Australian Government

Assessment Requirements for MARB014 Maintain and repair shipboard machinery and equipment

Release: 1

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Modification History

Release 1. New unit of competency.

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
- explaining principles of shipboard machinery and equipment and imparting knowledge and ideas verbally and in writing
- initiating timely action in response to defects or damage
- performing calculations and interpreting graphical information used in maintaining shipboard machinery and equipment
- reading and interpreting written information related to the operation, performance and maintenance of shipboard machinery and equipment, including machinery specifications and operational manuals
- scheduling maintenance of shipboard machinery and equipment
- using testing equipment and explaining test and performance results relevant to shipboard machinery and equipment.

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 diesel engine operation including:
  - typical starting air and manoeuvring systems of diesel engines, including all components normally found therein
  - typical diesel engine lubrication systems, including:
  - operating principles and adjustments of diesel engine fuel injection equipment, including common service faults, symptoms and causes of diesel fuel injection problems, explaining appropriate actions to be taken
  - means of pressure charging diesel engines, including common service faults, appropriate actions to rectify these faults, and emergency operation and isolation procedures
  - different methods of cooling marine diesel engines, including common requirements of cooling
  - common faults and appropriate action to be taken with cooling of diesel engines

  - causes of crankcase and air-line explosions, and scavenge and uptake fires
  - materials used to construct following diesel engine major parts:
  - crank shafts
  - cylinder liners and heads
  - exhaust valves
- basic principles of electrotechnology, marine electrical practice and marine automation and control relevant to detection, fault finding and repair of faults in electrical and electronic equipment, including:
  - basic electrical circuit theory
  - basic theory of electromagnetism and electrostatics
  - electrolytic action and cells
  - AC and DC theory and plant and equipment
  - basic cabling, distribution and lighting systems
  - basic control and switch gear
  - instruments, calibration and testing
- basic principles of mechanics as they relate to forces, pressures, stress and strains in shipboard dynamic machinery
- basic principles of operating and maintaining:
  - fluid power control systems
  - refrigeration systems
  - machinery lubrication systems
  - marine boilers and materials used to construct following boiler major parts:

    water tubes

    furnace

    steam and water drum

    superheaters
- basic thermodynamics, including:
  - basic thermodynamic properties of common working fluids
  - methods of heat transfer and related problems
  - principles of heat transfer by conduction, convection and radiation and their application to marine systems
  - elementary principles of steam plants
  - basic steam plant cycles and function of each component
  - combustion process and calorific value of fuels
  - air/fuel ratio and significance of excess air on combustion
  - operating cycle of single stage reciprocating air-conditioners, including methods for the mass of air delivered
  - clearance volume, its effect on volumetric efficiency and methods of calculating volumetric efficiency
  - advantages of multi-staging and inter-cooling
  - meaning of gauge and absolute pressure

  - temperature and temperature scales
  - system international (SI) units and common thermodynamic terms and principles
- maintenance and repair hazards and problems, and appropriate preventative and remedial action and solutions during maintaining and repairing shipboard plant and equipment
- maritime communication techniques needed during maintenance and repair operations
- materials used to construct the following gas turbine major parts:
  - turbine casing
  - rotors
  - compressors
  - gas generators
- materials used to construct the following steam turbine major parts:
  - turbine casings
  - • rotors
  - • blades
  - • nozzles
  - • reduction gears
- 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
- nature and causes of typical shipboard plant and equipment malfunctions and available methods for their detection and repair, including established fault finding techniques
- operating principles and performance specifications for different types of shipboard plant and equipment usually found on a vessel of unlimited propulsion power
- operating principles of unmanned machinery spaces (UMS) and automated monitoring and control of machinery
- planned maintenance systems and procedures for condition monitoring of plant and equipment, including responsibilities and requirements covered by various forms of vessel survey
- plant and equipment typically found on board a vessel of unlimited propulsion power
- procedures for:
  - carrying out shipboard plant and equipment fault finding and repair as part of routine maintenance procedures to ensure compliance with company and survey requirements, and established safety rules and regulations
  - completing temporary and permanent repair and/or replacement procedures for plant and equipment on board vessels at sea, alongside and in dry dock
  - reading and interpreting plant and equipment performance readings and instrumentation
- purpose and content of safety data sheets (SDS)/material safety data sheets (MSDS)
- safe procedures for:
  - handling heavy plant, equipment and component parts during maintenance and repair of shipboard plant and equipment
  - using hand and power tools and maintenance equipment

- safety, environmental and hazard control precautions and procedures relevant to shipboard plant and equipment inspection and maintenance operations
- types of vessel maintenance and repair records to be maintained to meet requirements of company, survey and regulatory authorities
- typical vessel and plant and equipment specifications, equipment drawings, operational manuals, and electrical and control circuit diagrams
- 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

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2