

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

<b>TSC Category</b>	Installation, Testing and Commissioning					
<b>TSC Title</b>	Electrical Equipment and Systems Testing					
<b>TSC Description</b>	Manage testing of electrical equipment and systems to ensure reliable functionality of power systems and networks					
<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>&lt;Insert TSC Code&gt;</b>	<b>&lt;Insert TSC Code&gt;</b>	<b>&lt;Insert TSC Code&gt;</b>	<b>&lt;Insert TSC Code&gt;</b>	
		Witness tests on electrical equipment and systems according to test plans and procedures	Interpret test results of electrical equipment and systems to identify any potential issues, faults and failures	Review compliance of electrical test procedures and results with industry standards and project requirements	Provide acceptance for electrical test results in accordance with industry standards and project requirements	
<b>Knowledge</b>		<ul style="list-style-type: none"> <li>Standards and procedures for testing of equipment</li> <li>Rules for control and safe operation of low and high voltage apparatus</li> <li>Equipment in electricity transmission and distribution networks</li> <li>Characteristics and potential dangers of electrical equipment and systems</li> <li>Concepts of electrical systems settings, schematics and specifications</li> <li>Types of testing and procedures for electrical equipment, systems and network</li> </ul>	<ul style="list-style-type: none"> <li>Principles of transmission and distribution systems and networks</li> <li>Standards and procedures for testing of equipment</li> <li>Rules for control and safe operation of low and high voltage apparatus</li> <li>Components and operating principles of electrical equipment and systems</li> <li>Concepts of settings, schematics and specifications</li> <li>Fault calculation techniques</li> <li>Test equipment maintenance methods</li> <li>Electrical equipment, networks, system testing procedures</li> <li>Fault recording and interpretation</li> </ul>	<ul style="list-style-type: none"> <li>Standards and procedures for testing of equipment</li> <li>Interpretation and application of rules for control and safe operation of low and high voltage apparatus</li> <li>Components, protection settings, schematics, specification and operating principles of transmission and distribution systems</li> <li>Test equipment and software used on power systems</li> <li>Fault investigation methods</li> <li>Complex fault calculation techniques</li> <li>Relevant regulations, industry standards, codes of practice and safety procedures</li> </ul>	<ul style="list-style-type: none"> <li>Interpretation and application of standards and procedures for testing of equipment</li> <li>Interpretation and application of rules for control and safe operation of low and high voltage apparatus</li> <li>Components, protection settings, schematics, specification and operating principles of transmission and distribution systems</li> <li>Industry developments, trends and best practices in electrical power systems</li> <li>Agency strategy and direction</li> <li>Test procedure effectiveness evaluation processes</li> <li>Relevant regulations, industry standards, codes of practice and safety procedures</li> </ul>	
<b>Abilities</b>		<ul style="list-style-type: none"> <li>Oversee checks for test tools and equipment</li> <li>Witness tests on electrical equipment and systems, including the setting up of different test equipment according to</li> </ul>	<ul style="list-style-type: none"> <li>Oversee tests on electrical equipment and systems</li> <li>Interpret test results to identify any potential issues and/or equipment failures</li> </ul>	<ul style="list-style-type: none"> <li>Review tests on electrical systems, including the use of complicated test equipment and software</li> <li>Review fault investigations on electrical systems and</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate test procedures to reflect industry developments, trends and best practices</li> <li>Provide acceptance for test results in accordance</li> </ul>	

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		<p>standards and procedures, safety and regulatory requirements</p> <ul style="list-style-type: none"> <li>• Witness basic pre-commissioning tests on electrical power systems at new substations or new circuits</li> <li>• Record faults using appropriate forms and documentation procedures</li> <li>• Verify that tests are completed according to test plans</li> </ul>	<ul style="list-style-type: none"> <li>• Witness pre-commissioning tests on electrical power systems</li> <li>• Witness on-load commissioning of main protection</li> <li>• Verify settings and other records from protection relays and fault recording devices</li> <li>• Identify components and systems that do not meet quality and safety standards</li> <li>• Ensure work orders are completed effectively</li> <li>• Report testing results and follow-up procedures</li> </ul>	<p>recommend suitable follow-up measures</p> <ul style="list-style-type: none"> <li>• Review results of pre-commissioning and witness commissioning tests on electrical power systems</li> <li>• Contribute to the resolution of complex issues pertaining to transmission and distribution systems</li> </ul>	<p>with industry standards and project requirements</p> <ul style="list-style-type: none"> <li>• Approve complex fault investigations on electrical power systems and recommend suitable follow-up actions</li> <li>• Provide technical advice on issues in transmission and distribution systems</li> <li>• Advise on complex faults based on test records</li> <li>• Advocate compliance with industry standards, regulatory and project requirements</li> </ul>	
<p><b>Range of Application</b></p>		<p>Range of application includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>• Electrical installations and power systems in buildings, facilities and infrastructure, including but not limited to: Building electrical systems e.g. transformers, switchboards and wiring systems, battery systems, fire protection systems, security systems, uninterruptible power supply (UPS) systems, standby power generation, lighting systems, lightning protection systems, relay and protection systems, air-conditioning and mechanical ventilation systems, lightings, lifts and escalators, amusement rides, and building management systems</li> <li>• Electrical installations and power systems in water treatment plants and waste-to-energy plants, including but not limited to: Environmental compaction systems (ECS), conveyor belts, baghouse filters, high-tension power equipment including power transformers, switchgears, generators, distributed control system and field instruments, refuse crane system, motors and variable speed drives, pumps, air-conditioning system, fire alarm system, actuators, lightings, incinerator-boilers, turbo-generators and power distribution network, and control and monitoring systems</li> <li>• Electrical installations and power systems in railway and air traffic management systems, including but not limited to: High voltage power systems, railway traction power systems, aircraft ground power supply systems, AC/DC and DC/AC converters, and signalling, communication and control systems and equipment, airfield lighting systems, and public announcement systems</li> <li>• Renewable and distributed energy resources, including but not limited to: Solar photovoltaic installations, microgrids and energy storage systems</li> <li>• Systems used in transmission network system planning, control and management, including but not limited to: energy management systems, information technology (IT) and operational technology (OT) systems, substation remote control unit (RCU) systems, interruptible load monitoring system, distributed generator monitoring system, flexible AC transmission systems (FACTS), and supervisory control and data acquisition (SCADA) systems</li> </ul>				