

PART 2: EMPLOYER'S REQUIREMENTS
**CHAPTER 9C: TRACTION NETWORK-
TEST SHEETS**

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Note: These specifications are the bare minimum requirement, PST Contractor must verify the design and should fulfil while selecting system/equipment/component & executions. The final requirements of the specifications will depend upon the simulation studies and based upon that the PST contractor has to provide the material over and above to these specifications which shall be finally approved by Engineer / Employer.

1. TEST SHEETS

1.1. 25 kV Circuit Breaker - (IEC 62271-100)

INDICATIONS	TYPE of TEST			
	Type	Routine	FAT	On site
Dielectric test	✓	✓	✓	
Radio interference voltage test	✓			
Measurement of resistance of main circuit	✓	✓	✓	✓
Temperature rise test	✓	✓		
Short time withstand current & peak withstand current	✓	✓		
Tightness test	✓	✓	✓	✓
EMC test	✓			
Mechanical operation test at ambient temperature	✓	✓	✓	✓
Short circuit current making breaking test	✓			
Capacitive current switching test cable charging current	✓			
Verification of the degree protection	✓			
Low & high temperature test	✓			
Static terminal load test	✓			
Static terminal load test	✓			
Static terminal load test	✓			
Pressure tests of gas filled compartment	✓			
Interlocking			✓	✓
Visual inspection			✓	✓
Measurement of operation time			✓	✓
Insulation resistance test			✓	✓
Contact resistance test			✓	✓

The Mechanical operation test to be done as a Routine test and shall comprise of five opening and five closing operations at each of the rated, maximum and minimum control voltages. The contact travel characteristics shall be recorded for each closing and tripping operation & operation test (110%, 100%, 85%, 70% of control supply).

1.2. 25kV Interrupters - (IEC 62271-100)

INDICATIONS	TYPE of TEST			
	Type	Routine	FAT	On site
Dielectric test	✓	✓	✓	
Radio interference voltage test	✓			
Measurement of resistance of main circuit	✓	✓	✓	✓
Temperature rise test	✓	✓		
Short time withstand current & peak withstand current	✓	✓		
Tightness test	✓	✓	✓	✓
EMC test	✓			
Mechanical operation test at ambient temperature	✓	✓	✓	✓
Short circuit current making breaking test	✓			
Capacitive current switching test cable charging current	✓			
Verification of the degree protection	✓			
Low & high temperature test	✓			
Static terminal load test	✓			
Static terminal load test	✓			
Static terminal load test	✓			
Pressure tests of gas filled compartment	✓			
Interlocking			✓	✓
Visual inspection			✓	✓
Measurement of operation time			✓	✓
Insulation resistance test			✓	✓
Contact resistance test			✓	✓

The Mechanical operation test to be done as a Routine test and shall comprise of five opening and five closing operations at each of the rated, maximum and minimum control voltages. The contact travel characteristics shall be recorded for each closing and tripping operation & operation test (110%, 100%, 85%, 70% of control supply).

1.3. 25 kV Isolators

(Manual or Motorized, Pole Mounted) (IEC 60694, 62271-100, RDSO ETI/SPG/PSI/ISOLATOR/1060 LATEST)

INDICATIONS	TYPE of TEST			
	Type	Routine	FAT	On site
Visual examination of isolator & its parts	✓	✓	✓	✓
Dimensional verification of parts	✓	✓	✓	✓
Assembly & interchangeability	✓	✓	✓	
Measurement of resistance of main circuit & earth circuit (before & after mechanical endurance test)	✓	✓		
Temperature rise	✓	✓		
Mechanical Endurance test	✓	✓		
Short time rated current test	✓	✓		
One-minute wet power frequency test across the isolating distance & to earth	✓	✓	✓	
Lightning impulse withstand voltage	✓			
Galvanization test	✓	✓	✓	✓
Chemical analysis of materials copper contacts, spring, fasteners & bus bar	✓			
Physical test on springs & fastener & copper strips	✓			
Insulation resistance test			✓	✓
Contact resistance test			✓	✓
Operational check & record the motor current			✓	✓
Peaks & short time current withstand	✓			
Aux. circuits dielectric withstand		✓	✓	✓
Main circuits resistance value		✓		
Withstand voltage at 50Hz		✓		
All devices operation checking		✓	✓	✓
Operation times		✓	✓	✓
Wiring		✓	✓	✓
Interlocking		✓	✓	✓
Painting & external visual inspection		✓	✓	✓
Exchangeability of similar devices		✓	✓	✓
Aux. circuits insulation			✓	✓

Clearance between male and female contact				✓
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1.4. 25kV Current Transformer (IEC 61869-2)

INDICATIONS	TYPE of TEST			
	Type	Routine	FAT	On site
Temperature rise	✓			
Lightning impulse withstand voltage	✓			
Short circuit withstand	✓			
EMC	✓			
Test of accuracy	✓			
Primary windings Voltage withstand at 50 Hz		✓	✓	
Secondary windings Voltage withstand at 50 Hz		✓	✓	
Between section Voltage withstand at 50 Hz		✓	✓	
Transformer ratio		✓	✓	✓
Terminal marking		✓	✓	✓
Visual inspection		✓	✓	✓
Exchangeability of similar devices		✓	✓	
Knee point voltage measurement			✓	✓
IR value test			✓	✓
Winding test			✓	✓
Polarity test				✓
Continuity test				✓

1.5. 25 kV Lightning Arrester

(IEC 60099-4 & RDSO SPEC ETI/PSI/71 (1/87) with A&C SLIP 1 to 7 or LATEST VERSION)

INDICATIONS	TYPE of TEST			
	Type	Routine	FAT	On site
Insulation withstand tests on the arrester housing	✓	✓		
Residual Voltage test	✓	✓	✓	
Test to verify long term stability under continuous operating voltage	✓	✓	✓	
Repetitive charge transfer with stand	✓	✓		
Heat dissipation behavior verification	✓	✓		
Operation duty test	✓	✓		
Power frequency voltage versus time	✓			
Short circuit tests	✓	✓	✓	
Environmental tests	✓			
Test to verify the dielectric withstand of the internal components of arrester	✓	✓	✓	
Test of internal grading components	✓			
Pollution housing test	✓			
Partial discharge test	✓		✓	
Insulation resistance measurement			✓	✓
Measurement of reference voltage		✓	✓	
Visual inspection		✓	✓	✓
Leakage current test		✓	✓	✓
Surge counter reading			✓	✓
Checking of Healthiness			✓	✓

1.6. 25kV Voltage Transformer (IEC 61869-3)

INDICATIONS	TYPE of TEST			
	Type	Routine	FAT	On site
Temperature rise	✓			
lightning impulse withstand voltage	✓			
Short circuit withstand	✓			
Test of Accuracy	✓			
EMC	✓			

Short circuit withstand capability test	✓			
Primary windings Voltage withstand at 50 Hz		✓	✓	
Secondary windings Voltage withstand at 50 Hz		✓	✓	
Between section Voltage withstand at 50 Hz		✓	✓	
Transformer ratio		✓	✓	✓
Terminal marking		✓	✓	✓
Visual inspection		✓	✓	✓
Exchangeability of similar devices		✓		
IR value test			✓	✓
Measurement of capacitance & dielectric dissipation factor		✓	✓	
Internal Arc fault test		✓		

1.7. 25kV Capacitive Voltage Sensor (IEC 61869-5)

INDICATIONS	TYPE of TEST			
	Type	Routine	FAT	On site
Null responder DC	✓			
Operation time tests	✓			
Dielectric tests with industrial frequency for 1 minute	✓			
Dielectric test: Lightning impulse withstand voltage	✓			
Climatic tests	✓			
Short Circuit withstand	✓			
Corrosion test	✓			
Response value at different voltages		✓	✓	
Dry auxiliary voltage		✓	✓	
Limit Value converter output (mA)		✓	✓	
Output voltage converter in open circuit		✓	✓	
Capacitive sensor test		✓	✓	

Terminal marking		✓	✓	✓
Visual inspection		✓	✓	✓
Exchangeability of similar devices		✓	✓	

NOTE: All the above tests are indicative subject to be change as required by Engineer- in charge. The ITP/test matrix as per above test sheets, conforming latest relevant standards, shall be submitted by the contractor one month prior to the Engineer/Employer.