



Australian Government

Australian Maritime Safety Authority

Engineer Class 3 Near Coastal

Skills and Knowledge
Required for Marine Order 505
(Certificates of competency
— national law) 2022



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TABLE 1 – SURVIVAL AT SEA

Outcome	Content	Standards for evaluating competence
Survive at sea in the event of vessel abandonment	<ul style="list-style-type: none"> • Types of emergency situations which may occur, such as collision, fire, foundering • Types of life-saving appliances normally carried on board • Equipment in survival craft • Location of personal life-saving appliances • Principles concerning survival, including: <ul style="list-style-type: none"> - Value of training and drills - Personal protective clothing and equipment - Need to be ready for any emergency - Actions to be taken when called to survival craft stations - Actions to be taken when required to abandon ship - Actions to be taken when in the water - Actions to be taken when aboard a survival craft - Main dangers to survivors 	<ul style="list-style-type: none"> • Don a lifejacket • Don and use an immersion suit • Safely jump from a height into the water • Right an inverted liferaft while wearing a lifejacket • Swim while wearing a lifejacket • Keep afloat without a lifejacket • Board a survival craft from the vessel and from the water while wearing a lifejacket • Take initial actions on boarding survival craft to enhance chance of survival • Stream a drogue or sea-anchor • Operate survival craft equipment • Operate location devices, including radio equipment • Action taken on identifying muster signals is appropriate to the indicated emergency and complies with established procedures. • The timing and sequence of individual actions are appropriate to the prevailing circumstance and conditions and minimize potential dangers and threats to survival • Method of boarding survival craft is appropriate and avoids dangers to other survivors • Initial actions after leaving the vessel and procedures and actions in water minimise threats to survival
Demonstrate use of life-saving appliances and abandon ship procedures	<ul style="list-style-type: none"> • The operation of survival craft and rescue boats • Survival craft launching appliances and arrangements and their equipment, including EPIRBs 	<ul style="list-style-type: none"> • Actions in responding to abandon ship and survival situations are appropriate to the prevailing circumstances and comply with accepted safety practices and standards • Organise abandon ship drills • Actions to protect and safeguard all onboard during an emergency

TABLE 2 – FIRE PREVENTION AND FIRE FIGHTING*

Outcome	Content	Standards for evaluating competence
<ul style="list-style-type: none"> Minimise the risk of fire and maintain a state of readiness to respond to emergency situations involving fire Demonstrate knowledge of precautions against fire or explosion 	<ul style="list-style-type: none"> Shipboard fire-fighting organisation Location of fire-fighting appliances and emergency escape routes The elements of fire and explosion (the fire triangle) Types and sources of ignition Flammable materials, fire hazards and spread of fire The need for constant vigilance Actions to be taken on board Fire and smoke detection and automatic alarm systems Classification of fire and applicable extinguishing agents Methods of fire prevention Common causes of fire Advantages of cleanliness and good housekeeping practices Oil mist detectors Storage and use of LPG and petrol Bunkering and transfer of fuel Safety devices to prevent fire or explosion Dangers of accumulation of oil or gas in enclosed spaces 	<ul style="list-style-type: none"> Initial actions on becoming aware of an emergency conform with accepted practices and procedures Action taken on identifying muster signals is appropriate to the indicated emergency and complies with established procedures Organise fire drills Identify and demonstrate knowledge of the causes of fires and explosions and the means of prevention in accordance with maritime safety regulations and vessel procedures Procedures for monitoring fire detection and safety systems ensure that all alarms are detected promptly and acted upon in accordance with established vessel procedures
<p>Operate and maintain fire protection, detection and extinguishing equipment and operate machinery in such a way as to minimise fire risk</p>	<ul style="list-style-type: none"> Methods of dealing with fire onboard vessels Construction, testing and use of various portable and fixed fire extinguishers Remote shut-offs and closing appliances Fire-fighting equipment and its location on board Fixed installations Fire-fighter's outfits Personal equipment Fire-fighting appliances and equipment Fire-fighting methods Fire-fighting agents Fire-fighting procedures Use of breathing apparatus for fighting fires and effecting rescues 	<ul style="list-style-type: none"> Type and potential risk of the fire is identified, explained and initial actions conform to emergency procedures and contingency plans

* Practical demonstration in spaces which provide truly realistic training conditions (e.g., simulated shipboard conditions) and, whenever possible and practical, in darkness

Outcome	Content	Standards for evaluating competence
Fight and extinguish fires		<ul style="list-style-type: none"> • Clothing and equipment are appropriate to the nature of the fire-fighting operations • The timing and sequence of individual actions are appropriate to the prevailing circumstances and conditions • Extinguishment of fire is achieved using appropriate procedures, techniques and fire-fighting agents • Breathing apparatus procedures and techniques comply with accepted practices and procedures • Practical demonstration in spaces which provide truly realistic training conditions (e.g., simulated shipboard conditions) and, whenever possible and practical, in darkness, of the ability to: <ul style="list-style-type: none"> • Use various types of portable fire extinguishers • Use self-contained breathing apparatus • Extinguish smaller fires, e.g., electrical fires, oil fires, propane fires • Extinguish extensive fires with water, using jet and spray nozzles • Extinguish fires with foam, powder or any other suitable chemical agent • Enter and pass through, with lifeline but without breathing apparatus, a compartment into which high-expansion foam has been injected • Fight fire in smoke-filled enclosed spaces wearing self-contained breathing apparatus • Extinguish fire with water fog or any other suitable fire-fighting agent in an accommodation room or simulated engine-room with fire and heavy smoke • Extinguish oil fire with fog applicator and spray nozzles, dry chemical powder, or foam applicators • Effect a rescue in a smoke-filled space wearing breathing apparatus

TABLE 3 – PERSONAL SAFETY AND SOCIAL RESPONSIBILITY

Outcome	Content	Standards for evaluating competence
Comply with emergency procedures	<ul style="list-style-type: none"> • Types of emergency which may occur, such as collision, fire, foundering • Knowledge of shipboard contingency plans for response to emergencies • Emergency signals and specific duties allocated to crew members in the muster list; muster stations; correct use of personal safety equipment • Action to take on discovering potential emergency, including fire, collision, foundering and ingress of water into the vessel • Action to take on hearing emergency alarm signals • Value of training and drills • Knowledge of escape routes and internal communication and alarm systems 	<ul style="list-style-type: none"> • Initial action on becoming aware of an emergency and follow-up actions conform to established emergency response procedures • Information given on raising alarm is prompt, accurate, complete and clear
Take precautions to prevent pollution of the marine environment	<ul style="list-style-type: none"> • Basic knowledge of the impact of shipping on the marine environment and the effects of operational or accidental pollution on it • Basic environmental protection procedures • Basic knowledge of complexity and diversity of the marine environment 	<ul style="list-style-type: none"> • Organisational procedures designed to safeguard the marine environment are observed at all times
Observe safe working practices	<ul style="list-style-type: none"> • Importance of adhering to safe working practices at all times • Safety and protective devices available to protect against potential hazards aboard ship • Precautions to be taken prior to entering enclosed spaces • Familiarisation with international measures concerning accident prevention and occupational health 	<ul style="list-style-type: none"> • Safe working practices are observed, and appropriate safety and protective equipment is correctly used at all times • Working practices are in accordance with legislative requirements, codes of practice, permits to work and environmental concerns

Outcome	Content	Standards for evaluating competence
Contribute to effective communications on board	<ul style="list-style-type: none"> • Understand the principles of, and barriers to, effective communication between individuals and teams within the vessel • Ability to establish and maintain effective communications 	<ul style="list-style-type: none"> • Communications are clear and effective at all times
Contribute to effective human relationships on board	<ul style="list-style-type: none"> • Importance of maintaining good human and working relationships on board • Basic teamworking principles and practice, including conflict resolution • Social responsibilities; employment conditions; individual rights and obligations; dangers of drug and alcohol abuse 	<ul style="list-style-type: none"> • Expected standards of work and behaviour are observed at all times
Understand and take necessary actions to control fatigue	<ul style="list-style-type: none"> • Importance of obtaining the necessary rest • Effects of sleep, schedules, and the circadian rhythm on fatigue • Effects of physical stressors on seafarers • Effects of environmental stressors in and outside the vessel and their impact on seafarers • Effects of schedule changes on seafarer fatigue 	<ul style="list-style-type: none"> • Fatigue management practices are observed and appropriate actions are used at all times

TABLE 4 – MARINE ENGINEERING

Outcome	Content	Standards for evaluating competence
Use mathematical techniques to solve engineering problems	<ul style="list-style-type: none"> • Areas of geometric figures • Volumes of geometric solids • Relationship between relative density/specific gravity and volumes • Representation of a force as a vector • Resolution of vectors to a resultant thrust obtained from tangential forces in simple structures and lifting apparatus • Basic laws of friction • Force to overcome friction • Friction losses in simple slides • Simple lifting machines • First moments as applied to levers • Velocity ratio • Mechanical advantage • Efficiency of simple machines • Levers, rope blocks, screw and hydraulic jacks 	<ul style="list-style-type: none"> • Calculations are carried out with results in accordance with manufacturers' or design specifications, product data sheet
Carry out mathematical calculations relative to: <ul style="list-style-type: none"> • Vessel stress and stability • Heat value of fuel • Heat transference and expansion rates • Fluid pressures 	<ul style="list-style-type: none"> • Stress, strain and elastic limit • Working stress and safe working load • Relationship between circumferential and longitudinal stress in thin cylinders and spherical shells • Equilibrium of floating bodies • Linear expansion due to heating • Units of heat • Specific heat • Sensible heat (enthalpy) • Latent heat (enthalpy) • Higher and lower calorific values of fuel • Relationship between power and mean effective pressure • Turning moment applied to a shaft • Calorific value • Specific fuel consumption • Variation in fuel consumption with vessel speed 	<ul style="list-style-type: none"> • Calculation results conform to engineering practices and/or case study results • IMO recommendations concerning vessel stability

Outcome	Content	Standards for evaluating competence
<ul style="list-style-type: none"> Identify properties of common marine engineering materials and methods of joining Manufacture simple components Apply simple heat treatment 	<ul style="list-style-type: none"> Characteristics and limitations of materials used in construction and repair of ships and equipment Characteristics and limitations of processes used for fabrication and repair Properties and parameters considered in the fabrication and repair of systems and components 	<ul style="list-style-type: none"> Identification of important parameters for fabrication of typical ship-related components are appropriate Selection of material conforms to vessel design Use of equipment and machine tools are according to engineering workshop practices Identify common marine engineering materials List the properties as per material specifications Fabricate the following in conformance with welding and mechanical techniques, to engineering tolerances: <ul style="list-style-type: none"> Fit male and female finger joint Machine and make threads to demonstrate use of lathe Join two sections of: <ul style="list-style-type: none"> the same material; and different material
<p>Demonstrate knowledge of the properties of liquids and gases commonly used aboard vessels</p>	<ul style="list-style-type: none"> Properties of liquids and gases commonly used on board 	<ul style="list-style-type: none"> Monitor and control vessel fluids and gases to ensure compliance with legislative requirements and measures to ensure safety of life at sea and protection of the marine environment
<p>Develop emergency and damage control plans and handle emergency situations</p>	<ul style="list-style-type: none"> Vessel construction, including damage control. Actions to limit damage and salvage the vessel following fire, explosion, collision or grounding. Methods and aids for fire prevention, detection and extinction 	<ul style="list-style-type: none"> Emergency procedures are in accordance with the established plans for emergency situations Knowledge of damage control procedures and equipment
<p>Implement safety precautions before entering tanks or confined spaces</p>	<ul style="list-style-type: none"> Dangers encountered in tanks and confined spaces Precautions before entering tanks or confined spaces 	<ul style="list-style-type: none"> Maintenance activities are planned and carried out in accordance with technical, legislative, safety, and procedural specifications
<p>Demonstrate knowledge of the construction features of a vessel that impact on its watertight integrity and stability</p>	<ul style="list-style-type: none"> Common terms associated with vessel construction Interpret plans Rudder details Oil and water lubricated stern tube details Propeller types and fitting Underwater fittings Free surface effect Management of tanks to maintain trim and stability 	<ul style="list-style-type: none"> Structural components of a vessel are identified and information from vessel technical drawings is interpreted in accordance with design Knowledge of principles of ship construction, factors affecting trim and stability, and measurements to preserve trim and stability Demonstrate knowledge of how the procedures ensure and maintain the watertight integrity and stability of the vessel in accordance with accepted practice

Outcome	Content	Standards for evaluating competence
<ul style="list-style-type: none"> Demonstrate knowledge of elementary principles, and care and management of auxiliary power sources (steam and motor), including boilers and their fittings Operate auxiliary power sources 	<ul style="list-style-type: none"> Waste heat boilers and economisers and their fittings Auxiliary oil-fired boilers and their fittings Boiler water treatment and testing Correct use of gauge glasses Danger of water hammer Maintenance of boiler water density Diesel generators Shaft generators Design features and system configurations of automatic control equipment and safety devices for steam boiler 	<ul style="list-style-type: none"> Auxiliary power sources are maintained and operated within manufacturer's specifications and vessel maintenance schedules Assessment of boiler condition is based on relevant information available from local and remote indicators and physical inspection and is in compliance with manufacturer's operating instructions and procedures Malfunctions and deviations from the operating specifications are identified and rectification procedures comply with vessel procedures and manufacturer's recommendations Incidents are reported to the vessel Master detailing the operational restrictions necessary
<p>Demonstrate knowledge of elementary principles, and care and management of the various types of auxiliary machinery systems up to 3000 kW</p>	<ul style="list-style-type: none"> Care and management of pumps and pumping, piping systems, and other shipboard auxiliaries Types of pumps and principles of operation Pumping systems for fuel oil, freshwater, seawater, lubricating oil, and bilge-water Centrifugal separators Oily water separators Sewage systems 	<ul style="list-style-type: none"> Operation of auxiliary equipment is planned and carried out in accordance with established rules and procedures to ensure safety of operations and avoid pollution of the marine environment Auxiliary equipment is maintained and operated within manufacturer's specifications and vessel maintenance schedules Malfunctions and deviations from the specifications are identified and rectification procedures comply with vessel procedures and manufacturer's recommendations Incidents are reported to the vessel Master detailing any operational restrictions necessary
<p>Dismantle, inspect, repair and reassemble vessel machinery</p>	<ul style="list-style-type: none"> The importance of correct alignment The effects of incorrect alignment Achieving correct alignment of machinery and machinery parts 	<ul style="list-style-type: none"> Dismantling, inspecting, repairing and reassembling equipment is in accordance with manuals and good practice
<p>Use gauges and meters to monitor and measure</p>	<ul style="list-style-type: none"> Construction and use of the various gauges and meters 	<ul style="list-style-type: none"> The electrical, pressure and measuring gauges and meters are used in accordance with the technical specifications and parameter

Outcome	Content	Standards for evaluating competence
Maintain engineering records including oil pollution	<ul style="list-style-type: none"> • Maintenance of records and machinery logs • Organisation of planned maintenance • Maintenance of spare parts and consumable stores • Knowledge of statutory and survey requirements • Knowledge of pollution legislation 	<ul style="list-style-type: none"> • A record is maintained of the movements and activities relating to the vessel's engineering systems in accordance with vessel procedures and maritime engineering and safety procedures • Maintenance activities are planned and carried out in accordance with technical, legislative, safety, and procedural specifications • Plans, specifications, materials, spare parts and equipment are available according to vessel contingency plans for maintenance and repair • Procedures for monitoring operations and maintenance comply with legislative requirements • Potential non-compliance is promptly identified and action taken to prevent actual occurrence • Requirements for renewal and extension of certificates ensure continued validity of survey items and equipment
Detect and identify the cause of machinery malfunctions and correct faults	<ul style="list-style-type: none"> • Detection of machinery malfunction, location of faults and action to prevent damage • Inspection and adjustment of equipment 	<ul style="list-style-type: none"> • Methods of comparing actual operating conditions are in accordance with recommended practices and procedures • Actions and decisions are in accordance with recommended operating specifications and limitations
Monitor legislative requirements	<ul style="list-style-type: none"> • Relevant maritime law • International agreements and conventions 	<ul style="list-style-type: none"> • Certificates, how they are obtained and periods of validity • Responsibilities affecting safety of passengers and crew • Responsibilities under relevant International Conventions including but not restricted to: <ul style="list-style-type: none"> - <i>Marine Safety (Domestic Commercial Vessel) National Law Act 2012</i>, Regulations and Marine Orders - National Standard for Commercial Vessels - STCW, Loadline, SOLAS, MARPOL - Other State, National and local legislation
Maintain safety and security of the vessel, crew and passengers and the operational condition of life-saving, and other safety systems	<ul style="list-style-type: none"> • A thorough knowledge of life-saving appliance regulations • Maintenance of operational condition of life-saving, and other safety systems • Functions and use of life-saving appliances 	<ul style="list-style-type: none"> • Procedures for monitoring safety systems ensure that all alarms are detected promptly and acted upon in accordance with established emergency procedures

Outcome	Content	Standards for evaluating competence
Operate and maintain refrigeration systems	<ul style="list-style-type: none"> Principles of refrigeration Properties of common refrigerants Operating temperature and pressures Methods of temperature control Care and management of refrigeration equipment, recognition of defects 	<ul style="list-style-type: none"> Demonstrate knowledge of the operating principles of a refrigeration system in accordance with manufacturer's specifications Refrigeration and air-conditioning systems are operated and maintained within technical specifications and in accordance with accepted practices and procedures to ensure safety of operation and avoid pollution of the marine environment <p>WARNING: <i>Relevant Commonwealth, local and 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 electrical work.</i></p>
Manage the operation of propulsion plant machinery: <ul style="list-style-type: none"> marine diesel engine marine steam turbine marine gas turbine marine steam boiler 	<ul style="list-style-type: none"> Design features, operative mechanism, Heat cycle, thermal efficiency and heat balance Propulsive characteristics including speed, output and fuel consumption Manage safe and effective maintenance and repair procedures 	Knowledge and understanding of design features and operating mechanisms are appropriate <ul style="list-style-type: none"> Detect, diagnose and identify causes of machinery malfunctions Actions to rectify machinery malfunctions are appropriate Correct faults Plan repairs Plan and undertake maintenance Use safe work practices Attend to maintenance according to manufacturer's directions and legislative requirements Maintain maintenance records in accordance with legislative requirements
Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery	<ul style="list-style-type: none"> Start up and shut down main propulsion and auxiliary machinery, including associated systems Operating limits of propulsion plant The efficient operation, surveillance, performance assessment and maintenance of safety of propulsion plant and auxiliary machinery 	<ul style="list-style-type: none"> The methods of preparing the shutdown and of supervising the cooling down of the engine are the most appropriate. The methods of measuring the load capacity of the engines are in accordance with technical specifications. Performance levels are in accordance with technical specifications

Outcome	Content	Standards for evaluating competence
<ul style="list-style-type: none"> • Operate and maintain two- and four-stroke machinery • Operate and maintain compressed ignition engines • Operate marine internal combustion engines and associated systems up to 3000 kW 	<ul style="list-style-type: none"> • Simple constructional details • Care and management of two–stroke and four-stroke main propulsion internal combustion engines • Care and management of compressed ignition internal combustion engines • Two- and four-stroke cycles and timing • Scavenging and supercharging • Engine cooling and lubrication • Tuning • Overloading • Safety devices • Engine governors and trips • Starting, reversing and operational procedures • Engine bearings • Detection of defects • Crankcase explosions 	<ul style="list-style-type: none"> • Identify and demonstrate knowledge of the function of internal combustion engine components • The methods of preparing for start-up and making available fuels, lubricants, cooling water and air are in accordance with vessel procedures or manufacturer’s specification • Checks of pressures, temperatures and revolutions during the start-up and warm-up period are in accordance with the technical specifications • Watchkeeping (or bridge monitoring) schedules ensure the main propulsion plant is operated within manufacturer’s specifications • Function and mechanism of automatic control for main engines and auxiliaries including: <ul style="list-style-type: none"> - Generator distribution system - Steam boilers - Oil purifiers - Pumping gear - Steering gear systems - Cargo handling equipment - Deck machinery • Malfunctions and deviations from the operating specifications are identified promptly and accurately and rectification procedures comply with the vessel procedures and manufacturer’s recommendations and are reported to the vessel Master detailing any operational restrictions necessary • Arrangements for ensuring the safe and efficient operation and condition of the machinery installation are in compliance with vessel operating procedures • Detect, identify and diagnose faults, take action to rectify

Outcome	Content	Standards for evaluating competence
Demonstrate knowledge of the principles of engine cooling, fuel and lubricating systems	<ul style="list-style-type: none"> • Cooling systems for diesel engines • Relationship between temperature and efficiency • Cooling water testing • Fuel systems for diesel engines • Safety devices • Centrifugal separators • Fuel filters • Lubricating systems for diesel engines • Boundary and full fluid film • Viscosity • Additives and total base numbers • Onboard tests of lubricating oil 	<ul style="list-style-type: none"> • Engine cooling, fuel and lubricating systems are operated and maintained in accordance with technical specifications to ensure safety of operation and avoid pollution of the marine environment
Manage ballast operations	<ul style="list-style-type: none"> • Operation and maintenance of ballast pumps and piping system 	<ul style="list-style-type: none"> • Ballast operations meet operational requirements and are carried out so as to prevent pollution of the marine environment
Outline the principles of air compressors, and their care and maintenance	<ul style="list-style-type: none"> • Reciprocating air compressors • Cooling and intercooling • Compressor defects • Relief valves • Air receivers and their mountings • Oil contamination of air start systems 	<ul style="list-style-type: none"> • Air compressors and ancillary equipment are operated and maintained in accordance with technical specifications and accepted procedures to ensure safety of operation

TABLE 5 – ELECTRICAL, ELECTRONIC AND CONTROL ENGINEERING

Outcome	Content	Standards for evaluating competence
Define electrical terms and solve basic electrical problems using mathematics	<ul style="list-style-type: none"> • S.I. units, amperes, volts, ohms • Ohms law • Resistance in series and parallel • Batteries in series and parallel • Heating effect of electric current • Calculation of electrical power given a network of resistance and applied voltage 	<ul style="list-style-type: none"> • Terms are defined in accordance with electrical trade handbooks and calculations conform to principles of electricity
Manage operation of electrical and electronic control equipment	<ul style="list-style-type: none"> • Marine electronics, power electronics, automatic control engineering and safety devices • Design features of high voltage installations • Design features and system configuration of auto control equipment and safety devices for main engine • Features of hydraulic and pneumatic control equipment 	<ul style="list-style-type: none"> • Operation of equipment and system is in accordance with operating manuals • Performance levels are in accordance with technical specifications <p>WARNING: <i>Relevant State/Territory electrical licensing requirements need to be fulfilled by any persons carrying out installation, maintenance and/or repair of electrical circuits or systems that are 50 V AC or above, or 120 V DC or above, on a vessel.</i></p>
Manage troubleshooting and restoration of electrical and electronic control equipment to operating condition	<ul style="list-style-type: none"> • Troubleshooting of electrical and electronic control equipment. • Function test of electrical, electronic control equipment and safety devices. • Troubleshooting of monitoring systems 	<ul style="list-style-type: none"> • Inspection, testing and troubleshooting of equipment are appropriate
Demonstrate electrical safety during repair and inspection of electrical circuitry and equipment	<ul style="list-style-type: none"> • Procedures for safe isolation of electrical and other types of plant and equipment • Supervision and management of electrical work • Safe working procedures on electrical plant and equipment 	<ul style="list-style-type: none"> • Isolation, dismantling and reassembly of plant and equipment is in accordance with electrical trade practices and procedures <p>WARNING: <i>Relevant State/Territory electrical licensing requirements need to be fulfilled by any persons carrying out installation, maintenance and/or repair of electrical circuits or systems that are 50 V AC or above, or 120 V DC or above, on a vessel.</i></p>
Demonstrate knowledge and use of the colour coding system for electric conductors	<ul style="list-style-type: none"> • Colour coding system 	<ul style="list-style-type: none"> • Earth, active and neutral conductors are defined and wiring is connected in accordance with design diagrams and electrical trade practices and procedures

Outcome	Content	Standards for evaluating competence
Operate and maintain electric starter motors	<ul style="list-style-type: none"> • Types of AC and DC motor starters • Circuit protection devices for over and under loading • Design features and system configurations of operational control equipment for electrical motors 	<ul style="list-style-type: none"> • Operation and maintenance requirements are explained in accordance with vessel procedures and manufacturer's manuals • AC and DC motors, starters and protection devices are operated and maintained in accordance with technical specifications and established procedures to ensure safety of operation <p>WARNING: <i>Relevant State/Territory electrical licensing requirements need to be fulfilled by any persons carrying out installation, maintenance and/or repair of electrical circuits or systems that are 50 V AC or above, or 120 V DC or above, on a vessel.</i></p>
Demonstrate knowledge of the principles of operation and operating procedures for AC and DC generators	<ul style="list-style-type: none"> • Preparing, starting, coupling and changing over alternators or generators • Management of load sharing • Location of common faults and action to prevent damage • Design features, system configuration of automatic control equipment and safety devices 	<ul style="list-style-type: none"> • The operation of AC and DC generators is explained in accordance with manufacturer's manuals and operating procedures comply with manufacturer's instructions and vessel procedures <p>WARNING: <i>Relevant State/Territory electrical licensing requirements need to be fulfilled by any persons carrying out installation, maintenance and/or repair of electrical circuits or systems that are 50 V AC or above, or 120 V DC or above, on a vessel.</i></p>
Manage and maintain batteries and accumulators	<ul style="list-style-type: none"> • Types of accumulators and storage batteries • Accumulators and storage battery construction • Accumulator and storage battery charging • Accumulator and storage battery maintenance and safety 	<ul style="list-style-type: none"> • Accumulators and storage batteries are managed and maintained within technical specifications and in accordance with established procedures to ensure safety of operation <p>WARNING: <i>Relevant State/Territory electrical licensing requirements need to be fulfilled by any persons carrying out installation, maintenance and/or repair of electrical circuits or systems that are 50 V AC or above, or 120 V DC or above, on a vessel.</i></p>
Repair, maintain and manage power distribution of single and three phase electrical power	<ul style="list-style-type: none"> • Single phase distribution systems • Three phase distribution systems • Circuit protection • Earth fault detection and rectification • Electrical safety procedures • Maintain marine switchboards • Test automatic control devices 	<ul style="list-style-type: none"> • Distribution systems are managed and operated within technical specifications and in accordance with established rules of the electrical trade <p>WARNING: <i>Relevant State/Territory electrical licensing requirements need to be fulfilled by any persons carrying out installation, maintenance and repair of electrical circuits or systems that are 50 V AC or above, or 120 V DC or above, on a vessel.</i></p>

TABLE 6 – WATCHKEEPING AND LEADERSHIP

Outcome	Content	Standards for evaluating competence
Maintain a safe engineering watch	<ul style="list-style-type: none"> • Engineering watchkeeping standards, procedures and practices • Watchkeeping duties in routine and emergency situations • Engine room teamwork procedures • Conduct, handover and relief of an engineering watch • Information, including numerical and graphical information, required to undertake watchkeeping duties in routine and emergency situations • Actions to be taken in the event of malfunctions and emergency situations • Functions of unmanned machinery space (ums) controls, alarms and indicators • Fitness for duty • Signs of fatigue • Fatigue management principles and techniques • Drug and alcohol policy 	<ul style="list-style-type: none"> • Watchkeeping arrangements are planned and implemented in accordance with accepted standards and procedures • Information required to undertake watchkeeping duties in routine and emergency situations is accessed and interpreted • Communication and reporting procedures adopted in the engine room are clearly defined, accepted and implemented • Adopted procedures enhance vessel safety, protection of the marine environment and the safety of all on board • Conduct, handover and relief of engineering watch are in accordance with established marine engineering practice and regulatory requirements • Initial, and follow-up, actions in response to malfunctions and emergency situations are appropriate
Application of leadership and teamworking skills	<ul style="list-style-type: none"> • Working knowledge of shipboard personnel management and training • A knowledge of related international maritime conventions and recommendations, and national legislation • Ability to apply task and workload management, including: <ul style="list-style-type: none"> - planning and co-ordination - personnel assignment - time and resource constraints - prioritisation 	<ul style="list-style-type: none"> • The crew are allocated duties and informed of expected standards of work and behaviour in a manner appropriate to the individuals concerned • Training objectives and activities are based on assessment of current competence and capabilities and operational requirements • Operations are demonstrated to be in accordance with applicable rules • Operations are planned and resources are allocated as needed in correct priority to perform necessary tasks • Communication is clearly and unambiguously given and received • Effective leadership behaviours are demonstrated • Necessary team member(s) share accurate understanding of current and predicted vessel status and operational status and external environment • Decisions are most effective for the situation

Outcome	Content	Standards for evaluating competence
Application of leadership and teamworking skills continued	<ul style="list-style-type: none"> • Knowledge and ability to apply effective resource management: <ul style="list-style-type: none"> - allocation, assignment and prioritisation of resources - effective communication on board and ashore - decisions reflect consideration of team experiences - assertiveness and leadership, including motivation - obtaining and maintaining situational awareness • Knowledge and ability to apply decision-making techniques: <ul style="list-style-type: none"> - situation and risk assessment - identify and consider generated options - selecting course of action - evaluation of outcome effectiveness 	

TABLE 7 – SECURITY AWARENESS

Outcome	Content	Standards for evaluating competence
Contribute to the enhancement of maritime security through heightened awareness	<ul style="list-style-type: none"> • Basic working knowledge of maritime security terms and definitions, including elements that may relate to piracy and armed robbery • Basic knowledge of international maritime security policy and responsibilities of Governments, companies and persons • Basic knowledge of maritime security levels and their impact on security measures and procedures aboard ship and in port facilities • Basic knowledge of security reporting procedures • Basic knowledge of security-related contingency plans 	<ul style="list-style-type: none"> • Requirements relating to enhanced maritime security are correctly identified
Recognition of security threats	<ul style="list-style-type: none"> • Basic knowledge of techniques used to circumvent security measures • Basic knowledge enabling recognition of potential security threats, including elements that may relate to piracy and armed robbery • Basic knowledge enabling recognition of weapons, dangerous substances and devices and awareness of the damage they can cause • Basic knowledge in handling security-related information and security-related communications 	<ul style="list-style-type: none"> • Maritime security threats are correctly identified
Understanding of the need for and methods of maintaining security awareness and vigilance	<ul style="list-style-type: none"> • Basic knowledge of training, drill and exercise requirements under relevant conventions, codes and IMO circulars, including those; relevant for anti-piracy and anti-armed robbery 	<ul style="list-style-type: none"> • Requirements relating to enhanced maritime security are correctly identified

