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

TSC Category	Energy Operations Management					
TSC Title	Electricity Network Operations Management					
TSC Description	Manage low, high and/or extra high voltage network operations to ensure compliance with regulatory requirements and safety, and optimise operational efficiency					
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>**	
		Monitor low voltage (LV) network operations procedures	Review low voltage (LV) network operations as per project needs, regulatory and safety requirements	Review high voltage (HV) or extra high voltage (EHV) network operations and recommend contingency plans	Provide technical guidance on low voltage (LV), high voltage (HV) or extra high voltage (EHV) operational problems and process improvement	
Knowledge		• Types of LV distribution equipment • Nomenclatures of the LV distribution equipment • Types of maintenance programmes for LV distribution equipment • Principles on power transmission and distribution • Criteria for the uses of fuses and links • Procedures for the control and safe operation of LV apparatus • Procedures for installation of new LV distribution equipment • Procedures for inspection and servicing of LV distribution equipment • Types of worksite environments • LV network configurations and reinforcement • Types of power outages or disturbances	• Types of LV distribution equipment • Types of cable faults in LV networks • Causes of LV cable faults • Method for testing the status of the LV cables using the test lamp or voltage detector • Methods for proper isolation and tagging of faulty cables • Cable insulation resistance test on a LV cable • Fault resistance test with a multi-meter on a faulty LV cable • Continuity test with a multi-meter on a LV cable • Selection of appropriate test methods • Proper setting-up of test equipment for pre-fault location • Working principle of Pulse Echo test set.	• Types of Allen keys and locking systems • Lockout and tagout schemes • Types of tools and equipment used for operations and maintenance • Rules for control and safe operation of HV and EHV apparatus • Types of EHV transmission equipment or HV distribution equipment • Characteristics of EHV or HV networks • Operating principles for withdrawable and non-withdrawable types of switchgear • Operating principles of Ring Main Units • Operating principles of transformer tap changers • Power system protection methods • Communication channels with control centres such as Electricity Service	• Types of Allen keys and locking systems • Lockout and tagout schemes • Types of tools and equipment used for operations and maintenance • Procedures for the control and safe operation of HV and EHV apparatus • Types of EHV transmission equipment or HV distribution equipment • Characteristics of EHV or HV networks • Operating principles for withdrawable and non-withdrawable types of switchgear • Operating principles of Ring Main Units • Operating principles of transformer tap changer • Power system protection methods • Communication channels with control centres such as Electricity Service	

		• Appropriate tools, measuring instruments and equipment • Types of cable faults in the LV network • Safety precautions while working with LV distribution equipment	• Interpretation of reflected waveforms in the Pulse Echo test sets • Proper usage methods of the surge generator sequence of the sectionalising method of fault location • Phasing out test procedures during cable jointing • Consequences of wrong phase sequence • Procedures for the control and safe operation of LV and High Voltage (HV) apparatus • Risk assessment and toolbox meeting • Method for reinstatement of the affected sites upon completion of all work activities • Importance of good housekeeping • Importance of making post activity reports • Reporting protocols and guidelines	Centres (ESCs), Distribution Control Centres (DCCs), Power Control Centres and buddy systems • Approaches in attending to HV or EHV faults • Methods to trace circuits or equipment that is affected by an outage • Types of faults in EHV and/or HV networks • Causes of faults in EHV and/or HV networks • Methods for the identification of faulty cables • Methods for the isolation of faulty cables • Planning for the restoration of supply • Procedures for restoration of supply • Performance checks on the status of "network cuts" in HV networks • Selection of appropriate alternative feeds • Procedures for performing closing and opening of network cuts • Reporting protocols and guidelines • Contingency and response plan for Electricity Network Operations	Centres (ESC), Distribution Control Centres (DCC), Power Control Centres and buddy systems • Approaches in attending to EHV and/or HV faults • Methods to trace circuits or equipment that is affected by an outage • Types of faults in EHV or HV networks • Causes of faults in EHV and/or HV networks • Methods for the identification of faulty cables • Methods for the isolation of faulty cables • Planning for the restoration of supply • Procedures for restoration of supply • Performance checks on the status of network cuts in the HV network • Selection of the appropriate alternative feeds • Performing the closing and opening of network cuts • Rules for control and safe operation of HV and EHV apparatus • Reporting protocols and guidelines • Contingency and response plan for Electricity Network Operations	
Abilities		• Identify the types of LV distribution equipment in power distribution systems • Interpret the nomenclatures on LV distribution equipment in accordance with Standard Operating Procedures (SOPs)	• Prepare tools, measuring instruments and equipment for pre-fault location tests on faulty LV cables in accordance with organisational Standard Operating Procedures (SOPs) • Perform analysis of fault characteristics in	• Clarify and acknowledge EHV or HV outages with the relevant personnel • Prepare the necessary tools, measuring instruments and equipment for carrying out the restoration of EHV or HV outages in accordance to organisational Standard	• Review analysis to identify gaps in operations and maintenance procedures • Provide technical guidance to solve LV, HV or EHV-related operational problems • Establish transmission or distribution key performance indicators	

		• Perform maintenance of LV distribution equipment in accordance with SOPs • Supervise work performed by relevant parties in the maintenance of LV distribution equipment in accordance with SOPs • Apply appropriate electrical safety precautions whilst working with LV distribution equipment in different environments in accordance with SOPs • Conduct appropriate measurements of LV distribution equipment in accordance with SOPs • Report non-compliance of nomenclatures used on LV distribution equipment at worksites in accordance with SOPs	accordance with operation and maintenance manuals • Perform the pre-fault location tests • Set-up the equipment for pin-pointing cable faults after pre-fault location • Perform the location of the faulty section of cable circuits by applying the sectionalising test method • Perform phasing out tests on LV cables in accordance with operation and maintenance manuals • Apply appropriate electrical safety precautions while working with LV distribution equipment in accordance with SOPs • Reinstate the affected sites upon completion of all work activities in accordance with SOPs • Complete and submit post activity reports showing the analysis of fault characteristics and position of the faulty cables • Collaborate with stakeholders to develop contingency plans based on possible scenarios that may occur during LV network operations • Liaise with stakeholders to develop contingency plans based on possible scenarios that may occur during LV network operations	Operating Procedures (SOPs) • Perform tracing of circuit breaker tripping or fuse blown-up to the source of the affected circuit or equipment in accordance with SOPs • Perform analysis of the protective relays of the affected circuits or equipment while tracing the faults • Perform tests on the affected circuits to identify faulty cables using established test methods in accordance with organisational SOPs • Perform the isolation of the identified faulty cable or equipment safely in accordance with SOPs • Perform the restoration of supply by selecting the appropriate alternative feed in the EHV or HV networks • Apply appropriate electrical safety precautions while working with EHV or HV transmission or distribution equipment in accordance with SOPs • Complete and submit post activity reports and communicate to relevant persons in accordance with SOPs • Liaise with stakeholders to develop contingency plans based on possible scenarios that may occur during EHV or HV network operations	• Provide technical inputs for the development of transmission or distribution network policies • Integrate systems and work processes to drive performance and capabilities of transmission or distribution network systems • Formulate contingency guidelines and policies	

Range of Application		Range of application includes, but is not limited to:
		
		• LV distribution equipment
		  ○ LV Distribution Boards (LVB)
		  ○ Overground Boxes (OGB)
		  ○ Meter Room Box (MRB)				

		• Test-plugs, insulation resistance tester, multi-meter, clamp-on ammeter, voltage detector cum hot stick, approved discharge stick
		• HV or EHV equipment
		  ○ Load Break and Fuse Switches in Ring Main Unit (RMU)
		  ○ Transformers
		  ○ Switchgears
		  ○ Fuses
		  ○ Circuit Breakers	