# SKILLS FRAMEWORK FOR SEA TRANSPORT

## TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT

<table>
<thead>
<tr>
<th>TSC Category</th>
<th>Marine Engineering</th>
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</thead>
<tbody>
<tr>
<td>TSC</td>
<td>Propulsion, Plant and Machinery</td>
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<tr>
<td>TSC Description</td>
<td>Manage propulsion plant and machinery and transfer, bilge and ballast operations</td>
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<table>
<thead>
<tr>
<th>TSC Proficiency Description</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
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<tr>
<td></td>
<td>STP-MEG-2004-1.1</td>
<td>STP-MEG-3004-1.1</td>
<td>STP-MEG-4004-1.1</td>
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<tr>
<td>Contribute to fuelling and oil transfer, bilge and ballast operations and operation of equipment and machinery</td>
<td>Operate main and auxiliary machinery and associated control systems</td>
<td>Plan, schedule and manage the operation of propulsion plant machinery</td>
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### Knowledge

- 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:
  - Valves and pumps
  - Hoists and lifting equipment
  - Hatches, watertight doors, ports and related equipment
- Basic construction and operation principles of machinery systems:
  - 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
- Design features, operative mechanisms, heat cycle, thermal efficiency and heat balance of the following machinery and its associated auxiliaries:
  - 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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| | **SKILLS FRAMEWORK FOR SEA TRANSPORT**  
**TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT** |  |
|---|---|---|
| | • Auxiliary prime movers and associated systems  
• 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 | • 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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<th>Abilities</th>
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<tr>
<td></td>
<td>• Carry out transfer operations in accordance with safety practices and equipment operating instructions</td>
<td>• Operate main and auxiliary machinery and associated control systems</td>
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<td>• Comply with safety practices when handling dangerous, hazardous and harmful liquids</td>
<td>• Plan and carry out operations in accordance with operating manuals, established rules and procedures</td>
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<td>• Carry out bilge and ballast operations and maintenance</td>
<td>• Ensure safety of operations and avoid pollution of marine environment</td>
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<td>• Operate fuel, lubrication, ballast and other pumping systems and associated control systems</td>
<td>• Identify deviations from the norm promptly</td>
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<td>• Ensure plants and engineering systems output meets requirements, including bridge orders relating to changes in speed and direction</td>
<td>• Operate fuel, lubrication, ballast and other pumping systems and associated control systems</td>
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<td>• Identify causes of machinery malfunctions</td>
<td>• Ensure pressure, temperature and revolutions during start-up and warm-up are in accordance with technical specifications and agreed work plans</td>
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<td>• Design actions to ensure overall safety of the ships and plants</td>
<td>• Conduct surveillance of main propulsion plants and auxiliary systems</td>
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<td>• Plan and prepare operations to suit the design parameters of the power installation and voyage requirements</td>
<td>• Check performance against bridge orders</td>
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<td>• Ensure performance levels are in accordance with technical specifications</td>
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<td>• Manage fuel, lubrication and ballast operations</td>
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<td></td>
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<td>• Ensure fuel and ballast operations meet operational requirements and prevent pollution of marine environment</td>
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