

**SKILLS FRAMEWORK FOR MARINE AND OFFSHORE
TECHNICAL SKILLS & COMPETENCIES (TSC) REFERENCE DOCUMENT**

TSC Category	Marine and Offshore System Design					
TSC	Cargo System Design					
TSC Description	Design cargo handling systems for ships and/or conversions to ensure efficient and controlled loading, discharging and treatment of specific cargoes					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
			MAR-MSD-3002-1.1	MAR-MSD-4002-1.1	MAR-MSD-5002-1.1	
			Analyse loading and discharging rates and capacities of cargo handling equipment	Develop cargo handling system specification sheets and sketches by integrating information from marine engineering calculations with details of cargoes to be handled and types and locations of the cargo handling equipment	Verify whether handling equipment lists, position lists and calculations for cargo system designs are in line with international regulations and the equipment manufacturers' recommendations	
Knowledge			<ul style="list-style-type: none"> Principles of fluid dynamics Properties of different types of cargoes and their implications on cargo system designs Securing systems and related classification rules and requirements for different types of cargoes Design considerations for stowage, trim and stability Methods of calculating cargo loading and discharging rates General arrangement and cargo plan drawings Principles of numerical computation of flow rates and tank capacities Principles of structural stress analysis Marine engineering calculations 	<ul style="list-style-type: none"> Types of cargo handling systems, cranes and derrick equipment Types of cargo pumping equipment and pipeline configurations for liquid-based cargoes Specifications of pumps, pipes and cranes Types of sensors and actuators for pressure and flow measurements and regulation Principles of loading and discharging sequencing Conventions used in cargo system drawings Types of cargo handling software for ships, rigs and conversions Safety provisions in cargo handling systems Design considerations for hazardous cargoes Methods for evaluating cargo handling processes 	<ul style="list-style-type: none"> Procedures for formulating cargo handling systems Evaluation criteria for cargo handling processes Manufacturers' recommendations and limitations Legislative requirements governing cargo handling systems 	

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<p>Abilities</p>			<ul style="list-style-type: none"> • Determine appropriate data for executing relevant cargo system design calculations • Identify sources for retrieving relevant data • Interpret general arrangement and cargo plan drawings • Execute accurate calculations for loading, discharge rates and implications of load on trim and stability • Evaluate system reliability from design specifications 	<ul style="list-style-type: none"> • Identify suitable cargo handling systems based on the ship, rig, conversion specifications • Evaluate types of pumping and piping systems required for specific cargo handling systems • Evaluate specifications and capacities of the systems • Ascertain specifications of lifting gears • Incorporate relevant safety features in the cargo handling systems • Produce cargo handling system designs to be used by the manufacturing department 	<ul style="list-style-type: none"> • Design process workflows to execute cargo handling system designs • Evaluate performance specification analysis on lifting equipment • Evaluate performance specification analysis on selection of sensors and actuators • Evaluate performance specification analysis on selection of pumping systems • Evaluate performance specification analysis on selection of piping specifications and configurations • Evaluate application of industry standards and international conventions in drawings • Evaluate final reports on selected components used to meet the system requirements 	
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