



Australian Government

MARC018 Employ tools, equipment and materials in a shipboard context

Release: 2

MARC018 Employ tools, equipment and materials in a shipboard context

Modification History

Release 2. Duplication of information removed from Application.

Release 1. New unit of competency.

Application

This unit involves the skills and knowledge required to employ tools, equipment and materials to perform maintenance activities on a vessel. It includes the use of hand, power and machine tools, welding equipment, heat treatment processes, soldering operations, adhesives and bonding materials in performing routine and non-routine maintenance activities.

This unit applies to the work of a Marine Engineer Class 3 Near Coastal.

This unit has links to legislative and certification requirements.

Pre-requisite Unit

Not applicable.

Competency Field

C – Equipment Operations

Unit Sector

Not applicable.

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Follow safe work practices

- 1.1 Work health and safety (WHS)/occupational health and safety (OHS) procedures relevant to using tools and equipment in a shipboard context are complied with
- 1.2 Safety hazards are identified and reported according to safety and vessel procedures
- 1.3 Prior to use, tools and equipment needed to carry out maintenance activities are checked for correct operation and safety according to safety and vessel procedures

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|------------------------------------|-----|---|
| | 1.4 | Before commencing maintenance activities, isolation precautions are implemented according to safety and vessel procedures |
| 2 Carry out heat treatment | 2.1 | Requirements of job are determined from engineering drawings, job sheet or supervisor |
| | 2.2 | Heat treatment equipment is selected for required heat treatment according to safety, workplace and manufacturer requirements |
| | 2.3 | Equipment is set up and used according to standard operating procedures and manufacturer instructions |
| | 2.4 | Personal protective equipment (PPE) is used according to standard operating procedures |
| | 2.5 | Emergency procedures are complied with according to approved safety instructions |
| | 2.6 | Safety signs and symbols are identified and complied with according to approved safety instructions |
| | 2.7 | Heat treatment process is applied according to job, safety and workplace requirements |
| | 2.8 | Hazardous conditions are identified and risk control measures are implement to maintain a safe work environment |
| 3 Use hand tools | 3.1 | Hand tools are used according to workplace procedures, WHS/OHS requirements and manufacturer instructions. |
| | 3.2 | Faults with hand tools and equipment are identified and reported to appropriate personnel |
| 4 Use hand power tools | 4.1 | Hand power tools are used according to workplace procedures, WHS/OHS requirements and manufacturer instructions. |
| | 4.2 | Faults with hand power tools and equipment are identified and reported to appropriate personnel |
| 5 Perform onboard pipe work | 5.1 | Job requirements are determined from engineering drawings, job sheet or supervisor |
| | 5.2 | Sequence of operations is determined according to workplace, WHS/OHS and job requirements |
| | 5.3 | Pipe work is fabricated and joined according to relevant |

- standards, and job, safety and workplace requirements
- 5.4 Pipe work is inspected for defects according to workplace procedures
 - 5.5 Pipe work is installed in specified location without damage or distortion to pipe work, surrounding environment or other services
 - 5.6 Type of filters and strainers in shipboard piping systems are located and determined using relevant engineering drawings and specifications
 - 5.7 Pipe work is tested for compliance with job specification and workplace requirements
- 6 Use machine tools**
- 6.1 Job requirements are determined from engineering drawings, job sheet or supervisor
 - 6.2 Sequence of operations is determined according to workplace, WHS/OHS and job requirements
 - 6.3 Machine tools are selected according to workplace procedures, WHS/OHS requirements and manufacturer instructions
 - 6.4 Machining operations are performed according to workplace, WHS/OHS and job requirements
 - 6.5 Components are measured in line with workplace, WHS/OHS and job requirements
 - 6.6 Machine is adjusted and maintained according to workplace, safety, manufacturer and job requirements
- 7 Perform welding and thermal cutting operations**
- 7.1 Job requirements are determined from engineering drawings, job sheet or supervisor
 - 7.2 Materials are prepared for welding using correct tools, equipment, materials and procedures
 - 7.3 Materials are welded using appropriate welding process according to relevant standards and job, safety and workplace requirements
 - 7.4 Joints are welded according to relevant standards and job, safety and workplace requirements
 - 7.5 Oxygen fuel gas cutting torch is used to cut straight lines and curves in mild steel plate up to 10 mm thick according to

		relevant standards and job, safety and workplace requirements
	7.6	Weld is inspected according to relevant standards, and job and workplace requirements
8 Perform soldering operations	8.1	Job requirements are determined from engineering drawings, job sheet or supervisor
	8.2	Materials are prepared for soldering using correct tools, equipment, materials and procedures
	8.3	Materials are soldered according to relevant standards and job, safety and workplace requirements
	8.4	Soldered joints are performed according to relevant standards and job, safety and workplace requirements
	8.5	Soldered joints are inspected according to relevant standards and job, and workplace requirements
	8.6	Materials are desoldered using correct procedure and minimising damage to materials/components
9 Select and use sealants, adhesives, bonding agents, gaskets and packings	9.1	Job requirements are determined from engineering drawings, job sheet or supervisor
	9.2	Gaskets and packings are selected and used according to job requirements and manufacturer/component supplier instructions
	9.3	Sealants and adhesives are selected and used according to job requirements and manufacturer/component supplier instructions
	9.4	Plastic bonding is performed according to job requirements and manufacturer/component supplier instructions
	9.5	Sealants, adhesives, bonding agents, gaskets and packings are stored according to workplace and manufacturer/component supplier instructions

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Specifies different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Heat treatment process include one or more of the following:

- annealing
- hardening
- normalising
- tempering

Hand tools include one or more of the following:

- anvil
- benders
- brushes
- chisels
- chucks
- cutters
- drills
- drivers
- files
- gear pullers
- hacksaws
- hammers
- nippers
- pliers
- punchers
- reamers
- scissors
- scrapers
- spanners
- swage block
- taps and dies
- vices
- wrenches

Hand power tools include one or more of the following:

- drills
- grinders
- hand shear and nibbler
- impact wrenches
- portable jigsaw
- sanders

Pipe work defects include one or more of the following:

- ovality
- thinning

Machine tools include one or more of the following:

- drills
- grinder
- lathes
- milling machines

Welding process include one or more of the following:

- gas metal arc welding
- gas tungsten arc welding
- oxy-acetylene welding
- shielded metal arc welding

Joints include one or more of the following:

- butt
- fillet joints:
- corner joints
- lap joints
- tee joint plate edge preparations
- throat length with concave and convex reinforcement

Soldered joints include one of the following :

- hard
- soft

Unit Mapping Information

This is a new unit. This unit is equivalent to MARC5001A Employ tools, equipment and materials.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

Assessment Requirements for MARC018 Employ tools, equipment and materials in a shipboard context

Modification History

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- assessing own work outcomes and maintaining knowledge of current codes, standards, regulations and industry practices
- communicating procedures associated with using hand and machine tools and equipment verbally and in writing
- identifying methods, procedures and materials needed for operating hand and power tools on vessels
- initiating timely action in response to defects or damage
- reading and interpreting written information related to operating tools and equipment used for maintenance operations on board vessels, including technical manuals and specifications
- safely using hand and machine tools.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- characteristics, limitations and use of metals and non-metallic materials used in ship construction and repair
- hand and power tools and component:
 - types
 - operational characteristics and performance specifications
 - maintenance
- heat treatment:
 - material characteristics
 - applications, equipment and processes
 - emergency procedures
 - material preparation, quenching, preheating requirements
 - material condition during heat treating process
 - batch and/or piece loading of furnaces

- safe loading of furnaces
- hazards and control measures associated with heat treatment, including housekeeping
- use and application of personal protective equipment (PPE)
- safe work practices and procedures
- machine tools:
 - reasons for selecting chosen sequence of operations
 - methods of work holding
 - basic marking out techniques including datum points/lines
 - geometry of cutting tools for a range of materials and applications
 - benefits of using correctly sharpened cutting tools
 - machine operation
 - selection of feeds and speeds to suit a range of materials and operations within the scope of this unit
 - correct methods of mounting a variety of cutting tools
 - safety issues with regard to correct clamping, guards and shields
 - tolerances and limits of size
 - situations indicating need for machine adjustment, lubrication and cleaning
 - techniques, tools and equipment to measure materials and machined components
 - use and application of PPE
 - safe work practices and procedures
 - hazards and control measures associated with general machining
- materials used in ship construction and repair:
 - metallurgy principles
 - types of materials
 - limitations of materials
 - properties of materials
- national and international regulations, International Maritime Organization (IMO) Conventions and Codes, including Australian Maritime Safety Authority (AMSA) Marine Orders applicable to managing shipboard plant and equipment maintenance and repair operations on vessels
- own ability and limits to rectify irregularities and faults
- pipe work:
 - installation techniques
 - purging techniques, applications and precautions
 - capping/sealing pipe work and assembly methods
 - identifying location/layout of pipe work and assemblies, and application and characteristics of enclosure/hanging/supporting systems
 - pipe work, ancillary installation and joining procedures
 - leak testing applications and uses
- procedures for completing temporary and permanent repair and/or replacement procedures for plant and equipment on board vessels at sea, alongside and in dry dock

- properties and parameters of engineering materials
- safety data sheets (SDS)/material safety data sheets (MSDS)
- sealants, gaskets, bonding agents, adhesives and packing:
 - dangers of working with sealants and adhesives
 - operating principles of gaskets and their relationship to other components
 - types, characteristics, uses and limitations of sealants and adhesives
 - gasket installation procedures
 - sealant and adhesives application techniques
- soldering:
 - cleaning solutions and properties, and cleaning procedures
 - use and application of PPE for manual soldering/desoldering
 - methods of joint preparation
 - properties of fluxes and their uses
 - heat and damage protection procedures
 - procedures for preventing electrostatic discharge damage
 - soldered joint testing and inspection procedures
 - reworking procedures and precautions
- testing procedures for materials under load:
 - compressive load testing procedures
 - shear load testing procedures
 - tensile load testing procedures
- welding:
 - characteristics and properties of common metals and welding materials
 - effect of gas and electrical welding operations on metals
 - hazards and control measures associated with gas and electrical welding, including housekeeping
 - welding safety practices and procedures
 - effect of various treatments on a range of commonly used metals
 - use and application of PPE
- work health and safety (WHS)/occupational health and safety (OHS) legislation, policies and procedures.

Assessment Conditions

Assessors must satisfy National Vocational Education and Training Regulator (NVR)/Australian Quality Training Framework (AQTF) assessor requirements.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that reflect workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- tools, equipment, machinery, materials and personal protective equipment currently used in industry
- applicable documentation such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- range of relevant exercises, case studies and/or simulations.

Links

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