POWER ENGINEERING COMPETENCY FRAMEWORK FOR POWER ENGINEERING PROFESSIONALS IN PUBLIC SERVICE
TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT

TSC Category	Electrical and Power Systems Management					
TSC Title	Traction Power Systems Management					
TSC Description	Manage the design, installation, testing, commissioning, operations and maintenance of traction power systems according to functional and performance requirements					
TSC Proficiency Description	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**
		<Insert TSC Code>	**<Insert TSC Code>**	**<Insert TSC Code>**	**<Insert TSC Code>**	**<Insert TSC Code>**
		Prepare design drawings and progress reports on site installation and site acceptance tests for traction power systems	Develop traction power system designs, technical specifications and performance specifications for compliance with regulations, industry standards and agency requirements	Review the design, operation and maintenance of traction power systems for reliability, compliance, cost-effectiveness, fit for purpose and sustainability	Provide technical advice and guidance on design, installation, testing and commissioning and operation and maintenance of the traction power systems	Formulate strategic plans for research and provide technical advice for improvements to the traction power systems
Knowledge		• Objectives of traction power systems • Key components of traction power systems arrangements • Plantroom layouts • Relevant industry standards and codes of practice including Singapore Standards, IEC standard and BS EN standard • Key internal stakeholders	• Design criteria and considerations for traction power system • Traction power system maintenance operations • Functions and performance requirements for traction power equipment and components • Use of AC and DC design power simulation tools • Traction power system equipment sizing, cable sizing • Interfacing requirements between traction power system and other systems • Challenges and constraints in upgrading, replacement and renewal works • System assurance and hazard identification methodology	• Principles, intent and purpose of relevant industry standards, codes of practices and requirements for traction power system on equipment and components • Relevant industry standards governing the quality and performance testing of the traction power system on equipment and components • Operation and control system for traction power system • Implications of alternatives, options, changes, deviations or non-conformances • Challenges encountered and lessons learned from the practical applications	• Traction power system design techniques and protocols • Latest developments, emerging trends and potential changes to industry standards and products pertaining to traction power system • Industry best practices for traction power system • Condition monitoring and preventative maintenance programmes • Compliance and audit programmes • Traction power system commissioning, testing and handover • Past and present challenges encountered from equipment performance and from research and development	• Traction power system design techniques and protocols • Latest developments in technical committees and working groups for local and international standards on traction power system • Cross-division and multi-disciplinary resources of new technology and design implementation • New technologies and innovations • Traction power system integration, transition and upgrade • Compliance and audit programmes • Traction power system commissioning, testing and handover • Implementation risks of traction power system

			• Safety integrity level requirements • Cybersecurity threat assessment and prevention	• Factors affecting the performance and capacities of traction power system • Challenges encountered for traction power system replacement work • Fault finding techniques	• Relevant regulations, industry standards and safety procedures	• Relevant regulations, industry standards and safety procedures
Abilities		• Check design calculations and drawings for accuracy and completeness • Prepare drawings for design reports, engineering standards and tenders • Conduct routine inspections to verify that the contractors' works comply with specifications, drawings and programmes • Conduct site testing of equipment and sub-system to ensure that they are correctly installed and suitable for operation • Prepare progress reports on site installation and site acceptance tests	• Check design and drawings and ensure that they comply with design objectives, criteria, performance requirements and applicable codes, industry standards, regulations, specifications and agency requirements • Develop in-house traction power system design including calculations, computer simulation analysis, design reports, drawings and operation mode • Develop technical specifications, design criteria and performance specifications for tenders and evaluate technical proposals • Check equipment, materials and shop drawing submissions and ensure that they comply with the specifications and the supports for the equipment and services are correctly sized • Develop checklists for inspection and	• Set design objectives, criteria and performance requirements for the system • Check design for reliability, completeness, feasibility, optimisation, cost-effectiveness, fit for purpose, sustainability • Check design and ensure that the interface with other systems have been properly coordinated and conflicts are resolved • Check tender specifications for completeness and adequacy • Review equipment, materials and shop drawings submissions to ensure that they are of acceptable quality and the equipment and services are properly and adequately supported • Approve checklists for inspection and monitoring the site installation works • Identify industry standards and requirements for testing	• Approve objectives, design criteria and performance requirements for the system • Approve design and drawings • Approve tender specifications • Approve equipment, materials submissions and shop drawings submissions • Approve testing and commissioning test plans and procedures and testing and commissioning results • Review recommendations on changes or improvements to system performance, specifications and engineering standards, alternatives, options, deviations and non-conformances • Integrate and update new standard and technologies in local and international technical committees • Provide technical advice and guidance on incident	• Identify potential partnerships for new solutions • Identify new technologies and innovations for integration into existing systems and processes • Formulate mid to long term strategic plans for research and improvements • Provide expert technical advice on improvements proposed to traction power system • Approve recommendations on changes or improvements to system performance, specifications and engineering standards, alternatives, options, deviations and non-conformances • Approve new relevant industry practices, novel solutions and standardisation for application

			monitoring of the installation works for compliance with approved design, drawings, specifications, programme, safe practices and with considerations for access for maintenance and future replacement • Check testing and commissioning plans and procedures and ensure that the tests comply with the specifications, applicable industry standards and safe practices and tests will demonstrate that the system and equipment function properly and fulfil the design and performance requirements • Review system performance testing, system interface testing and integrated testing and commissioning and ensure that the tests are conducted safely and comply with approved procedures and industry standards • Identify, investigate and report defects and non-compliance found during design check, inspection and testing and commissioning and propose solutions to rectify the defects and non-conformances • Perform technical audits on system performance,	of the system, and check testing and commissioning plans and procedures to ensure that they are comprehensive to demonstrate that the system can operation, function and fulfil the performance requirements • Check results of testing and commissioning to ensure that the system can operate and function properly and meet the design and performance requirements • Evaluate and provide technical advice and recommendations on alternatives, options, changes, deviations, and defect and non-conformances rectification • Evaluate and provide recommendations for improvements to system performance, specifications and engineering standards • Investigate incidents, technical problems and issues and recommend solutions	investigations, and develop solutions for complex design/system/process problems and issues • Identify and propose new relevant industry practices, novel solutions and standardisation for application • Incorporate technical knowledge into training materials	

			site investigation and gather data for analysis • Identify and propose recommendations for improvements to system performance, specifications and engineering standards			