



Australian Government

Assessment Requirements for MARL038

Apply advanced principles of marine electrotechnology

Release: 1

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Modification History

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package Release 6.0.

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
- identifying and applying relevant mathematical formulas and techniques to solve complex problems related to marine electrotechnology
- identifying and interpreting numerical and graphical information, and performing mathematical calculations to perform tasks, such as using phasor diagrams and mathematical expressions to explain the effects of loads and excitation on synchronous motors
- identifying, collating and processing information required to perform complex calculations related to marine electrotechnology
- imparting knowledge and ideas through verbal, written and visual means
- reading and interpreting written information needed to perform complex electrical calculations
- solving problems using appropriate laws and principles
- using calculators to perform complex mathematical calculations.

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:

- alternating current (AC) commutator motors
- AC induction motors
- AC principles
- AC single phase motors
- advanced principles of marine electrotechnology
- asynchronous machines
- batteries
- circuits:
 - capacitance
 - inductance

- resistance
- circuit diagrams
- circuit combinations, including:
 - resistive/capacitive
 - resistive/inductive
- complex number theory
- direct current (DC) generators and motors
- difference between AC and DC
- electrical:
 - circuits
 - current
 - power
 - safety
 - units of measurement
- electromagnetic:
 - force
 - induction
- electrical meters:
 - energy meters
 - frequency meters
 - induction disc watt meters
 - power factor meters
- Faraday's and Lenz's Laws of electromagnetic induction
- Flemings rule
- Fourier series for non-sinusoidal voltage and current representation
- intermediate electrical circuits
- intermediate principles of marine electrotechnology
- Kirchhoff's circuit laws
- losses, including:
 - copper losses
 - iron losses or magnetic losses
 - mechanical losses
- magnetic circuits and key parameters, including:
 - current
 - flux
 - flux density
 - magnetising force
 - magneto motive force
- national and international maritime regulations, International Maritime Organization (IMO) conventions and codes applicable to the operation of electrical and electronic control

equipment on vessels of typically unlimited propulsion power

- Ohm's Law
- operating principles of:
 - DC generators
 - DC motors
 - electrical instrumentation
 - parallel circuits
- parallel operation of AC and DC generators
- polyphase AC circuits
- power factor
- power factor correction mechanisms
- principles and procedures for electrical and electronic measurement
- problems, including:
 - tapping point
 - turns
 - voltages
- principles of:
 - electrical safety
 - electrolytic action
 - electromagnetism
- reluctance and permanent magnet machines
- resistance
- series circuits
- shipboard DC machinery, including
 - electrical safety
 - electrolytic action
 - electromagnetism
- single and three phase transformers
- synchronous motors and generators
- Thevenin's theorem
- work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

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.

Practical assessment must occur in a workplace, or realistic industry approved marine operations site or simulated workplace, under the normal range of workplace conditions.

Simulations and scenarios may be used where situations cannot be provided in the workplace or may occur only rarely, in particular for situations relating to emergency procedures and adverse weather conditions where assessment would be unsafe, impractical or may lead to environmental damage.

Resources for assessment must include access to:

- relevant documentation, including workplace procedures, regulations, codes of practice and operation manuals
- tools, equipment, materials, personnel and relevant personal protective equipment (PPE) currently used in industry.

Links

Companion Volume implementation guide can be found in VetNet -

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