

PART 2: EMPLOYER'S REQUIREMENTS
CHAPTER 13C: 220 kV RECEIVING
SUBSTATIONS TEST SHEET

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1 TRACTION TRANSFORMERS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise test	X		
2.	Dielectric type test	X		
3.	Noise level **	X		
4.	Short circuit withstand **	X		
5.	Dielectric Special Tests**	X		
6.	Determination of capacitance winding to earth, and between winding**	X		
7.	Determination of transient voltage transfer characteristic**	X		
8.	Measurement of zero sequence impedance on three phase transformers**	X		
9.	Measurement of the harmonics of the no load current**	X		
10.	Measurement of the power taken by fan and oil pump motor**	X		
11.	Measurement of Windings resistance		X	X
12.	Measurement of voltage ratio		X	X
13.	Measurement of Short-circuit impedance and load loss		X	
14.	Measurement of no-load loss and current		X	
15.	Separate source AC high voltage withstand test (Dielectric test)		X	
16.	Induced over voltage withstand test		X	
17.	Polarity Test		X	X
18.	Insulation Resistance Test		X	X
19.	Capacitance and tan delta test on windings		X	
20.	Capacitance and tan delta test on bushing		X	X
21.	Magnetic balance and magnetizing current test		X	X
22.	Core Insulation resistance		X *	X
23.	No Load Current harmonics measurement		X	
24.	Aux. circuits insulation		X	
25.	Insulation oil breakdown strength		X	X
26.	Dissolved Gas Analysis (DGA)		X	X
27.	Frequency Response Analysis (FRA)		X	X
28.	Tank, Expansion vessel & Radiator Water tight		X	
29.	Piping welds & joints Water tight		X	
30.	Painting & external visual inspection		X *	X
31.	Tightness of OLTC Tank		X	
32.	Mechanical and Electrical operation of on load tap changer		X	
33.	RTCC, OLTC and Marshalling Box Functional Test		X	X

* Tests to be performed just prior shipment.

** These are special tests.

2 AUXILIARY MAIN TRANSFORMERS

Sr. No	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise test	X		
2.	Dielectric type test	X		
3.	Noise level **	X		
4.	Short circuit withstand **	X		
5.	Dielectric Special Tests**	X		
6.	Determination of capacitance winding to earth, and between winding**	X		
7.	Determination of transient voltage transfer characteristic**	X		
8.	Measurement of zero sequence impedance on three phase transformers**	X		
9.	Measurement of the harmonics of the no load current**	X		
10.	Measurement of the power taken by fan and oil pump motor**	X		
11.	Measurement of Auxiliary losses.	X		
12.	Measurement of Zero Sequence Impedance	X		
13.	Measurement of Windings resistance		X	X
14.	Measurement of voltage ratio		X	X
15.	Measurement of Short-circuit impedance and load loss		X	
16.	Measurement of no-load loss and current		X	
17.	Separate source AC high voltage withstand test (Dielectric test)		X	
18.	Induced over voltage withstand test		X	
19.	Polarity Test		X	X
20.	Insulation Resistance Test		X	X
21.	Capacitance and tan delta test on windings		X	X
22.	Capacitance and tan delta test on bushing		X	X
23.	Magnetic balance and magnetizing current test		X	X
24.	Core Insulation resistance		X *	X
25.	No Load Current harmonics measurement		X	
26.	Aux. circuits insulation		X	
27.	Insulation oil breakdown strength		X	X
28.	Dissolved Gas Analysis (DGA)		X	X
29.	Frequency Response Analysis (FRA)		X	X
30.	Tank, Expansion vessel & Radiator Water tight		X	
31.	Piping welds & joints Water tight		X	
32.	Painting & external visual inspection		X *	X
33.	Tightness of OLTC Tank		X	
34.	Mechanical and Electrical operation of On load tap changer		X	
35.	RTCC, OLTC and Marshalling Box Functional Test		X	X

* Tests to be performed just prior shipment.

** These are special tests.

3 220kV GIS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Dielectric withstand test	X		
2.	Power Frequency withstand test	X	X	X
3.	Impulse withstand test	X		
4.	Switching impulse withstand voltage	X		
5.	Making and Breaking capability test	X		
6.	Short time current test and peak current test	X		
7.	Mechanical	X		
8.	Continuous current carrying and temperature rise	X		
9.	Current path resistance measurement	X		
10.	Pressure tests	X		
11.	Partial Discharge test	X		
12.	Additional tests on auxiliary control circuit			
13.	Verification of degree of protection			
14.	EMC Tests			
15.	Pressure test performed on all individual enclosures		X	X
16.	Circuit Breaker Tests		X	X
17.	Tests of disconnector switches and ground switches		X	X
18.	Current transformer test		X	X
19.	Voltage transformer test		X	X
20.	Tests on transport units		X	X
21.	Visual Inspection			X
22.	SF ₆ Gas leakage test			X
23.	Gas density monitor check			X
24.	Measurement of Moisture content			X
25.	CT and VT Test			X
26.	DC Resistance measurement of the main circuits			X
27.	Interlock Test			X
28.	Manual operating check of CB, disconnecting switch, earth switch, and fault making earth switch			X

Note:

PST Contractor shall perform / submit all applicable type and routine tests as per relevant IEC standards.

4 220 KV HIGH VOLTAGE ISOLATORS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Dielectric Test	X		
2.	Power Frequency Voltage Test	X		
3.	Lightning Impulse Voltage Test	X		
4.	Partial Discharge Test	X		
5.	Voltage Test as Condition Check	X		
6.	Radio Interference Test	X		
7.	Measurement of resistance of the main circuit	X		
8.	Measurement of resistance of the auxiliary circuit	X		
9.	Temperature Rise Test	X		
10.	Short Time Withstand and Peak Withstand current Test	X		
11.	Verification of the Protection	X		
12.	Electromagnetic compatibility tests (EMC)	X		
13.	Tests on Auxiliary and Control Circuits	X		
14.	Functional Test	X		
15.	Electrical continuity of earthed metallic parts test	X		
16.	Verification of the operational characteristics of auxiliary contacts	X		
17.	Environmental Tests	X		
18.	Test to prove the short-circuit making performance of earthing switches	X		
19.	Tests to prove satisfactory operation and mechanical endurance	X		
20.	Tests to prove satisfactory operation at temperature limits (a). Operation at minimum ambient air temperature (b). Operation at maximum ambient air temperature	X		
21.	Di-electric test on control & auxiliary circuit		X	
22.	Main circuits resistance value		X	
23.	Withstand voltage at 50 Hz		X	
24.	Withstand voltage at 50 Hz on the isolating distance		X	
25.	All devices operation checking		X	
26.	Insulation resistance Test		X	X
27.	Wiring		X	X
28.	Function		X	X
29.	Interlocking		X	X
30.	Painting & external visual inspection		X *	X
31.	Aux. circuits insulation			X

*** Tests to be performed just prior shipment.**

5 HIGH VOLTAGE CURRENT TRANSFORMERS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise	X		
2.	Lightning impulse withstand voltage	X		
3.	Tests for accuracy	X		
4.	Short time current test.	X		
5.	Measurement of capacitance and dielectric dissipation factor	X		
6.	Internal arc fault test	X		
7.	Determination of the remanence factor	X		
8.	Determination of the instrument security factor of measuring current transformer.	X		
9.	Primary windings power frequency withstands voltage test		X	
10.	Secondary windings power frequency withstand voltage test		X	
11.	Between section power frequency withstand voltage test		X	
12.	Determination of the secondary loop time constant.		X	
13.	Accuracy test-ratio & phase error test on metering cores		X	
14.	Measurement of instrument security factor for metering.		X	
15.	Resistance, knee point voltage, exciting current measurement on special protection		X	X
16.	Inter turn overvoltage test		X	
17.	Sf6 leakage test.		X	
18.	Terminal marking		X	X
19.	Visual inspection		X	X
20.	Current ratio test		X	X
21.	Polarity test		X	X
22.	Insulation resistance test		X	X
23.	Continuity test		X	X
24.	Secondary winding resistance		X	X
25.	Exchangeability of similar devices			X

6 HVCAPACITOR VOLTAGE TRANSFORMER

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Accuracy tests	X		
2.	Temperature-rise test	X		
3.	Capacitance and $\tan \delta$ measurement at power-frequency (50Hz)	X		
4.	Chopped impulse test	X		
5.	EMC radio interference voltage (RIV) tests	X		
6.	Short-circuit withstand capability test	X		
7.	Lightning Impulse test on primary winding	X		
8.	Wet test for outdoor type transformers	X		
9.	Transient response test	X		
10.	Ferro-resonance tests	X		
11.	Tightness test of a liquid-filled electromagnetic unit	X		
12.	Accuracy tests	X		
13.	Power frequency withstand test on the electromagnetic unit.		X	
14.	power frequency voltage withstand test on high voltage terminal		X	
15.	Power frequency test on low voltage terminal. (NHF terminal of CVD)		X	
16.	Capacitance & $\tan \delta$ before and after one minute power frequency test		X	
17.	Partial discharge test		X	
18.	Determination of errors		X	
19.	Sealing test		X	
20.	Verification of terminal marking and polarity		X	X
21.	Visual inspection		X	X
22.	Insulation Resistance test		X	X
23.	Continuity test		X	X
24.	Voltage ratio test		X	X
25.	Exchangeability of similar devices		X	X

7 HV SURGE ARRESTERS

Sl. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Insulation withstand test on the arrester housing	X		
2.	Residual voltage test	X		
3.	Long duration current impulse withstand test.	X		
4.	Standard lightning impulse spark over test	X		
5.	Short Circuit test	X		
6.	Measurement of front-of-wave impulse spark over- voltage	X		
7.	Operating duty test	X		
8.	Thermal stability test	X		
9.	Partial discharge test	X	X	
10.	Leakage current test		X	
11.	Reference voltage test		X	
12.	Current sharing test		X	
13.	Visual inspection		X	X
14.	Insulation resistance measurement			X

8 NEUTRAL GROUNDING RESISTORS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Power frequency withstand test between Line and Earth using 60kV RMS for 1 min		X	
2.	Power frequency withstand test between Line and Earth using 60kV RMS for 1 min for auxiliary circuit		X	
3.	Insulation resistance value test.		X	
4.	Resistance value test at 30 c ambient temp.		X	
5.	Thickness check		X	
6.	Paint and Visual inspection		X	
Neutral isolator		As per previous associated isolator		
Neutral Current transformer		As per previous associated current transformer		
Neutral LA		As per previous associated LA		

9 33 KV CIRCUIT BREAKER

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise	X		
2.	Dielectric tests	X		
3.	Radio interference voltage test.	X		
4.	Measurement of the resistance of the main circuit.	X	X	
5.	Lightning impulse withstand voltage	X		
6.	Short circuit withstand	X		
7.	Protection of persons against live parts	X		
8.	Short time withstand current and peak withstand current tests.	X		
9.	EMC test	X		
10.	Mechanical operation test at ambient temperature.	X		
11.	Short circuit making and breaking capacity	X	X	
12.	Dielectric test on auxiliary and control circuits	X	X	
13.	Capacitive current switching test: line-changing current breaking test.	X		
14.	Capacitive current switching test: Cable-changing current breaking test.	X		
15.	Tightness test.	X		
16.	Verification of the degree of protection.	X		
17.	High temperature test	X		
18.	Magnetising and small inductive current switching	X		
19.	Power frequency withstand voltage test		X	
20.	All devices operation checking		X	X
21.	Wiring		X	X
22.	Mechanical operation test at rated, max & min control voltage.		X	X
23.	Interlocking		X	X
24.	Painting & external visual inspection		X*	X
25.	Exchangeability of similar devices		X	
26.	Measurement of speed and Time		X	
27.	Coil Insulation Resistance		X	X
28.	Timing Test			X
29.	Breaker Insulation resistance		X	X

* Tests to be performed just prior shipment.

10 33KV CURRENT TRANSFORMERS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise	X		
2.	Lightning impulse withstand voltage	X		
3.	Tests for accuracy	X		
4.	Short time current test.	X		
5.	Measurement of capacitance and dielectric dissipation factor	X		
6.	Internal arc fault test	X		
7.	Determination of the remanence factor	X		
8.	Determination of the instrument security factor of measuring current transformer.	X		
9.	Primary windings power frequency withstands voltage test		X	
10.	Secondary windings power frequency withstand voltage test		X	
11.	Between section power frequency withstand voltage test		X	
12.	Determination of the secondary loop time constant.		X	
13.	Accuracy test-ratio & phase error test on metering cores		X	
14.	Measurement of instrument security factor for metering.		X	
15.	Resistance, knee point voltage, exciting current measurement on special protection		X	X
16.	Inter turn overvoltage test		X	
17.	Sf6 leakage test.		X	
18.	Terminal marking		X	X
19.	Visual inspection		X	X
20.	Current ratio test		X	X
21.	Polarity test		X	X
22.	Insulation resistance test		X	X
23.	Continuity test		X	X
24.	Secondary winding resistance		X	X
25.	Exchangeability of similar devices			X

11 33KV CURRENT TRANSFORMERS

Sr .No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature Rise Test	X		
2.	Short Circuit Withstand Capability Test	X		
3.	Lightning Impulse Withstand Test	X		
4.	Switching Impulse Test	X		
5.	Wet Test for Outdoor Type Transformer	X		
6.	Measurement of Radio Interference Voltage	X		
7.	Determination of Errors	X		
8.	Chopped Impulse Test on Primary Winding**	X		
9.	Measurement of capacitance & dielectric dissipation factor**	X		
10.	Mechanical Test**	X		
11.	Transmitted Overvoltage measurement**	X		
12.	Primary windings power frequency withstand voltage test		X	
13.	Secondary windings power frequency withstand voltage test		X	
14.	Between section power frequency withstand voltage test		X	
15.	Partial discharge test		X	
16.	Determination of errors		X	
17.	Transformer ratio		X	X
18.	Verification of terminal marking and polarity		X	X
19.	Visual inspection		X	X
20.	Insulation Resistance test		X	X
21.	Continuity test		X	X
22.	Exchangeability of similar devices		X	X

12 25KV HIGH VOTAGE ISOLATORS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Dielectric Test	X		
2.	Power Frequency Voltage Test	X		
3.	Lightning Impulse Voltage Test	X		
4.	Partial Discharge Test	X		
5.	Voltage Test as Condition Check	X		
6.	Radio Interference Test	X		
7.	Measurement of resistance of the main circuit	X		
8.	Measurement of resistance of the auxiliary circuit	X		
9.	Temperature Rise Test	X		
10.	Short Time Withstand and Peak Withstand current Test	X		
11.	Verification of the Protection	X		
12.	Electromagnetic compatibility tests (EMC)	X		
13.	Tests on Auxiliary and Control Circuits	X		
14.	Functional Test	X		
15.	Electrical continuity of earthed metallic parts test	X		
16.	Verification of the operational characteristics of auxiliary contacts	X		
17.	Environmental Tests	X		
18.	Test to prove the short-circuit making performance of earthing switches	X		
19.	Tests to prove satisfactory operation and mechanical endurance	X		
20.	Tests to prove satisfactory operation at temperature limits (a). Operation at minimum ambient air temperature (b). Operation at maximum ambient air temperature	X		
21.	Di-electric test on control & auxiliary circuit		X	
22.	Main circuits resistance value		X	
23.	Withstand voltage at 50 Hz		X	
24.	Withstand voltage at 50 Hz on the isolating distance		X	
25.	All devices operation checking		X	
26.	Insulation resistance Test		X	X
27.	Contact resistance measurement		X	X
28.	Wiring		X	X
29.	Function		X	X
30.	Interlocking		X	X
31.	Painting & external visual inspection		X*	X
32.	Aux. circuits insulation			X

*** Tests to be performed just prior shipment.**

13 25KV CIRCUIT BREAKER

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise	X		
2.	Dielectric tests	X		
3.	Radio interference voltage test.	X		
4.	Measurement of the resistance of the main circuit.	X	X	
5.	Lightning impulse withstand voltage	X		
6.	Short circuit withstand	X		
7.	Protection of persons against live	X		
8.	Short time withstand current, and peak withstand current tests.	X		
9.	EMC test	X		
10.	Mechanical operation test at ambient temperature.	X		
11.	Short circuit making and breaking capacity	X	X	
12.	Dielectric test on auxiliary and control circuits	X	X	
13.	Capacitive current switching test: line- changing current breaking test.	X		
14.	Capacitive current switching test: Cable-changing current breaking test.	X		
15.	Tightness test.	X		
16.	Verification of the degree of	X		
17.	High temperature test	X		
18.	Magnetizing and small inductive current switching	X		
19.	Power frequency withstand voltage test		X	
20.	All devices operation checking		X	X
21.	Wiring		X	X
22.	Mechanical operation test at rated, max & min control voltage.		X	X
23.	Interlocking		X	X
24.	Painting & external visual inspection		X*	X
25.	Exchangeability of similar devices		X	
26.	Measurement of speed and Time		X	
27.	Coil Insulation Resistance		X	X
28.	Timing Test			X
29.	Contact resistance measurement		X	X
30.	Breaker Insulation resistance		X	X

* Tests to be performed just prior shipment.

14 25KV CURRENT TRANSFORMERS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise	X		
2.	Lightning impulse withstand voltage	X		
3.	Tests for accuracy	X		
4.	Short time current test.	X		
5.	Measurement of capacitance and dielectric dissipation factor	X		
6.	Internal arc fault test	X		
7.	Determination of the remanence factor	X		
8.	Determination of the instrument security factor of measuring current transformer.	X		
9.	Primary windings power frequency withstands voltage test		X	
10.	Secondary windings power frequency withstand voltage test		X	
11.	Between section power frequency withstand voltage test		X	
12.	Determination of the secondary loop time constant.		X	
13.	Accuracy test-ratio & phase error test on metering cores		X	
14.	Measurement of instrument security factor for metering.		X	
15.	Resistance, knee point voltage, exciting current measurement on special protection		X	X
16.	Inter turn overvoltage test		X	
17.	Sf6 leakage test.		X	
18.	Terminal marking		X	X
19.	Visual inspection		X	X
20.	Current ratio test		X	X
21.	Polarity test		X	X
22.	Insulation resistance test		X	X
23.	Continuity test		X	X
24.	Secondary winding resistance		X	X
25.	Exchangeability of similar devices			X

15 25KV VOLTAGE TRANSFORMER

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature Rise Test	X		
2.	Short Circuit Withstand Capability Test	X		
3.	Lightning Impulse Withstand Test	X		
4.	Switching Impulse Test	X		
5.	Wet Test for Outdoor Type Transformer	X		
6.	Measurement of Radio Interference	X		
7.	Determination of Errors	X		
8.	Chopped Impulse Test on Primary Winding**	X		
9.	Measurement of capacitance & dielectric dissipation factor**	X		
10.	Mechanical Test**	X		
11.	Transmitted Overvoltage measurement**	X		
12.	Primary windings power frequency withstand voltage test		X	
13.	Secondary windings power frequency withstand voltage test		X	
14.	Between section power frequency withstand voltage test		X	
15.	Partial discharge test		X	
16.	Determination of errors		X	
17.	Transformer ratio		X	X
18.	Verification of terminal marking and		X	X
19.	Visual inspection		X	X
20.	Insulation Resistance test		X	X
21.	Continuity test		X	X
22.	Exchangeability of similar devices		X	X

16 25KV VOLTAGE TRANSFORMER

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise	X		
2.	Lightning impulse withstand voltage	X		
3.	Tests for accuracy	X		
4.	Short time current test.	X		
5.	Measurement of capacitance and dielectric dissipation factor	X		
6.	Internal arc fault test	X		
7.	Determination of the remanence factor	X		
8.	Determination of the instrument security factor of measuring current transformer.	X		
9.	Primary windings power frequency withstands voltage test		X	
10.	Secondary windings power frequency withstand voltage test		X	
11.	Between section power frequency withstand voltage test		X	
12.	Determination of the secondary loop time constant.		X	
13.	Accuracy test-ratio & phase error test on metering cores		X	
14.	Measurement of instrument security factor for metering.		X	
15.	Resistance, knee point voltage, exciting current measurement on special protection		X	X
16.	Inter turn overvoltage test		X	
17.	Sf6 leakage test.		X	
18.	Terminal marking		X	X
19.	Visual inspection		X	X
20.	Current ratio test		X	X
21.	Polarity test		X	X
22.	Insulation resistance test		X	X
23.	Continuity test		X	X
24.	Secondary winding resistance		X	X
25.	Exchangeability of similar devices			X

17 ACDB

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise test	X		
2.	Dielectric properties	X		
3.	Short circuit withstand	X		
4.	Clearances and creepage distance	X		
5.	Mechanical operation	X		
6.	Degree of protection	X		
7.	Wiring, electrical operation		X	X
8.	Dielectric test		X	
9.	Insulation resistance		X	X
10.	Protective measure		X	
11.	Effectiveness of protective circuit	X		

18 BATTERY CHARGERS

Sr. No	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Rated output test	X		
2.	Over current test	X		
3.	Temperature rise test	X		
4.	Power loss determination	X		
5.	Confirmation of output frequency adjustable range	X		
6.	Checking of automatic control	X		
7.	Dry heat test	X		
8.	Performance test	X		
9.	Surge immunity test	X		
10.	Electrostatic Discharge test	X		
11.	Electromagnetic compatibility test	X		
12.	Cooling test	X		
13.	Vibration shock bump test	X		
14.	Measurement of THD or THF for voltage and/or current.	X		
15.	Short circuit test	X		
16.	Damp heat test	X		
17.	Radio Interference test	X		
18.	Salt Mist test	X	X	
19.	Visual Inspection		X	
20.	Checking auxiliary devices		X	
21.	Insulation test		X	
22.	Checking the protective devices		X	
23.	Light load and functional test		X	
24.	Measurement of output voltage		X	

25.	Confirmation of output voltage adjustable range		X	
26.	High voltage test		X	
27.	Ripple Content Measurement		X	
29.	Current limit test		X	
30.	Efficiency test		X	
31.	Alarm and Function test		X	
32.	Heat run test for 8 hour		X	
33.	Audible noise test		X	
34.	Insulation resistance test		X	X
35.	Regulation test		X	
36.	Floating operation mode test		X	
37.	Equalization operation mode test		X	
38.	Direct operation mode test		X	
39.	Protection devices operation		X	
40.	Setting test		X	X
41.	Measurement of power factor	X		
42.	Output voltage unbalance test	X		
43.	Output frequency tolerance band test	X		
44.	Immunity test	X		
45.	Emission test	X		
46.	Additional test	X		
47.	Water Tightness Test	X		
48.	Equipment Stress Screening	X		
49.	Low Temperature storage test	X		

19 BATTERY

Sr.No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Physical examination	X	X	X
2.	Dimension	X		
3.	High Rate Current	X		
4.	Charge acceptance at constant voltages	X		
5.	Electrolyte Retention	X		
6.	Marking	X	X	X
7.	Polarity and absence of short circuit	X	X	X
8.	Air pressure test	X	X	
9.	Ampere-hour capacity	X	X	X
10.	Endurance test	X		
11.	Retention of charge	X	X	
12.	Discharge performance at low temp.	X		
13.	Life cycle test	X		
14.	Environmental tests	X		
15.	Insulation resistance	X	X	
16.	Dielectric test.	X		
17.	High temperature float charge	X		
18.	Storage	X		

20 33/.415KV STATION TRANSFORMERS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise test	X		
2.	Noise level **	X		
3.	Short circuit withstand **	X		
4.	No Load Current harmonics measurement**	X		
5.	Determination of capacitances of winding to earth and between winding**	X		
6.	Determination of transient voltage transformer characteristics**	X		
7.	Measurement of Zero-sequence impedance**	X		
8.	Dielectric test	X	X	
9.	Measurement of Short-circuit impedance and load loss		X	
10.	Measurement of no-load loss and current		X	
11.	Separate source AC high voltage withstand test (Dielectric test)		X	
12.	Induced over voltage withstand test		X	
13.	Measurement of Windings resistance		X	X
14.	Measurement of voltage ratio and phase displacement		X	X
15.	Insulation Resistance Test		X	X
16.	Magnetic balance and magnetizing current test		X	X
17.	Painting & external visual inspection		X *	X

Tests to be performed just prior shipment. **
These are special tests.

21 220kV EHV CABLES

Note: All the type tests, routine test and on-site tests shall be carried out as per latest relevant IEC standards.

Sr. no	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise test	X		
2.	Short circuit withstand **	X		
3.	Bending test on the cable	X	X	
4.	tan δ measurement	X		
5.	Heating cycle voltage test	X		
6.	Partial discharge tests	X	X	
7.	lightning impulse voltage test	X		
8.	Power frequency voltage test	X	X	
9.	Resistivity of the cable semi-conducting screens	X	X	
10.	check of cable construction	X	X	
11.	Determining the mechanical properties of insulation before & after ageing	X	X	
12.	Determining the mechanical properties of over sheaths before and after ageing	X	X	
13.	Ageing tests on pieces of complete cable to check compatibility of materials	X		
14.	loss of mass test on PVC over sheaths	X		
15.	Pressure test at high temperature on over sheaths	X		
16.	Tests on PVC over sheaths at low temperature	X		
17.	Heat shock test for PVC over sheaths	X		
18.	ozone resistance test for EPR and HEPR insulation	X		
19.	Hot set test for XLPE insulations	X	X	
20.	Shrinkage test for XLPE insulations	X		
21.	Test under fire conditions	X		
22.	Water penetration test	X	X	
23.	Conductor Resistance		X	
24.	Conductor Examination		X	
25.	Check of Dimension		X	
26.	High voltage test for 30 min		X	
27.	DC voltage test on outer sheath		X	
28.	Capacitance measurement		X	
29.	Measurement of DC electrical resistance of conductor		X	
30.	Measurement of DC electrical resistance of armour		X	

*** Tests to be performed just prior shipment. ** These are special tests.**

22 25kV HV CABLES

Sr. No	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise test	X		
2.	Short circuit withstand **	X		
3.	Bending test on the cable	X	X	
4.	tan δ measurement	X		
5.	Heating cycle voltage test	X		
6.	Partial discharge tests	X	X	
7.	lightning impulse voltage test	X		
8.	Power frequency voltage test	X	X	
9.	Resistivity of the cable semi- conducting screens	X	X	
10.	Check of cable construction	X	X	
11.	Test for determining the mechanical properties of insulation before and after ageing	X	X	
12.	Test for determining the mechanical properties of over sheaths before and after ageing	X	X	
13.	Ageing tests on pieces of complete cable to check compatibility of materials	X		
14.	loss of mass test on PVC over sheaths	X		
15.	Pressure test at high temperature on over sheaths	X		
16.	Tests on PVC over sheaths at low temperature	X		
17.	Heat shock test for PVC over sheaths	X		
18.	ozone resistance test for EPR and HEPR insulation	X		
19.	Hot set test for XLPE insulations	X	X	
20.	Shrinkage test for XLPE insulations	X		
21.	Test under fire conditions	X		
22.	Water penetration test	X	X	
23.	Conductor Resistance		X	
24.	Conductor Examination		X	
25.	Check of Dimension		X	
26.	High voltage test		X	X
27.	DC voltage test on outer sheath		X	
28.	Capacitance measurement		X	
29.	Measurement of Dc electrical resistance of conductor		X	
30.	Measurement of DC electrical resistance of armour		X	
31.	IR test		X	X

23 33kV HV CABLES

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Insulation resistance measurement at ambient temperature.	X	X	X
2.	Insulation resistance measurement at maximum conductor temperature	X		
3.	Voltage test for 4 hours	X	X	
4.	Check of cable construction	X	X	
5.	Test for determining the mechanical properties of insulation before and after ageing	X	X	
6.	Test for determining the mechanical properties of over sheaths before and after ageing	X	X	
7.	Ageing tests on pieces of complete cable to check compatibility of materials	X		
8.	loss of mass test on PVC over sheaths	X		
9.	Pressure test at high temperature on over sheaths	X		
10.	Tests on PVC over sheaths at low temperature	X		
11.	ozone resistance test for EPR and HEPR insulation	X		
12.	Hot set test for XLPE insulations	X	X	
13.	Shrinkage test for XLPE insulations	X		
14.	Test under fire conditions	X		
15.	water penetration test	X		
16.	Special Bending test	X		
17.	Additional test on Halogen free over sheath	X	X	
18.	Conductor Resistance		X	
19.	conductor Examination		X	
20.	Check of Dimension		X	
21.	High voltage test		X	X
22.	Partial discharge test.		X	
23.	Volume resistivity test		X	

24 33kV HV CABLES

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Insulation resistance measurement at ambient	X		
2.	Insulation resistance measurement at maximum	X		
3.	Voltage test for 4 hours	X	X	
4.	Check of cable construction	X	X	
5.	Test for determining the mechanical properties of insulation before and after ageing	X	X	
6.	Test for determining the mechanical properties of over sheaths before and after ageing	X	X	
7.	Ageing tests on pieces of complete cable to check compatibility of materials	X		
8.	Loss of mass test on PVC over sheaths	X		
9.	Pressure test at high temperature on over sheaths	X		
10.	Tests on PVC over sheaths at low temperature	X		
11.	Ozone resistance test for EPR and HEPR insulation	X		
12.	Hot set test for XLPE insulations	X	X	
13.	Shrinkage test for XLPE insulations	X		
14.	Test under fire conditions	X		
15.	Water penetration test	X		
16.	Special Bending test	X		
17.	Additional test on Halogen free over sheath	X	X	
18.	Conductor Resistance		X	
19.	Conductor Examination		X	
20.	Check of Dimension		X	
21.	High voltage test for 30 min		X	
22.	Volume resistivity test		X	

25 1.1kV LV CABLES

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
1.	Temperature rise	X		
2.	Lightning impulse withstand voltage	X		
3.	Short time withstand current and peak withstand current	X		
4.	Test of tightness of the gas filled compartment	X	X	
5.	Test under condition of arcing due to internal fault.	X		
6.	Power frequency voltage test	X		
7.	Pressure test of the gas filled compartment	X	X	
8.	Cable charging current switching tests	X		
9.	Proof of the degree of protection (IP 65, 4X, 2X)	X		
10.	Mechanical operation test	X	X	
11.	Mechanical impact test	X		
12.	Partial discharge tests	X		
13.	Mechanical endurance test	X		
14.	Measurement of the resistance of the main circuit.	X	X	
15.	Magnetizing and small inductive current switching	X		
16.	Protection of persons against live	X		
17.	Short circuit making and breaking capacity	X		
18.	Power frequency withstand voltage test on auxiliary and		X	
19.	Power frequency withstand voltage test	X	X	
20.	Mechanical operation test at rated, max & min control voltage.		X	
21.	All devices operation checking		X	X
22.	Inspection of Wiring		X	X
23.	Interlocking		X	X
24.	Painting & External visual inspection		X*	X
25.	Insulation resistance test		X	X

*Tests to be performed just prior shipment.

26 25 KV GIS

Sr. No.	INDICATIONS	TYPE OF TEST		
		Type	Routine	On site
COMPLETE BAY				
1.	Dielectric test	X		
2.	Temperature rise	X		
3.	Measurement of the resistance of the circuit	X		
4.	Lightning impulse withstand voltage	X		
5.	Short time withstand current and peak withstand current	X		
6.	Test of tightness of the gas filled compartment	X	X	
7.	Test under condition of arcing due to internal fault.	X		
8.	Power frequency voltage test	X		
9.	Pressure test of the gas filled compartment	X	X	
10.	Cable charging current switching tests	X		
11.	Proof of the degree of protection (IP 65, 4X, 2X)	X		
12.	Mechanical operation test	X	X	
13.	Mechanical impact test	X		
14.	Partial discharge tests	X		
15.	Mechanical endurance test	X		
16.	Measurement of the resistance of the main circuit.	X	X	
17.	Magnetising and small inductive current switching	X		
18.	Protection of persons against live	X		
19.	Short circuit making and breaking capacity	X		
20.	Power frequency withstand voltage test on auxiliary and	、	X	
21.	Power frequency withstand voltage test	X	X	
22.	Mechanical operation test at rated, max & min control voltage.		X	
23.	All devices operation checking		X	X
24.	Inspection of Wiring		X	X
25.	Interlocking		X	X
26.	Painting & External visual inspection		X*	X
27.	Insulation resistance test		X	X

* Tests to be performed just prior shipment.