



Australian Government

Assessment Requirements for MARL049

Demonstrate advanced knowledge of marine control systems and automation

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

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:

- accessing information and sketching diagrams, and interpreting and explaining testing requirements related to control systems on commercial vessels
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and work practices
- assessing own work outcomes and maintaining knowledge of current codes, standards, regulations and industry practices
- explaining advanced principles of marine automation and process control, and imparting knowledge and ideas verbally, in writing and visually
- identifying and interpreting numerical and graphical information, including schematic diagrams, relevant to control systems on commercial vessels
- identifying and suggesting ways of rectifying faults and malfunctions in control systems on commercial vessels
- identifying methods, procedures and materials needed to operate and maintain control systems on commercial vessels
- reading and interpreting written information related to operating control systems on commercial vessels.

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:

- actuators and control valves, including:
 - electric
 - hydraulic
 - pneumatic
- analogue and digital programmable logic controllers (PLCs)
- Australian Standards for drawing symbols/layouts for schematic diagrams
- automatic control engineering and safety devices
- bridge control systems

- characteristics and functions of temperature, pressure and viscosity of fuel
- concept of 'fail safe' philosophy
- concepts of unmanned machinery spaces (UMS), and automated monitoring and control of machinery
- control and monitoring of ship machinery
- control:
 - loops
 - theory
- design features and system configuration of automatic control equipment and safety devices, including:
 - general requirements
 - generator and distribution system
 - main engine
 - steam boiler
- design features and system configuration of operational control equipment for electrical motors, including:
 - distribution
 - effects of varying frequency and voltage of alternating current (AC) motors
 - emergency power
 - insulated gate bipolar transistor (IGBT) motor speed control
 - motor control and protection
 - motor speed control by thyristors
 - three phase AC motors
 - three phase generators
 - three phase synchronous motors
 - three phase transformers
- design features of high voltage (HV) installations
- differential pressure transmitters
- electronic:
 - electronic systems circuit diagrams
 - temperature sensors and transmitters
 - transmitters
- electronic, power electronics
- faults, including:
 - earths
 - electronic component failure
 - high resistance joints
 - open circuits
 - power supply faults
 - short circuits

- fault-finding techniques for control systems
- features of hydraulic and pneumatic control equipment
- final control element arrangements
- governors and governor adjustments, including mismatching between prime mover types and responses
- industry standards for drawing symbols/layouts for schematic diagrams
- instrument process and control terms
- machinery space monitoring alarm and control systems
- marine electrotechnology
- measurement and test equipment used for fault finding electronic apparatus
- mechanical and electrical sensors
- meters, including:
 - rotometer
 - target meter
- methods of testing transmitter outputs, including:
 - MA test point
 - MV test point
 - no test points
- open and closed loop systems
- operation of hydraulic governors
- operation of pneumatic 3-term controller and controller adjustment procedures
- operation of PLCs
- operational safety of HV installation
- proportional-integral-derivative (PID) electronic controllers
- pneumatic and electrical instrumentation transmitters
- principles and operation of pneumatic control element and systems
- principles of:
 - basic electronic circuits
 - basic pneumatic systems and action of pneumatic instruments
 - process control
- safety devices, alarms and monitoring systems
- sensing and transmitting elements
- signal transmissions systems used for monitoring, controlling and shutting down machinery
- tests and procedures required to meet UMS requirements
- WHS/OHS legislation, policies and procedures.

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 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 and relevant personal protective equipment (PPE) that replicate and are 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>