



Australian Government

Assessment Requirements for MARL042

Apply basic 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.

Performance Evidence

- 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 basic problems related to marine electrotechnology
- identifying and interpreting numerical and graphical information, and performing mathematical calculations, such as resistance of electrical conductors, power output and efficiency in direct current (DC) motors, and driving torque in induction motors
- identifying, collating and processing information required to perform basic calculations related to marine electrotechnology
- performing accurate and reliable calculations
- reading and interpreting written information needed to perform basic electrical calculations
- solving problems using appropriate laws and principles.

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:

- basic principles of marine electrotechnology
- batteries
- cables
- circuit breakers
- coupling, load sharing and changing over generators, including:
 - conditions for automatic start of emergency generator and starting methods
 - control systems for distribution for active and reactive power
 - excitation systems of generators
 - methods of synchronisation
 - power factor
 - principles of power management, including:
 - control of start-release of big consumers directly supplied from main switchboard

- automatic three-step disconnection of non-essential power consumers
- load depending start and stop of generator and automatic load sharing
- protections for generators and diesel engines, including:
 - asymmetrical voltage and current
 - frequency and voltage stabilisation of shaft generators
 - open circuit, wire fault and earth-fault monitoring
 - overload
 - reverse power
 - short circuit
 - under and overvoltage
 - under and over frequency
- safety systems of generators
- voltage and frequency control systems
- DC motors and rotating machinery
- difference between alternating current (AC) and DC
- distribution panels
- electrical:
 - current
 - power
 - safety
 - units of measurement
- electromagnetic:
 - force
 - induction
- effective verbal, written and visual communication techniques
- electrical theory, including:
 - electrical circuits
 - impedance and inductance
 - Kirchhoff's Law
 - Ohm's Law
- electrical motors including:
 - AC motor
 - DC motor
- electrical motor starting methodologies
- emergency switchboard
- fundamentals of AC, including:
 - principles
 - rotating machinery
- high voltage (HV)
- lighting

- main switchboard
- measuring instruments for switchboards
- operational parameters of DC motors, including:
 - current
 - flux density
 - torque
 - voltage
- parallel circuits
- power distribution systems, including:
 - distribution
 - insulation
 - transformers
- principles of electromagnetism and electrolytic action
- resistance
- series circuits
- shore connection
- 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:

- applicable documentation, such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- tools, equipment, machinery, materials 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>