 regulations
- basic tools/equipment for installing, maintaining and calibrating pneumatic systems
- pneumatic system terminologies
- pneumatic systems components
- metering instrumentation
- fluid power principles
- controllers, contactors and relays
- installation techniques/methods for pneumatic systems
- maintenance techniques/methods for pneumatic systems
- The concept of work activities carried out in installing, maintaining and calibrating pneumatic systems
- writing basic English
- basic numeracy

Skills
The ability to:

- work safely to instructions
- select and use appropriate tools and equipment
- Identify pneumatic system components
- maintain and repair pneumatic system
- repair/replace and overhauling pneumatic system
- handle materials
- select material and supplies
- apply quality assurance

EVIDENCE GUIDE

Competency is to be demonstrated by effectively maintaining/repairing/replacing pneumatic system components and systems in accordance with the range listed in the range of variables statement, relevant to the work orientation.

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to undertake preventative maintenance checks/adjustments on pneumatic systems
- demonstrate correct procedures installing pneumatic systems
- demonstrate correct procedures for maintaining and diagnosing pneumatic systems
- demonstrate correct procedures in repairing/replacing pneumatic systems
- demonstrate the ability to calibrate and test pneumatic systems
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

BSBSBM0012A: Craft personal entrepreneurial strategy

Competency Descriptor:

This unit deals with the skills and knowledge required to craft an entrepreneurial strategy that fits with the attitudes, behaviours, management competencies and experience necessary for entrepreneurs to meet the requirements and demands of a specific opportunity.

Competency Field: Small Business Operations

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Demonstrate knowledge of the nature of entrepreneurship	1.1 Concepts associated with entrepreneurship are clearly defined.
	1.2 Factors which influence entrepreneurship in and outside of Jamaica are correctly identified and explained.
	1.3 The importance of entrepreneurship to economic development and employment is explained clearly.
	1.4 The findings of research conducted on entrepreneurial ventures and successes in the Caribbean region are clearly presented in an appropriate format.
	1.5 Differences between wage employment and entrepreneurial ventures are correctly stated.
2. Identify and assess entrepreneurial characteristics	2.1 Relevant research is carried out and required entrepreneurial characteristics identified.
	2.2 Entrepreneurial characteristics identified are assessed and ranked.
	2.3 An understanding of the process and discipline that enable an individual to evaluate and shape choices and to initiate effective action is correctly demonstrated.
	2.4 Factors that will help an entrepreneur to manage the risk and uncertainties of the future, while maintaining a future orientated frame of mind, are identified.

3.	Develop self-assessment profile	3.1	Self-assessment tools/methods to identify personal entrepreneurial potential are identified and properly used.
		3.2	The ability to apply creativity, problem-solving techniques and principles to solve business related problems are demonstrated.
		3.3	Feedback from others for the purpose of becoming aware of blind spots and for reinforcing or changing existing perceptions of strengths/ weaknesses is appropriately obtained.
4.	Craft an entrepreneurial strategy	4.1	A profile of the past that includes accomplishments and preferences in terms of life and work styles, coupled with a look into the future and an identification of what one would like to do is developed.
		4.2	Commitment, determination and perseverance; orientation towards goals; taking initiative and accepting personal responsibility; recognizing management competencies and identifying areas for development are determined.
		4.3	Written guidelines to obtain feedback that is solicited, honest, straightforward, and helpful but not all positive or negative are developed to facilitate reviews.
		4.4	Framework and process for setting goals which demand time, self-discipline, commitment, dedication and practice are developed.
		4.5	Goals established are specific and concrete, measurable, relate to time, realistic and attainable.
		4.6	Priorities, including identifying conflicts and trade-offs and how these may be resolved are established.
		4.7	Potential problems, obstacles and risks in meeting goals are identified.
		4.8	Specified action steps that are to be performed in order to accomplish goals are identified.
		4.9	The method by which results will be measured is indicated.

4.10 Milestones for reviewing progress and tying these to specific dates on a calendar are established.

4.11 Sources of help to obtain resources are identified.

4.12 Evidence of the ability to review process and periodically revise goals is demonstrated.

RANGE STATEMENT

At this stage of the entrepreneurial process the entrepreneur must be able to conduct a self-assessment profile, examine the frame work for self assessment, develop a personal entrepreneurial strategy, identify data to be collected in the self-assessment process and learn about receiving feedback and setting goals.

Concepts associated to include:

- risk
- entrepreneurship
- macro-screening
- micro-screening
- competition
- wage employment

Influencing factors to include:

- market conditions
- markets – demand/supply
- global trends
- level of economic activities
- funding
- economic stability
- social stability
- resources availability

The entrepreneur must be able to:

- understand the extreme complexity in predicting or aligning him/herself to specific careers in an environment of constant change
- determine the kind of entrepreneur he or she wants to become based on attitudes, behaviours, competencies, experience and how these fit with the requirements and demands for a specific opportunity
- evaluate thoroughly his or her attraction to entrepreneurship
- effectively develop personal plan
- utilize available information that will enhance his or her ability to achieve success

The entrepreneur may encounter setbacks if the planning process is not effectively pursued.

Pitfalls may include:

- proceeding without effective planning which may result in commitment to uncertainty
- commitment to a premature path with the desirability of flexibility can lead to disaster
- personal plans fail for the same reasons as business plans including frustration if the plan appears not to be working immediately and the challenges of changing behaviour from an activity-oriented routine to one that is goal oriented
- developing plans that fail to anticipate obstacles, and those that lack progress milestones and reviews

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- personal entrepreneurial profile systems
- effective management systems: marketing, operations/productions, finance, administration, law
- how to measure feedback
- the method of developing a personal plan
- and a business plan
- understanding the difference between entrepreneurial culture and management culture

Skills
The ability to:

- determine barriers to entrepreneurship
- minimize exposure to risk
- exploit any available resource pool
- tailor reward systems to meet a particular situation
- effectively plan and execute activities
- use computer technology to undertake assessments

EVIDENCE GUIDE

Competency is to be demonstrated when the entrepreneur is able to undertake a personal entrepreneurial assessment exercise to determine if he or she possesses the necessary credentials to be a successful entrepreneur. This stage of the entrepreneurial process is critical since experience has shown that the founder is one of the deciding forces if the venture is to succeed and prosper.

(1) Critical Aspects of Evidence

The entrepreneur will be assessed by his/her action in developing an orchestrated plan in order to effectively pursue the business concept.

(2) Method of Assessment

A useful method of assessment is to determine if the venture can stand up to the test of critical evaluation.

(3) Context of Assessment

This stage of the entrepreneurial process is assessed when comparisons are made between actual outcomes and plans/projections.

MEMMRD0182A: Locate and repair/rectify basic electrical circuits and secondary wiring

Competency Descriptor: This unit deals with the skills and knowledge required to effectively locate and repair/rectify basic electrical circuits and secondary wiring and applies to individuals working in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA	
1. Plan and prepare for repairs	1.1	Task are planned and prepared to ensure OH&S policies and procedures are followed.
	1.2	The work is appropriately sequenced in accordance with requirements.
	1.3	Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
	1.4	Electrical circuits and secondary wiring are checked against job requirements.
	1.5	Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.
	1.6	Tools, equipment and testing devices needed to carry out the repair work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.7	Preparatory work is checked to ensure that no unnecessary damage has occurred and complies with requirements.
2. Locate fault	2.1	Circuit/system function and characteristics are determined and understood by reference to circuit diagrams, and technical adviser.
	2.2	Built-in fault indicators, error codes examined and correctly interpreted and results recorded to standard operational procedures where appropriate.
	2.3	Circuit/s correctly isolated from power supply where appropriate.

		2.4	Faults are verified or localised using correct and appropriate techniques, procedures, tools and appropriate test equipment.
		2.5	Faults are recorded to standard operating procedures.
3.	Repair/rectify fault/s	3.1	Circuit/system is repaired, replaced or adjusted to specifications or manufacturer's requirements using correct and appropriate techniques, procedures, tools and equipment.
		3.2	Circuit/system is checked and tested using correct and appropriate techniques, procedures, tools and equipment for compliance with site or manufacturer's specifications.
		3.3	Repair/rectification are reported are recorded to standard operating procedures.
4.	Inspect and notify completion of work	4.1	Final inspections are undertaken to ensure the repairs to electrical circuit and secondary wiring conforms to requirements.
		4.2	Work is completed within acceptable time.
		4.3	Work area is left clean and tidy.
		4.4	Work completion is notified in accordance with established procedures.

RANGE STATEMENT

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge.

Work undertaken autonomously or in a team environment using predetermined standards of quality, safety and work procedures.

Circuits and systems cover industrial control systems for supply, switching, lighting, motor control, etc. using AC and DC power supplies incorporating a range of components, e.g.: switches, fuses, circuit breakers, relays, transformers, regulators, motors, etc.

This may include controls or switching via contactors, relays, programmable controllers or other electronic switching devices.

Fault finding techniques may include testing for voltage, current, frequency, polarity, phase, circuitry continuity, insulation resistance, earth continuity etc.

Correct and appropriate tools and equipment may include continuity testers, ammeters, voltmeters, multimeters, tong testers, wattmeters, cathode ray oscilloscopes, etc.

A range of hand and hand held power tools such as pliers, screwdrivers, spanners, etc.

All specifications and procedures gained from schematics, circuit diagrams/drawings, engineering data sheets and manufacturers' handbooks.

All work and work practices undertaken to relevant statutory authorities where required.

Circuit can be defined as one made up of more than one interdependent circuit. A complex circuit is made up of more than one circuit, controlling and processing inputs or outputs.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- hazards in the (electrical) work environment: shock hazards; fire hazards; chemical hazards
- hazardous areas
- special situations
- procedures for dealing with fires associated with electrical equipment
- procedures for dealing with related
- basic electrical circuit(s): source; control; protection; load
- circuit diagrams: symbols; conventions; interpretations; free sketches
- circuit connections and functions: open circuit; closed circuit; short circuit
- basic electrical measurement: use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; using ohms law
- fundamental electrical concepts: effects of current; practical resistors; sources of emf; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors; magnetism
- insulation resistance measurement and requirements
- earthing principles and systems
- methods for testing insulation resistance; continuity of prospective earthing conductor; continuity between exposed conductive parts and the earthing system
- cable types and conductor termination methods and techniques: conductors solid, stranded and flexible; colour codes
- single and three phase systems and loads: number of active and live conductors required; line and phase voltage; typical loads
- general appliances: appliance identification; appliance ratings
- single and three phase induction motors: motor identification; motor ratings; direction of rotation
- single and three phase heaters: types of heaters; heater identification; heater ratings
- electrical distribution arrangement: power systems; within a premises; purpose of switchboards/distribution boards (residual current devices)
- circuit isolation and protection devices
- isolation procedures: work clearance; testing for voltage; lock-off and tagging; techniques, regulation, codes of practice and procedures
- disconnection procedures, practices and requirements
- replacement equipment
- reconnection procedures, practices and requirements

Skills
The ability to:

- work safely to instructions
- select and use appropriate tools and equipment
- install apparatus to prepared electrical panels
- demonstrate correct procedures in fault finding and repairing/rectifying basic electrical circuits and secondary wiring
- handle materials
- select material and supplies
- apply quality assurance

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively fault find and repair/rectify basic electrical circuits and secondary wiring

Competency will be determined on evidence of having consistently performed across a representative range of applications which includes such things as apparatus, circuits, wiring systems, plant, equipment, tools, accessories, components and the like relative to that required for the category undertaken within and relevant to this unit of competence; autonomously and to requirements. Equivalent evidence from other sources is also acceptable

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the fault finding of interconnected electrical circuits, or other units requiring the exercise of the skills and knowledge covered by this unit.

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to fault find basic electrical circuits and secondary wiring
- demonstrate correct procedures of repairing/rectifying secondary wiring
- demonstrate correct procedures in repairing/rectifying basic electrical circuits
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0652A: Service and maintain electrical motor starting systems

Competency Descriptor: This unit refers to the maintenance and service of electrical motor starting systems including, but not limited to, process measurement, control systems and analytical instrumentation as applies to the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Undertake maintenance checks and routine tests	1.1 Electrical motor starting system functions are determined and understood by reference to circuit diagrams, equipment manuals and/or consultation with equipment operator where appropriate.
	1.2 Electrical motor starting system functions are recorded to standard operating procedures where appropriate.
	1.3 Built-in faults/status display are noted and recorded to standard operating procedure.
	1.4 Electrical motor starting system /sub-assemblies, components, connections, terminations etc. are checked visually and with correct and appropriate test equipment and techniques.
	1.5 Faulty components are removed and replaced where appropriate.
	1.6 All results are checked for compliance with manufacturers' requirements or specification, results are recorded to standard operating procedures.
2. Maintain and/or service electrical motor starting system	2.1 Where appropriate, isolate sub-assemblies to standard operating procedures.
	2.2 Electrical motor starting system /sub-assemblies are adjusted to standard operating procedures using correct and appropriate techniques, tools and equipment.
3. Return electrical motor starting system to service	3.1 Electrical motor starting system /sub assemblies are returned into service utilising correct and appropriate techniques and procedures.
	3.2 Electrical motor starting system /sub assemblies are checked for operational compliance to specifications and/or manufacturers requirements and documentation requirements are carried out to standard operating procedure.

RANGE STATEMENT

This unit covers the testing and maintenance of Electrical motor starting system; it covers situations in which a series of checks and pre-determined tests is applied in accordance with work shop manuals, testing procedures etc. This unit also covers the replacement of faulty components identified during these tests. Work ordinarily undertaken with minimal assistance but could include working as part of team. Work may be undertaken in field or workshop/laboratory, plant or site environment. All work and work practices are undertaken to industry and company requirements.

Correct and appropriate tools and equipment includes the use of:

- voltmeters
- ammeters
- cathode ray oscilloscopes
- frequency counters
- continuity testers
- hand tools
- soldering and de-soldering devices
- phase rotation tester

Check, tests, adjustments, services and maintenance undertaken on a wide range of equipment utilised in engineering environments including:

- telecommunication
- process control
- computer systems
- security monitoring
- alarm systems

Starting systems may include:

- fractional horsepower-manual motor starters
- manual line voltage starters
- starter control pilot devices
- reduced current starters
- reduced voltage starters
- three-phase multi-speed controllers
- wound rotors (slip ring) motor controllers
- synchronous motor control
- direct current controllers

All specifications and procedures may be obtained from:

- circuit drawings
- schematic diagram
- maintenance schedules
- engineering data sheets
- manufacturers hand books

Materials may include:

- cables
- solder/flux
- lubricants
- cleaning solvents
- contact cleaners
- connectors
- adhesive and sealants

Preliminary checks:

- checking for loose connections
- blown fuses
- checking for hairline cracks and poor solder joints, fuse checks
- checking for open circuits

Work completion details may include:

- plant and maintenance records
- job cards
- check sheets and on device labelling updates

Types of circuits:

- single phase systems - AC and DC
- multi phase systems - AC and DC

Work site environment may be affected by:

- nearby plant or processes e.g.
  - heat
  - noise
  - dust
  - oil
  - water and chemical
- shorted circuits
- burn, signs of excessive heat
- bulging fixed capacitors

Work activities may include:

- selecting tools and equipment
- setting up equipment
- isolating system
- examining system components
- grinding burnt contacts
- applying lubricants and coolants
- re-tightening loosened parts
- replacing damage or worn parts
- wiring, wiping and cleaning components

Control circuits may include:

- two - wire control
- three - wire and separate controls hand-off
- automatic controls, multiple push button stations interlocking methods of reversing control
- sequence control
- time-delay
- low-voltage release
- thyristor control single phase half wave speed control reversible speed control
- three-phase drive,
- pulse-width modulated control
- variable-frequency inverters

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational health and safety standards
- relevant statutory requirements and codes of practice
- relevant industry standards
- equipment and material required to perform the work
- isolation procedures
- general layout of plant/work site and operation of its equipment
- regulatory aspects
- characteristics of AC and DC supply
- principle of rectification and rectification circuits
- filter circuits and their principle of operation
- theory of voltage amplification
- motor starting circuits
- types of rectification circuits and their principle of operation
- limitations of motor starting circuits
- electrical fundamentals
- test and measurement instruments
- circuit plan appreciation
- basics of industrial electronics
- engineering and workshop practice
- communication principles

Skills
The ability to:

- apply occupational health and safety standards
- follow relevant statutory regulations and codes of practice
- locate and interpret plans, drawings and text
- use tools and relevant equipment
- use test and measurement instruments
- use correct maintenance procedures
- identify and select materials for the job
- apply regulatory aspects theory
- apply industrial electronics fundamentals theory
- apply distributed control theory
- carry out work completion details
- communicate effectively
- apply data analysis techniques and tools
- maintain motor starting systems
- service motor starting systems

EVIDENCE GUIDE

It is essential that competence is assessed in the critical aspects of the knowledge and application of relevant sections of occupational, health and safety guidelines, industry regulation, company/site safety procedures and company/site emergency procedures

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- attain electrical licence, where appropriate, deeming competency associated with electrical work
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to identify motor starting systems
- demonstrate correct procedures for checking motor starting systems
- demonstrate the ability to perform routine test on motor starting systems
- demonstrate correct procedures servicing motor starting systems
- demonstrate correct procedures for maintaining motor starting systems
- demonstrate correct procedures in removing and replacing motor starting systems
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor.
- identify supervisors or colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

(3) Context of Assessment

Competency shall be assessed on the job, off the job or a combination of both in accordance with work place procedures.

MEMMRD0402A: Check/identify/isolate/rectify malfunctioning electrical machinery appliance and fixtures

Competency Descriptor: This unit applies to the skills and knowledge necessary to perform functional checks on machinery, appliance and fixtures in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Plan and prepare for functional apparatus checks	1.1 Functional apparatus checks are planned and prepared to ensure OH&S policies and procedures are followed.
	1.2 The work is appropriately sequenced in accordance with requirements.
	1.3 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work site.
	1.4 Functional apparatus checks are checked against job requirements.
	1.5 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.7 Preparatory work is checked to ensure no unnecessary damage has occurred and complies with requirements.
2. Perform functional apparatus checks	2.1 OH&S policies and procedures for performing functional apparatus checks are followed.
	2.2 Functional apparatus checks are performed in accordance with requirements, without damage or distortion to the surrounding environment or services.
	2.3 Unplanned events or conditions are responded to in accordance with established procedures.

	2.4	Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented.
	2.5	On-going checks of the quality of the work are undertaken in accordance with established procedures.
3. Inspect and notify completion of work	3.1	Final inspections are undertaken to ensure the functional apparatus checks conform to requirements.
	3.2	Work is completed within acceptable time.
	3.3	Work area is left clean and tidy.
	3.4	Work completion is notified in accordance with established procedures.

RANGE STATEMENT

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation:

- computer systems
- electrical
- electronics
- refrigeration and air conditioning
- data communications

Sources of information:

- working drawing/sketches
- oral/written work instruction
- relevant health and safety regulations
- manufacturers recommendations
- relevant technical information

Safety:

- personal safety
- JS21 1992 regulation governing installation
- other relevant codes
- manual lifting and handling
- protective clothing
- relevant electrical and safety practices

Type of site/condition/structures:

- commercial
- farming-indoor and outdoor
- occupied, unoccupied
- walls,
- floors,

Electrical systems/ equipment/ components to include:

- range of starters
- contactors
- relays
- switch gears
- single and three phase-AC and DC all-not exceeding 440 volts

Apparatus to include:

- protection relays
- alarm devices
- control devices
- metering equipment
- current and potential
- transformers
- fixed voltmeter
- ammeters and power factor regulators

Metering instrumentation to include:

- voltage,
- current
- resistance
- power factor
- reactance cycle
- speed
- energy
- fluid level sensing device
- triggering devices
- pressure sensing devices
- electronic sensing devices
- limit switch
- whole current
- wave form

Controllers/motors to include:

- control and instrumentation
- protection - distribution panels
- fuse panels
- fuses
- circuit breakers
- relays (current transformers and voltage transformers)
- earth leakage devices
- The range of AC and DC motors up to 25hp to include - 3 leads, 6 leads - star and delta connections

Tools and equipment to include:

- pliers
- screwdrivers
- electric hand drill
- drill bits
- spirit level
- knife
- wire stripper
- hole saw
- appropriate electrical hand tools
- voltmeter
- ammeter
- ohmmeter
- tachometer
- lifting device
- spanners
- files

The following aspects must be demonstrated:

- prepare to disconnect electrical equipment
- disconnect electrical equipment
- check electrical equipment, appliance or fixture
- prepare to reconnect electrical equipment
- test the reconnected electrical equipment for safe operation
- provide status reports
- testing to ensure safety, including earth continuity and insulation integrity
- OH&S practice
- determining electrical characteristics of equipment
- identifying problem
- isolating equipment
- disconnection techniques
- selecting replacement equipment
- reconnection techniques
- applying techniques, procedures, information and resources relevant to performance

Electrical characteristics refers to:

- voltage
- current rating
- power rating
- direction of rotation
- phase sequence/polarity
- name plates information and duty

Electrical equipment refers to

- composite equipment
- pre-assembled
- control devices
- electrical heaters
- motors
- lighting

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- hazards in the (electrical) work environment: shock hazards; fire hazards; chemical hazards
- hazardous areas
- special situations
- procedures for dealing with fires associated with electrical equipment
- procedures for dealing with related
- basic electrical circuit(s): source; control; protection; load
- circuit diagrams: symbols; conventions; interpretations; free sketches
- circuit connections and functions: open circuit; closed circuit; short circuit
- basic electrical measurement: use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; using ohms law
- fundamental electrical concepts: effects of current; practical resistors; sources of emf; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors; magnetism
- insulation resistance measurement and requirements
- earthing principles and systems
- methods for testing insulation resistance; continuity of prospective earthing conductor; continuity between exposed conductive parts and the earthing system
- cable types and conductor termination methods and techniques: conductors solid, stranded and flexible; colour codes
- single and three phase systems and loads: number of active and live conductors required; line and phase voltage; typical loads
- general appliances: appliance identification; appliance ratings
- single and three phase induction motors: motor identification; motor ratings; direction of rotation
- single and three phase heaters: types of heaters; heater identification; heater ratings
- electrical distribution arrangement: power systems; within a premises; purpose of switchboards/distribution boards (residual current devices)
- circuit isolation and protection devices
- isolation procedures: work clearance; testing for voltage; lock-off and tagging; techniques, regulation, codes of practice and procedures
- disconnection procedures, practices and requirements
- replacement equipment
- reconnection procedures, practices and requirements

Skills
The ability to:

- work safely to instructions
- select and use appropriate tools and equipment
- identify malfunctioning electrical machinery, appliance and fixtures
- demonstrate correct procedures of checking malfunctioning electrical machinery appliance and fixtures
- demonstrate correct procedures in isolating/rectifying malfunctioning electrical machinery appliance and fixtures
- handle materials/equipment
- select material and supplies
- apply quality assurance

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively checking/identifying/isolating/rectifying malfunctioning electrical machinery appliance and fixtures.

Competency will be determined on evidence of having consistently performed across a representative range of applications which includes such things as apparatus, circuits, wiring systems, plant, equipment, tools, accessories, components and the like relative to that required for the category undertaken within and relevant to this unit of competence; autonomously and to requirements. Equivalent evidence from other sources is also acceptable

(1) Critical Aspects of Evidence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace.
- demonstrating an understanding of the underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'.

During assessment the individual will:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to identify malfunctioning electrical machinery, appliance and fixtures
- demonstrate correct procedures of checking malfunctioning electrical machinery appliance and fixtures
- demonstrate correct procedures in isolating/rectifying malfunctioning electrical machinery appliance and fixtures
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMMRD0452A: Maintain and repair commercial and/or industrial refrigeration and/or air conditioning controls

Competency Descriptor: This unit applies to the skills and knowledge necessary to maintain and repair commercial and/industrial refrigeration and /or air conditioning controls in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Install/replace refrigeration/air conditioning controls	1.1 Refrigeration/air conditioning control principles and system diagrams are interpreted and understood.
	1.2 Control circuit components identified and inspected for compliance to specifications.
	1.3 Sequential installation undertaken according to manufacturer's specifications and standard operating.
2. Check and adjust refrigeration/air conditioning control sequence and operation	2.1 The temperature, quality, pressure and properties of the air delivered by the air-conditioning system is checked for conformance to specification.
	2.2 Controls operation checked against operational specifications using appropriate test equipment and application principles/techniques.
	2.3 Adjustments performed to control sequence to meet/align to operational requirements and specifications.
	2.4 Modifications/alterations recorded and reported in accordance with standard operating procedures.
	2.5 Controls operation checked and returned to service to specifications.
3. Fault-find refrigeration/air conditioning control circuits	3.1 Control circuit diagrams, data sheets interpreted and understood.
	3.2 Control circuit components identified and inspected.
	3.3 Control circuit traced and action of components diagnosed to identify and localise faults.

		3.4	Control circuit parts tested using appropriate test equipment and application principles.
		3.5	Control circuit parts assessed against operational specifications.
		3.6	Fault condition localised at the component level.
		3.7	Faulty condition evaluated, root cause analysed and corrective action planned.
4.	Maintain, repair/replace control components	4.1	Correct maintenance procedures applied according to standard operating procedures.
		4.2	Repair procedures selected and applied using correct method and technique.
		4.3	Faulty items tested, repaired or replaced using sequential installation procedures according to manufacturers'
		4.4	Replacement items selected from manufacturers' catalogues to meet specification.
		4.5	Control components reassembled using appropriate principles and procedures according to specification.
5.	Check and adjust sequence of refrigeration/air conditioning controls	5.1	Using circuit diagram and refrigeration/air conditioning system control principles, identify sensors and system control principles, identify sensors and controllers.
		5.2	Make necessary adjustments to sequence control circuit to meet operational specification.
		5.3	Correct operation of control circuit checked and confirmed against operational specification.
		5.4	Refrigeration/air conditioning controls return to service to specification.
		5.5	Appropriate follow-up procedures adopted.
		5.6	Service/maintenance report completed to standard operating procedures.

6.	Clean up	6.1 Materials/supplies/equipment are stacked /stored for re-use or disposal.
		6.2 Work area is cleared.
		6.3 Tools and equipment are cleaned and stored in a cool place.
		6.4 Waste is disposed of using appropriate method according to National Environmental Protection Agency (NEPA) requirements, industry standards and company's operating procedures.

RANGE STATEMENT

This unit applies to the repair/replacement of commercial industrial refrigeration and commercial air conditioning controls.

Work is carried out autonomously or in a team environment, utilising predetermined standards of safety, quality and workshop procedures.

System circuit components may be:

- identified
- traced
- inspected operational function
- assessed
- verified

All undertaken using refrigeration/air conditioning principles to predetermined specifications interpreted from data sheets and circuit diagrams.

Work activity may include:

- installation
- adjustment
- repairs
- replacements
- overhauls

All undertaken to site or manufacturers' specifications, using working and application of principles of domestic refrigeration and/or commercial air conditioning control sequencing

Sources of information:

- working drawing/sketches
- oral/written work instruction
- relevant health and safety regulations
- manufacturers recommendations
- relevant technical information

Tasks relate to the use of:

- mechanical
- pneumatic
- electrical
- electronic (analog and digital) and associated sensing
- weight
- density and other process variables
- indication and signal transmitting instrumentation
- representing measurement of pressure
- temperature
- level
- flow rate

Safety:

- personal safety
- JS21 1992 regulation governing installation
- other relevant codes
- manual lifting and handling
- protective clothing
- relevant electrical and safety practices

Equipment utilised for maintenance, calibration and testing of process signal converters and final control elements includes:

- Manometers
- dead weight testers
- vacuum system
- power supplies
- Digital analogue test and calibration equipment.
- control valve test beds
- Pneumatic

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Occupational Health and Safety regulations
- JS21 1992 regulations
- basic tools/equipment for installing, maintaining and calibrating instrumentation sensors, transmitters and final control elements
- instrumentation sensors
- metering instrumentation
- controllers, contactors and relays
- PLC's
- relay logic control systems
- unitised/modular sensors
- transducers
- timers
- counters and associated equipment
- installation techniques/methods
- maintenance techniques/methods
- the concept of work activities carried out in servicing, maintaining and calibrating instrumentation sensors, transducers and final control elements
- writing basic English
- basic numeracy

Skills
The ability to:

- work safely to instructions
- select and use appropriate tools and equipment
- service instrumentation sensors, transducers and final control elements
- maintain sensors, transducers and final control elements
- remove repair and replace sensors, transducers and final control elements
- calibrate and test instrumentation sensors, transducers and final control elements
- handle materials
- select material and supplies
- apply quality assurance

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively maintain and repair commercial and/or industrial refrigeration and/or air conditioning control

(1) Critical Aspects of Evidence

It is essential that competence be observed in the following aspects:

- demonstrate compliance with Occupational Health and Safety regulations applicable to workplace operations
- show compliance with organizational policies and procedures including Quality Assurance requirements
- adopt and carry out correct procedures prior to undertaking task
- demonstrate safe and effective operational use of tools, plant and equipment
- demonstrate the ability to select tool and equipment for maintaining and repair commercial and/or industrial refrigeration and/or air conditioning control
- demonstrate correct procedures for maintaining commercial and/or industrial refrigeration and/or air conditioning control
- demonstrate correct procedures for repairing commercial and/or industrial refrigeration and/or air conditioning control
- demonstrate correct procedures in removing repairing and replacing sensors transducers and final control elements
- demonstrate the ability to calibrate and test instrumentation/electronic sensors, transducers and PLC's
- give particular attention to safety and elimination of hazards
- demonstrate safe handling/storage of material/supplies/equipment
- interactively communicate with others to ensure safe operations
- demonstrate effective engineering techniques to produce designed outcome

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities

Evidence of competence may be obtained through a variety of methods including:

- observation
- oral questioning
- examination of assessee's portfolio/CV
- supporting statement from section engineer, supervisor or equivalent
- examples of related activities to which applicant has contributed, or worked on
- training courses on material related to range of variables and or knowledge requirement
- examples of authenticated assessments and/or assignments from formal education courses
- simulation

(3) Context of Assessment

This unit may be assessed on the job, off the job, or a combination of both. The competencies covered by this unit would be assessment environment should not disadvantage the candidate.

MEMINS0232A: Prepare material and locations for installing drains and waste systems

Competency Descriptor: This unit deals with the skills and knowledge required to effectively prepare material and locations for installing drains and waste systems as applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Plan and prepare for installation	1.1 Work instructions/information are accurately interpreted and the task is organized accordingly.
	1.2 The correct size, type and quantity of material, components and location are selected and prepared.
	1.3 Material are located and stored according to the installation specifications/work instructions.
	1.4 Instructions/information communicated to appropriate personnel are confirmed as understood.
	1.5 Materials are not damaged and where deficiencies are observed appropriate corrective action is taken.
	1.6 Where required, materials and components are assembled according to specifications/instructions
	1.7 All connections are mechanically sound and water tight.
2. Prepare materials, components and locations	2.1 Material, components and waste system location are accurately located, correctly identified and are proved suitable for preparation.
	2.2 Where material, components and waste system location prove unsuitable, the appropriate action is taken.
	2.3 Where defects/potential dangers affect the achievements of the installation objectives, appropriate action is taken
	2.4 Disturbance/damage to building fabric and/or structure is minimized.

		2.5	Tools and equipment selected are appropriate for the intended task.
		2.6	Work is carried out in accordance with health, safety and codes of practice.
3.	Test equipment	3.1	Correct testing procedures are used.
4.	Clean up area	4.1	All waste material are removed and disposed of.
		4.2	Work area related to work activities is cleaned.
		4.3	Tools and equipment are cleaned, maintained and stored.
5.	Inspect and notify completion of work	5.1	Final inspections are undertaken to ensure the installed equipment, conforms to requirements.
		5.2	Work completion is notified in accordance with established procedures.

RANGE STATEMENT

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation.

Source of information:

- working drawings/sketches
- manufacturer's technical information
- statutory regulations
- oral/written work instructions

Corrective action:

- replacing defective/non-match materials/
- reporting deviation to supervisor

Tools and equipment:

- appropriate hand tools
- power tools
- equipment for digging trenches
- ladder
- scaffolding

Materials and components:

- sand
- cement
- aggregate
- bedding materials

Method of digging:

- use of hand tools and power tools

Range of pipes up to 200 mm in diameter to include earthen:

- plastic,
- copper
- cast-iron
- pre-cast concrete
- cast-iron chambers and manholes

Safety:

- manual handling,
- material handling,
- machine operating procedures,
- personal safety,
- ladder and scaffolding safety
- trench digging

Protective clothing:

- safety boots,
- safety helmet
- coverall,
- goggles
- gloves

Work activities:

- identifying and selecting tools and equipment
- excavating and timbering trenches
- grading and bedding trenches
- erecting and/or installing manholes and chambers
- erecting and/or installing piers, brackets and other supports
- excavation of walls and floor

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- standards of quality
- installation tools and equipment
- materials and components related to systems
- installation techniques
- range of plumbing draining systems
- range of plumbing waste systems
- use and selection of appropriate tools, materials and supplies

Skills
The ability to:

- handle ladders
- identify potential workplace hazards; preventative measures
- work with hand tools
- read and interpret sketches drawings manuals etc.
- measure accurately
- communicate effectively
- install plumbing equipment appropriately
- test system to ensure equipment are functional and being installed properly

EVIDENCE GUIDE

(1) Critical Aspects of Evidence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit in the related category and specialisation which is to be exhibited across a representative range of applications; autonomously and to requirements
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace for each of the categories and areas of specialisation undertaken from those listed in the Range statement or Evidence guide
- demonstrating an understanding of the underpinning knowledge and skills identified for the categories and related specialisation undertaken in the section, of this unit titled 'Underpinning knowledge'

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to prepare material and locations for installing drains and waste systems
- communicate information about processes, tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- plan tasks in all situations and review task requirements as appropriate
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify supervisors/colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

Competency shall be assessed on the job, off the job or a combination of both in accordance with workplace procedures.

MEMMRD0072A: Shut down/isolate machines/equipment

Competency Descriptor: This unit deals with skills and knowledge required to shut down/isolate machines/equipment and applies to individuals working in the metal engineering and maintenance trades.

Competency Field: Metal, engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Shut down machine/equipment	1.1	Machine/equipment operation and function are determined and understood.
		1.2	Shut down sequence is undertaken safely and to standard operating procedures.
		1.3	Machine/equipment are de-pressured/emptied/de-energised bled to standard operating procedures.
		1.4	Safe shut down of machine/equipment is verified.
		1.5	Safety/security lock off devices and signage are installed to standard operating procedure.
		1.6	Machine/equipment is left in clean and safe state.
2.	Isolate machine/equipment	2.1	Machine/equipment operation and function are determined and understood.
		2.2	Isolation methods and points are recognised and identified.
		2.3	Isolation is undertaken safely and to standard operating procedures.
		2.4	Safe isolation of machine/equipment is verified.
		2.5	Safety/security lock off devices and signage are installed to standard operating procedure.
		2.6	Machine/equipment are left in clean and safe state.

RANGE STATEMENT

Shut down/isolation is undertaken autonomously or as part of team.

Machines/equipment range includes manual, semi automatic and automatic machines of a stand alone, continuous production or process nature.

Shut down/isolation means and includes isolation of mechanical, electrical drives, pipe-work (pressure) rotating equipment etc.

Shut down/isolation utilises electrical lock off isolators, mechanical and power driven valves etc. Relevant regulations, Standards and legislative requirements governing isolation and shutdown are complied with.

This unit requires system knowledge that excludes the straightforward starting/stopping of machinery/equipment through the use of simple switching, including use of emergency switches.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- workplace and equipment safety requirements including relevant OH&S legislation and regulations
- drawings, sketches and instructions
- machines/equipment range includes manual, semi automatic and automatic machines of a stand alone, continuous production or process nature
- equipment/machine systems being shut down/isolated
- basic electrical principles
- basic mechanical drives systems
- electrical lock off isolators
- mechanical and power driven valves etc
- relevant regulations, standards and legislative requirements governing isolation and shutdown

Skills
The ability to:

- work safely to instructions
- communicate effectively
- interpret relative drawings and instructions
- shut down/isolate machines equipment

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively shutting down/isolating machines/equipment in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the isolation and shut down of machines and equipment or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times;
- demonstrate the ability to shut down/isolate machines equipment effectively
- communicate information about tasks being undertaken to ensure a safe and efficient working environment;
- take responsibility for the quality of their own work;
- perform all tasks in accordance with standard operating procedures;
- perform all tasks to specification;
- use accepted engineering techniques, practices, processes and workplace procedures.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit should be assessed on the job. 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.

MEMMAH0042A: Order materials

Competency Descriptor: This unit deals with the skills and knowledge required to effectively order materials relevant to related trade and applies to individuals working in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Prepare purchase order/list	1.1 Purchase order/list is prepared to standard operating procedure.
	1.2 Material specifications, price limitations, quantities and delivery requirements are determined from instructions, requisitions etc.
2. Order materials	2.1 Supplier/vendor is informed of requirements and specifications according to standard operating procedure.
	2.2 Supplier/vendor orders are followed up to achieve delivery as required.
	2.3 Where appropriate, goods are directly received and checked for damage.
	2.4 Records/files are completed accurately according to standard operating procedure.

RANGE STATEMENT

Competency is to be demonstrated by effectively performing routine ordering of materials in accordance with the range listed within the range of variables statement.

This unit applies to purchasing activities carried out by other than the purchasing officer eg: maintenance, service, stores and warehouse personnel. The work is undertaken autonomously or as part of team.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- written/oral communication techniques
- basic computation methods
- documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate to ordering materials
- supplier/vendor/sources for required material
- purchase orders

Skills
The ability to:

- work safely and accurately to instructions
- communicate effectively
- order materials relevant to related trade
- use documentation and record systems including the use of computers, information systems and business equipment technologies
- prepare order for materials

EVIDENCE GUIDE

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the ordering of materials or other units requiring the exercise of the skills and knowledge covered by this unit.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to order materials as related to the metal engineering and maintenance industry
- communicate information about tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit should be assessed on the job. 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.

MEMCOR0063A: Attend to breakdowns in hazardous areas

Competency Descriptor: This unit applies to the skills and knowledge necessary to attend to breakdowns in hazardous areas in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Prepare to attend breakdown	1.1	Nature of the breakdown is confirmed with appropriate personnel to establish the need to enter the hazardous area.
		1.2	Safety plan to enter the hazardous area is established in accordance with established procedures and policies.
		1.3	Relevant clearance to do the work is obtained.
		1.4	Testing devices and tools, anticipated as being needed for the work, are obtained and checked for correct operation and safety.
2.	Evaluate extent of work	2.1	OH&S policies and procedures for working in a hazardous area are followed.
		2.2	Other personnel required to determine cause and rectify breakdown is ascertained from available evidence and arrangements made for their attendance where applicable.
		2.3	Extent of repair work is ascertained from available evidence and confirmed with appropriate personnel.
		2.4	Limits of repair work that can be carried out in-situ are established with regards to explosion risk and in accordance with established procedures and requirements.

3.	Arrange repair work	3.1	Equipment is isolated in accordance with established procedures.
		3.2	Circuits of equipment being withdrawn from service are terminated or isolated safely and in manner approved for the classification of the area.
		3.3	Certification documentation for replacement equipment is sighted to ensure that it is identical with the equipment it replaces and is in accordance with the explosion-protection system design.
4.	Confirm completion	4.1	Explosion-protected equipment and systems are inspected and tested after repairs are completed to ensure the integrity of the system.
		4.2	Appropriate personnel are notified of the completion of the repair work and details are documented in accordance with established procedures and requirements.

RANGE STATEMENT

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation.

In order to maintain currency in this unit on-going competency development is to occur. This would include keeping abreast of any changes in standards, regulations, procedures, technology and the like related to the scope and application of this unit

Locations/conditions:

- trenches
- confined spaces
- elevated positions
- hot cold
- damp and wet situations

Source of information:

- working drawings/sketches
- oral/written work instructions
- maintenance schedules
- maintenance records

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- Safe working requirements and procedures
- definition of a hazardous area;
- conditions that lead to an explosion meaning of the terms "combustion", "detonation" and "propagation"
- OH&S& NEPA responsibilities;
- parties responsible for safety of hazardous areas;
- definition of classes and zones
- combustible properties of materials
- electrical protection devices
- temperature limitations of wiring and equipment
- limitations on non-metallic and specific alloy enclosures
- requirements for detailed initial/sample and close/visual inspections standards and procedures for terminating and connecting cables
- standards and requirements for the installation of equipment and wiring
- selection and application of sealing compounds
- standards for wiring systems in hazardous areas
- arrangements for approval for use of equipment in a hazardous area

Skills
The ability to:

- use company documentation and record systems including the use of computers, information systems and business equipment technologies
- operate plant and equipment associated with a given workplace
- attend to breakdown as related to the metal engineering and maintenance industry
- identify classes, zones and groups characteristics of a hazardous areas
- Identify the responsibilities of OH&S & NEPA
- Attend to breakdowns in hazardous areas efficiently

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively attending to breakdown in hazardous areas in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled 'Underpinning knowledge'

Competence must be demonstrated in relation to the technique for which competency is sought. It is essential that working safely in a potentially hazardous area is demonstrated in relation to:

- work permits and clearance
- hazard monitoring and evacuation procedures
- plant and electrical isolation
- evaluating extent of breakdown
- interpreting certification documentation in relation to repair and replacement
- following established breakdown procedures

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to attend to breakdown in hazardous areas as related to the metal engineering and maintenance industry
- communicate information about tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

Competency will be determined on evidence of having consistently performed across a representative range of activities and where required support the outcomes of other units within a qualification structure.

MEMMAH0073A: Purchase materials

Competency Descriptor: This unit applies to the skills and knowledge necessary to purchase materials in a wide range of different contexts in the metal engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Determine purchasing requirements	1.1 Consulted with client, customer or user as appropriate.
	1.2 Material specifications are determined from orders, instructions and/or technical drawings.
	1.3 Quantities, price limitations and delivery requirements are determined from orders/instructions.
2. Prepare purchase order/list	2.1 Purchase order/list is developed to standard operational procedure.
3. Purchase material	3.1 Standard operational procedures are followed.
	3.2 Supplier/vendor is informed of requirements and specifications.
	3.3 Purchasing schedules are adjusted where required to standard operational procedures.
	3.4 Appropriate paperwork/contracts are exchanged to standard operational procedure.
	3.5 Records/files are maintained accurately using standard operating procedures.

RANGE STATEMENT

Purchasing schedules developed to operating procedures and for pre-contracted suppliers/vendors.

Contracts/paperwork generated manually or electronically utilising on-site system.

Purchasing can cover one-off or multiple quantities of raw materials, components, equipment etc.

Purchasing specifications are determined from standard engineering drawings and data sheets, instructions written or verbal.

All work and work practices undertaken to regulations or standard requirements.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- written/oral communication techniques
- basic computation methods
- interpreting standard specifications and manuals
- documentation and record systems including the use of computers, information systems and business equipment technologies, as appropriate to ordering and purchasing of materials
- supplier/vendor/sources for required material
- purchase orders

Skills
The ability to:

- work safely and accurately to instructions
- communicate effectively
- order materials relevant to related trade
- use documentation and record systems including the use of computers, information systems and business equipment technologies
- interpret orders, instructions manuals quality specifications and/or technical drawings
- purchase materials relevant to related area

EVIDENCE GUIDE

Competency is to be demonstrated by purchasing materials within the range statement relative to the work orientation.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with the purchasing of materials or other units requiring the exercise of the skills and knowledge covered other units requiring the exercise of the skills and knowledge.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

This unit should be assessed on the job. 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.

MEMCOR0013A: Assist in the provision of on the job training

Competency Descriptor: This unit applies to the skills and knowledge necessary to assist in the provision of on the job training in a wide range of different contexts in the metal engineering and maintenance industry

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Plan for delivery of on-the-job training	1.1	Objectives of training and competency to be achieved are identified.
		1.2	Role in provision of training is clarified.
2.	Deliver on-the-job training	2.1	Training objectives are explained to trainee.
		2.2	Training is carried out using appropriate techniques.
		2.3	Trainee progress is monitored and constructive feedback provided to trainee.
3.	Review training program	3.1	Training program is evaluated according to standard operating procedure.
		3.2	Training data is recorded according to standard operating procedure.
		3.3	Training is reported on according to standard operating procedure.
		3.4	Training is promoted according to standard operating procedure.

RANGE STATEMENT

Training is delivered in a one-to-one or small group situation.

The training may be structured or informal and based on co-operation between trainer and other training personnel.

The training covers both underpinning knowledge and practical skills.

Training may be applied to technical, orientation, OH&S, or other areas.

Techniques that could be used as the subject of training includes but is not limited to:

- sketches
- drawings
- charts and maps
- logical presentation
- feedback
- production schedules
- written machine or job instructions
- client instructions
- sound communication methods
- demonstration/practice
- signage
- memos
- work schedules/work bulletins
- explanation
-

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- basic level of ability in speaking
- basic level in reading
- basic level in writing English
- basic numeracy
- work place safety requirements
- the use of work schedules, charts, work bulletins and memos

Skills
The ability to:

- work safely to instructions
- convey information in simple English to invoke correct actions
- assist in the provision of on the job training

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively assisting in the provision of on the job training in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

This unit should be assessed in conjunction with other specialisation or core units and not in isolation. The assessment should be linked with performance of normal workplace activities where the competency covered by this unit is demonstrated concurrently with other core or elective competencies. The communication tasks may be related to any aspect of the job, interacting with team members, receiving instructions, reporting and any other activity that requires communication with individuals or groups.

During assessment the individual will:

- demonstrate safe working practices at all times
- demonstrate the ability to assist in the provision of on the job training as related to the metal engineering and maintenance industry
- communicate information about tasks being undertaken to ensure a safe and efficient working environment
- take responsibility for the quality of their own work
- perform all tasks in accordance with standard operating procedures
- perform all tasks to specification
- use accepted engineering techniques, practices, processes and workplace procedures

(2) Method of Assessment

The candidate will be required to:

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

Tasks involved will be completed within reasonable timeframes relating to typical workplace activities.

(3) Context of Assessment

Competency will be determined on evidence of having consistently performed across a representative range of activities and where required support the outcomes of other units within a qualification structure.

MEMCOM0023A: Perform internal/external customer service

Competency Descriptor:

This unit deals with the skills and knowledge required to effectively perform internal/external customer service at the workplace, and applies to individuals working in the metal, engineering and maintenance industry.

Competency Field: Metal, Engineering and Maintenance

ELEMENT OF COMPETENCY		PERFORMANCE CRITERIA	
1.	Identify customer requirements	1.1	Customer requirements are identified from verbal or written communication.
		1.2	Degree to which customer requirements can be met is clearly communicated including details such as cost, delivery date, quantity or quality.
		1.3	Alternatives are proposed for any inability to completely satisfy customer requirements.
2.	Action customer requirements	2.1	Appropriate action is taken to implement customer requirements.
		2.2	Customer requirements that cannot be met are recorded and followed up on.

RANGE STATEMENT

This unit covers the knowledge and skills required for the provision of assistance to internal/external customers across a range of products and services.

Situations covered would go beyond simple sales and enquiries and could include taking one-off or special orders requiring detailed descriptions or handling of complaints.

Customers liaison can be undertaken through telephone, written, e-mail or face to face contact.

Typical applications of this unit would be found in service and maintenance departments.

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- basic level of ability in speaking
- basic level in reading
- basic level in writing English
- basic numeracy
- work place safety requirements
- organizations policy and procedures
- client services techniques
- the use of work schedules, charts, work bulletins and memos

Skills
The ability to:

- listen effectively
- work safely to instructions
- convey information in simple English to invoke correct actions
- perform internal/external customer service duties

EVIDENCE GUIDE

Competency is to be demonstrated by safely and effectively performing internal/external customer service duties in accordance with the range listed within the range of variables statement.

(1) Critical Aspects of Evidence

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with customer service or other units requiring the exercise of the skills and knowledge covered by this unit.

(2) Method of Assessment

The candidate will be required to orally, or by other methods of communication:

- answer questions put by the assessor.
- identify colleagues who can be approached for the collection of competency evidence where appropriate.
- present evidence of credit for any off-job training related to this unit.

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.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both.

The communication activities undertaken should be consistent with the individual's field of work and be based on interaction with others related to workplace tasks and procedures, tools, equipment, materials and documentation relevant to that field of work.

The competencies covered by this unit should be demonstrated by an individual working alone or as part of a team. Assessment should be conducted in an environment that the individual is familiar with.

MEMPLN0063A: Coordinate and manage basic installation projects

Competency Descriptor: This unit applies to the skills and knowledge necessary to coordinate and manage basic installation projects in a wide range of different contexts in the metal engineering and maintenance industry

Competency Field: Planning

ELEMENT OF COMPETENCY	PERFORMANCE CRITERIA
1. Plan and prepare to manage projects	1.1 Management of projects OH&S policies and procedures are planned and prepared to ensure these are followed.
	1.2 Project schedules are managed in accordance with requirements.
	1.3 Appropriate personnel are consulted to ensure projects are managed effectively.
	1.4 Projects are managed against requirements.
	1.5 Contribution is made to determine human resource and procurement management plans for projects in accordance with established procedures and checked against requirements.
2. Manage projects	2.1 Mechanisms are used to measure, record and report progress of activities in relation to the agreed project schedules and plans.
	2.2 Projects are managed in accordance with established procedures and requirements to achieve designated objectives.
	2.3 Records and documentation of project activities are maintained in accordance with established procedures to facilitate quality management and to provide an audit trail.
	2.4 Results of project activities are documented and evaluated in accordance with established procedures to determine compliance with agreed quality standards.
	2.5 Shortfalls in quality outcomes are reported in accordance with established procedures to enable appropriate action to be initiated.

3.	Inspect and notify completion of work	3.1	Quality management issues and responses are reported in accordance with established procedures.
		3.2	Completion of projects are notified in accordance with established procedures.

RANGE STATEMENT

This unit recognises the commonality of skills and knowledge that exists for the unit as well as the additional specific outcome; which is to be reported on. Therefore, competency can be displayed on one, some or all of the following categories and in addition to the respective common underpinning knowledge associated with the selected specialisation:

Project objectives may include:

- project manager responsibility
- behavioral aspect of project in terms of project personnel and coordinator
- work breakdown structure in coordinating projects
- tools and techniques for keeping the project on course
- pros and cons of working on projects

Nature of project may include:

- project plan
- project control
- project schedule (Gantt Chart/ Pert/CPM schedule network)
- the budget control

Projects may include:

- computer systems
- electrical equipment and systems
- electronics apparatus and systems
- instrumentation systems
- mechanical systems
- metal fabrication
- refrigeration and air conditioning systems

UNDERPINNING KNOWLEDGE AND SKILLS

Knowledge
Knowledge of:

- OH&S policies and procedures
- basic level of ability in speaking
- basic level in reading
- basic level in writing English
- basic numeracy
- work place safety requirements
- organizations policy and procedures
- project schedules
- mechanisms used to measure, record and report progress of activities in relation to the agreed project schedules and plans
- tools and techniques for keeping the project on course
- pros and cons of working on projects
- budget control

Skills
The ability to:

- listen effectively
- work safely to instructions
- convey information in simple English to invoke correct actions
- prepare project schedules
- perform project control activities
- Coordinate and manage basic installation projects

EVIDENCE GUIDE

Competency is to be demonstrated by the effective use of techniques to coordinate and manage basic installation projects within the range statement relative to the work orientation.

(1) Critical Aspects of Evidence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating consistent performance for each element of the unit in the related category and specialisation which is to be exhibited across a representative range of applications; autonomously and to requirements
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace for each of the categories and areas of specialisation undertaken from those listed in the Range statement or evidence guide
- demonstrating an understanding of the underpinning knowledge and skills identified for the categories and related specialisation undertaken in the section, of this unit titled ‘Underpinning knowledge’

(5) Method of Assessment

The candidate will be required to orally, or by other methods of communication,

- answer questions put by the assessor
- identify colleagues who can be approached for the collection of competency evidence where appropriate
- present evidence of credit for any off-job training related to this unit

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.

(3) Context of Assessment

This unit may be assessed on the job, off the job or a combination of both.

The communication activities undertaken should be consistent with the individual's field of work and be based on interaction with others related to workplace tasks and procedures, tools, equipment, materials and documentation relevant to that field of work.

The competencies covered by this unit should be demonstrated by an individual working alone or as part of a team. Assessment should be conducted in an environment that the individual is familiar with.