

**SKILLS FRAMEWORK FOR SEA TRANSPORT
TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT**

TSC Category	Marine Engineering					
TSC	Propulsion, Plant and Machinery					
TSC Description	Manage propulsion plant and machinery and transfer, bilge and ballast operations					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		STP-MEG-2004-1.2	STP-MEG-3004-1.1	STP-MEG-4004-1.1		
		Contribute to fuelling and oil transfer, bilge and ballast operations and operation of equipment and machinery	Operate main and auxiliary machinery and associated control systems	Plan, schedule and manage the operation of propulsion plant machinery		
Knowledge		<ul style="list-style-type: none"> • Functions and operation of fuel system and oil transfer operations • Methods of preparation for fuelling and transfer operations • Procedures for connecting and disconnecting fuelling and transfer hoses • Procedures relating to incidents that may arise during fuelling or transferring operations • Methods of securing related to fuelling and transfer operations • Tank levels measurement and reporting requirements • Function, operation and maintenance of the bilge and ballast systems • Safe operation of equipment: <ul style="list-style-type: none"> ○ Valves and pumps ○ Hoists and lifting equipment ○ Hatches, watertight doors, ports and related equipment 	<ul style="list-style-type: none"> • Basic construction and operation principles of machinery systems: <ul style="list-style-type: none"> ○ Marine Diesel Engines ○ Marine Steam Turbine ○ Marine Gas Turbine ○ Marine Boiler ○ Shafting Installations including propeller ○ Other auxiliaries ○ Steering gear ○ Automatic control systems ○ Fluid flow and characteristics of lubricating oil, fuel oil and cooling systems ○ Deck machinery • Safety and emergency procedures for operation of propulsion plant machinery, including control systems • Main engine and associated auxiliaries • Steam boiler and associated auxiliaries and steam systems • Auxiliary prime movers and associated systems 	<ul style="list-style-type: none"> • Design features, operative mechanisms, heat cycle, thermal efficiency and heat balance of the following machinery and its associated auxiliaries: <ul style="list-style-type: none"> ○ Marine Diesel Engine ○ Marine Steam Turbine ○ Marine Gas Turbine ○ Marine Steam Boiler • Thermodynamics and heat transmission • Mechanics and hydromechanics • Propulsive characteristics of diesel engines, steam and gas turbines, including speed, output and fuel consumption • Refrigerators and refrigeration cycle • Physical and chemical properties of fuels and lubricants • Technology of materials • Naval architecture and ship construction, including damage control 		

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		<ul style="list-style-type: none"> • Basic construction and operation principles of LNG, hybrid/electrical propulsion systems 	<ul style="list-style-type: none"> • Other auxiliaries, including refrigeration, air-conditioning and ventilation systems • Operational characteristics of pumps and piping systems including control systems • Operation of pumping systems • Oil-water separators (or similar equipment) requirements and operation 	<ul style="list-style-type: none"> • Operating limits of propulsion plants • Functions and mechanisms of automatic control for main engine and auxiliary machinery • Operation and maintenance of machinery, including pumps and piping systems • Methods of preparing the shut-down and of supervising the cooling down of the engine • Methods of measuring the load capacity of the engines • Operation and maintenance of machinery, including pumps and piping systems 		
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<p>Abilities</p>		<ul style="list-style-type: none"> • Carry out transfer operations in accordance with safety practices and equipment operating instructions • Comply with safety practices when handling dangerous, hazardous and harmful liquids • Carry out bilge and ballast operations and maintenance 	<ul style="list-style-type: none"> • Operate main and auxiliary machinery and associated control systems • Plan and carry out operations in accordance with operating manuals, established rules and procedures • Ensure safety of operations and avoid pollution of marine environment • Identify deviations from the norm promptly • Operate fuel, lubrication, ballast and other pumping systems and associated control systems • Ensure plants and engineering systems output meets requirements, including bridge orders relating to changes in speed and direction • Identify causes of machinery malfunctions • Design actions to ensure overall safety of the ships and plants 	<ul style="list-style-type: none"> • Plan and prepare operations to suit the design parameters of the power installation and voyage requirements • Start-up and shutdown main propulsion and auxiliary machinery, including associated systems • Ensure pressure, temperature and revolutions during start-up and warm-up are in accordance with technical specifications and agreed work plans • Conduct surveillance of main propulsion plants and auxiliary systems • Check performance against bridge orders • Ensure performance levels are in accordance with technical specifications • Manage fuel, lubrication and ballast operations • Ensure fuel and ballast operations meet operational requirements and prevent pollution of marine environment 		
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