

**SKILLS FRAMEWORK FOR ENGINEERING SERVICES  
TECHNICAL SKILLS & COMPETENCIES (TSC) REFERENCE**

<b>TSC Category</b>	Discipline Engineering Specialisation					
<b>TSC</b>	Mechanical Engineering Management					
<b>TSC Description</b>	Manage the design, technical specification, selection, modification and troubleshooting of mechanical equipment, structures and systems so as to provide mechanical engineering discipline support to construction, operations, maintenance and project teams					
<b>TSC Proficiency Description</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>	<b>Level 6</b>
			<b>EGS-EPM-3063-1.1</b>	<b>EGS-EPM-4063-1.1</b>	<b>EGS-EPM-5063-1.1</b>	
			Interpret designs, technical specifications, modification designs, constructability methods, and maintenance procedures to provide mechanical engineering support to construction, operations, maintenance and project teams	Enable the development and implementation of designs, technical specifications, modification designs, constructability methods, and maintenance procedures to manage mechanical engineering support to construction, operations, maintenance and project teams	Evaluate designs, technical specifications, modification designs, constructability methods, and maintenance procedures to drive high standards of mechanical engineering support to construction, operations, maintenance and project teams	
<b>Knowledge</b>			<ul style="list-style-type: none"> <li>• Mechanical equipment engineering standards which include American Society of Mechanical Engineers (ASME), International Organisation for Standardisation (ISO) and local statutory standards</li> <li>• Engineering drawing principles, tolerance, engineering conventions and representations</li> <li>• Mechanical equipment construction standards</li> <li>• Principles of equipment integrity and fitness for service</li> <li>• Principles of mechanical engineering materials</li> <li>• Principles of thermodynamics and fluid mechanics</li> <li>• Principles of piping and valve systems and piping classes</li> </ul>	<ul style="list-style-type: none"> <li>• Methods of mechanical engineering, construction and commissioning</li> <li>• Engineering design activities management techniques</li> <li>• Principles of fracture, fatigue and corrosion of mechanical engineering materials</li> <li>• Advanced fluid dynamics principles and concepts</li> <li>• Equipment and piping failure analysis techniques</li> <li>• Pressure vessels design and specifications</li> <li>• Heat exchangers design and specifications</li> <li>• Piping and valve systems design methods</li> <li>• Mechanical equipment engineering standards and best practice</li> <li>• Mechanical equipment integrity and fitness for service</li> </ul>	<ul style="list-style-type: none"> <li>• Advanced mechanical engineering, construction and commissioning support methods and techniques</li> <li>• Advanced mechanical engineering design evaluation methods</li> <li>• Engineering project leadership</li> <li>• Industry best practices in mechanical maintenance and reliability methods, techniques and practices</li> <li>• Technological advancements in mechanical construction and maintenance</li> <li>• Sustainable product design and construction</li> <li>• Advanced robotics</li> </ul>	

			<ul style="list-style-type: none"> <li>Investigation of equipment/piping failure methods</li> <li>Welding systems, codes, specifications and standards</li> <li>Mechanical equipment maintenance principles</li> </ul>			
<b>Abilities</b>			<ul style="list-style-type: none"> <li>Select and apply appropriate mechanical equipment engineering standards</li> <li>Apply solid modelling techniques for interpretation of engineering designs</li> <li>Provide engineering support at site for the installation, inspection, testing of mechanical equipment and piping work</li> <li>Perform reviews for fitness for service and remaining life assessments for mechanical equipment</li> <li>Provide engineering support for material inspection, testing and environmental degradation based on mechanical properties of materials</li> <li>Apply functional and safeguarding specifications for pressure vessels/heat exchangers using applicable codes and standards</li> <li>Provide commissioning support, evaluation, troubleshooting of unfired and fired heat transfer equipment including</li> </ul>	<ul style="list-style-type: none"> <li>Provide engineering support at site for the installation, inspection, testing of mechanical equipment and piping work</li> <li>Manage fitness for service and remaining life assessments for mechanical equipment</li> <li>Manage the materials' Quality Assurance/ Quality Control (QA&amp;QC) needs in specifying, construction, procurement and installation</li> <li>Define performance, functional and safeguarding specifications for pressure vessels/heat exchangers using applicable codes and standards</li> <li>Manage commissioning support, evaluation, troubleshooting of unfired and fired heat transfer equipment including furnaces, boilers, heat exchangers and others</li> <li>Manage the integration of operational/maintenance requirements into projects</li> <li>Provide engineering support for equipment</li> </ul>	<ul style="list-style-type: none"> <li>Define project execution and construction strategies through each project including project implementation with contractors</li> <li>Review and approve piping and valve systems maintenance and construction support through plans and isometrics, specifications and design criteria</li> <li>Benchmark equipment integrity management systems against company, statutory or regulatory requirements</li> <li>Define materials selection and corrosion control strategies for life-cycle integrity</li> <li>Review and endorse formal hand-over and close-out work procedures and practises for the owner</li> <li>Review and endorse equipment fitness for service, remaining life, repair and replacement assessments and proposals</li> <li>Review and endorse sustainable engineering designs and constructions</li> <li>Benchmark mechanical engineering technology</li> </ul>	

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			furnaces, boilers, heat exchangers and others <ul style="list-style-type: none"> <li>• Identify stress analysis methods and techniques to determine the integrity of piping and equipment</li> <li>• Conduct and verify equipment layout study including specific critical details and support</li> </ul>	and materials procurement processes <ul style="list-style-type: none"> <li>• Participate in vendor selection, qualification and review processes</li> <li>• Manage fitness for service and remaining life assessments</li> </ul>	and robotics application deployed by the organisation against industry best practices	
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