



Australian Government

MARC2003A Operate and maintain extra low and low voltage electrical systems and equipment

Release 1

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Modification History

Release 1

This is the first release of this unit.

Unit Descriptor

This unit involves the skills and knowledge required to operate, test and maintain extra low and low voltage electrical systems and equipment.

Application of the Unit

This unit applies to engine workers in the maritime industry working as a Marine Engine Driver Grade 3 on vessels up to 500 kW or as a Marine Engine Driver Grade 2 on vessels up to 750 kW or as a Marine Engine Driver Grade 1 on vessels up to 1500 kW.

WARNING: Relevant state/territory training and qualification requirements need to be fulfilled by any persons carrying out installation, maintenance and/or repair of refrigeration equipment especially with regard to preventing the escape of refrigerants into the atmosphere and to electrical work.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

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| 1 Operate electrical systems and equipment | <ul style="list-style-type: none">1.1 Routine pre-operational checks are carried out on <i>electrical systems and equipment</i> according to manufacturer specifications1.2 Systems and equipment are operated according to manufacturer specifications1.3 <i>Faults</i> are identified and appropriate action is taken to rectify them1.4 Faults are reported and logged promptly and accurately to appropriate personnel |
| 2 Carry out routine maintenance on electrical systems and equipment | <ul style="list-style-type: none">2.1 Tasks are planned and sequenced in conjunction with others involved in or affected by maintenance work2.2 <i>Tools and equipment</i> are selected and checked for serviceability2.3 Components to be maintained are isolated2.4 Systems are tested and test results are compared with manufacturer specifications2.5 <i>Maintenance tasks</i> are carried out to specification2.6 Unserviceable components are tagged according to organisational procedures and appropriate personnel are notified |
| 3 Isolate faulty components for repair | <ul style="list-style-type: none">3.1 Faulty items or components are isolated according to workplace procedures3.2 Serviceable items are fitted according to manufacturer specifications3.3 Operational check is carried out on equipment or system to ensure its compliance with manufacturer specification |
| 4 Clean up and complete documentation | <ul style="list-style-type: none">4.1 Work area is cleared and cleaned4.2 <i>Materials</i> are disposed of or recycled according to legislative and workplace requirements4.3 Tools and equipment are cleaned, checked and stored according to workplace procedures4.4 Maintenance report is completed according to workplace procedures |

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required Skills:

- Apply safety requirements throughout the work sequence including the use of personal protective equipment
- Complete all work to specification
- Ensure correct requirements and details of basic maintenance of electrical systems and equipment are available
- Implement safe and environmentally responsible work practices in testing and maintenance activities
- Locate, interpret and apply manufacturer specifications for electrical systems and equipment
- Operate direct current (DC) systems and conduct operator preventive maintenance according to manufacturer recommendations, regulations and vessel operating procedures to ensure safe operation
- Operate electrical systems according to manufacturer recommendations, regulations and vessel operating procedures to ensure safe operation
- Recognise electrical system faults and where necessary take steps to make them immediately safe
- Select and use appropriate processes, tools and equipment

Required Knowledge:

- Basic care and fault recognition of electrical systems and equipment
- Batteries:
 - care and maintenance
 - hazards
 - types
- Charging systems:
 - alarms/indicators
 - regulators
- Connecting batteries
- DC systems not exceeding 32 V DC
- Electrical systems:
 - above 32 V DC and up to 415 V alternating current (AC)
- Fault identification, location and safety implications
- Personal safety
- Protective devices on switchboards
- Relevant state/territory training and qualification requirements for carrying out

installation, maintenance and/or repair of refrigeration equipment especially with regard to preventing the escape of refrigerants into the atmosphere and to electrical work

- Shore power connection
- Starter motors, alternators and associated equipment:
 - operation
 - maintenance
- Uses of fuses and circuit breakers – selection of correct capacity
- Work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, the required skills and knowledge, the range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the Elements, Performance Criteria, Required Skills, Required Knowledge and include:

- initiating timely action in response to defects or damage
- ensuring currency of relevant WHS/OHS skills and knowledge.

Context of and specific resources for assessment

Performance is demonstrated consistently over time and in a suitable range of contexts.

Resources for assessment include access to:

- industry-approved marine operations site where operating and maintaining extra low and low voltage electrical systems and equipment can be conducted
- tools, equipment and personal protective equipment currently used in industry
- relevant regulatory and equipment documentation that impacts on work activities
- range of relevant exercises, case studies and/or other simulated practical and knowledge assessments
- appropriate range of relevant operational situations in the workplace.

In both real and simulated environments, access is required to:

- relevant and appropriate materials and equipment
- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals.

Method of assessment

Practical assessment must occur in an:

- appropriately simulated workplace environment and/or
- appropriate range of situations in the workplace.

A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate to this unit:

- direct observation of the candidate operating and maintaining extra low and low voltage electrical systems and equipment
- direct observation of the candidate applying relevant WHS/OHS requirements and work practices.

Guidance information for assessment

Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

In all cases where practical assessment is used it should be combined with targeted questioning to assess Required Knowledge.

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

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. Bold italicised wording, if used in the performance criteria, is detailed below.

Electrical systems and equipment may include:

- Alternators
- Batteries
- Charging systems
- Fuses and circuit breakers
- Generators
- Motors
- Shore power connection
- Starter motors

Faults may include:

- Battery faults
- Failure of alternators to produce voltage
- Failure of starter motors
- Faults with shore power connections including phase rotations
- Operation of fuses and circuit breakers

Tools and equipment may include:

- Hand and power tools
- Test equipment

Maintenance tasks may include:

- Replacing fuses
- Testing batteries, voltage, electrolyte and rectifying faults
- Testing charging system voltage output

Materials may include:

- Distilled water
- Rags
- Used components

Unit Sector(s)

Not applicable.

Competency Field

Equipment Operations