

Type Test Requirements of NTDC

The supplier shall offer only pre-type tested equipment, mentioned below, from one of the testing Laboratories as per Annexure A, in accordance with relevant NTDC tender specifications/ IEC along with the bid.

Grid Station Equipment

1. Circuit Breaker
2. Disconnecter
3. Potential Transformer/Capacitive Voltage Transformer
4. Current Transformer
5. Surge Arrester
6. Transformer Bushing
7. Insulators (Disc & Post)
8. Hardware (Connectors and Strings)
9. GIS

Transmission Line Equipment

1. Conductor
2. Hardware and accessories
3. Spacer damper
4. Stock Bridge Vibration Damper
5. Insulators

In case of non-submission of type test reports with the bids or if test reports supplied are not from one of the labs given in Annexure-A along with the bid, as per scope given in Annexure B, the same shall be considered technically non-responsive.

The validity of the Type Test reports shall be 10 years from the date of issuance of the reports. However, fresh type tests shall be required/repeated if;

- a) The applicable standards have changed
- b) The validity of the test reports has expired
- c) The material used for the manufacturing has changed
- d) The design has changed
- e) The sub-contractors / suppliers have changed
- f) The manufacturing process has changed
- g) Country of origin has changed
- h) Manufacturing facility has changed

No Inspection Report issued by any STL member lab shall be acceptable. Only those type test reports of the equipment shall be acceptable, which have been performed at the premises of the STL members

The Type Test Reports shall include the information regarding outsourced components /parts of the equipment type tested.

Annexure-A

(List of Approved /STL member labs)

1. CESI
Centro Elettrotecnico Sperimentale Italiano S.p.A.
Via Rubattino 54
20134 Milano MI
Italy

2. Institut
"Prueffeld fuer elektrische Hochleistungstechnik" GmbH (IPH)
Landsberger Allee 378A
D-12681 Berlin
Germany

3. FGH Engineering & Test GmbH
Hallenweg 40
D-68219 Mannheim
Germany

4. ESEF ASEFA
Ensemble des Stations d'Essais Ã Grande Puissance FranÃ§aises
EDF-LME
Avenue des RenardiÃ¨res
77818 Moret-Sur-Loing Cedex
France

5. Laboratoires des MatÃ©riels Electriques (LME)
Site des RenardiÃ¨res
EDF- R-&-D-LME
Avenue des RenardiÃ¨res
77818 Moret-sur-Loing Cedex
France

6. Centre d'Essais Rhodanien De l'Appareillage
CERDA
ALSTOM Grid
BP No. 1321
130 Rue LÃ©on Blum
69611 Villeurbanne Cedex
France

- 7. L2E VOLTA**
Schneider Electric Industries SAS
38050 Grenoble Cedex 9
France
- 8. JSTC**
Japan Short-Circuit Testing Committee
c/o The Japan Electrical Manufacturers' Association
17-4, Ichiban-cho
Chiyoda-ku
Tokyo 102-0082
Japan
- 9. Central Research Institute of Electric Power Industry**
CRIEPI
2-6-1, Nagasaka
Yokosuka-shi
Kanagawa 240-0196
Japan
- 10. Hitachi Ltd., High Voltage & High Power Testing Laboratory**
1-1, Kokubu-cho
Hitachi-shi
Ibaragi 316-8501
Japan
- 11. MEIDENSHA CORPORATION High Power Testing Laboratory**
515, Kaminakamizo Higashimakado
Numazu-shi
Shizuoka 410-8588
Japan
- 12. Mitsubishi Electric Corp. High Voltage & High Power Testing Laboratories**
8-1-1, Tsukaguchi-Honmachi
Amagasaki-shi
Hyogo 661-8661
Japan

- 13.** High Voltage and High Power Testing Laboratory Nissin Electric Co., Ltd
47, Umezu-Takase-cho
Ukyo-ku, Kyoto-shi
Kyoto 615-8686
Japan
- 14.** Toshiba Corp. Hamakawasaki High Voltage and High Power Testing Laboratory
2-1, Ukishima-cho
Kawasaki-ku, Kawasaki-shi
Kanagawa 210-0862
Japan
- 15.** KEMA DNV GL - Energy, Power TIC
Utrechtseweg 310
6812 AR Arnhem
The Netherlands
- 16.** DNV GL - Energy, Power TIC
High Power and High Voltage Laboratories
4379 County Line Road
Chalfont, PA 18914
USA
- 17.** KERI
Korea Electrotechnology Research Institute
12, Bulmosan-ro 10 beon-gil
Seongsan-gu, Changwon-si
Gyeongsangnam-do, 642-120
South Korea
- 18.** High Power High Voltage Testing & Evaluation Division in Main office
Korea Electrotechnology Research Institute
12, Bulmosan-ro 10 beon-gil
Seongsan-gu, Changwon-si
Gyeongsangnam-do, 642-120
South Korea
- 19.** Power Apparatus Testing & Evaluation Division in Ansan office
Korea Electrotechnology Research Institute
111, Hanggaul-ro
Sangnok-gu, Ansan-si,
Gyeonggi-do, 426-910
South Korea

20. PEHLA

Gesellschaft fuer elektrische Hochleistungspruefungen
Hallenweg 40
68219 Mannheim
Germany

21. ABB Switzerland Ltd.

High Voltage Products and Components, Dept. PGHV-X
Fabrikstrasse 13
CH-5400 Baden
Switzerland

22. High-Voltage Institute Kassel

GE ALSTOM Grid GmbH
Lilienthalstrasse 150
D-34123 Kassel
Germany

23. ABB AG

Calor Emag Medium Voltage Products
Oberhausener Strasse 33
D-40832 Ratingen
Germany

24. FGH Engineering & Test GmbH

Hallenweg 40
D-68219 Mannheim
Germany

25. Institut

"Prueffeld fuer elektrische Hochleistungstechnik" GmbH (IPH)
Landsberger Allee 378A
D-12681 Berlin
Germany

26. Siemens AG

Nonnendammallee 104
D-13629 Berlin
Germany

27. Siemens AG

Carl-Benz-Strasse 22
D-60386 Frankfurt am Main
Germany

28. PEHLA-Laboratory Regensburg

Rathenastr. 2
D-93055 Regensburg
Germany

29. SATS

Scandinavian Association for Testing of Electric Power Equipment
c/o SINTEF Energy Research AS
NO-7465 Trondheim
Norway

30. ABB AB High Power Laboratory

LyviksvÄrögen 14
SE-77180 Ludvika
Sweden

31. STRI AB

P.O Box 707
77180 Ludvika
Sweden

32. NEXANS Norway AS

P.O. Box 42
1751 Halden
Norway

33. NEFI

P.O. Box 108 Sentrum
3701 Skien
Norway

34. STLNA

Short-Circuit Testing Liaison of the Nations of the Americas
c/o NEMA
1300 North 17th Street
Suite 900
Rosslyn, VA 22209
USA

35. Powertech Laboratories Inc.

12388 - 88th Avenue
Surrey, British Columbia
Canada V3W 7R7

36. Eaton's Cooper Power Systems Division

Thomas A. Edison Power Test Laboratories
11131 Adams Road
Franksville, WI 53126
USA

37. KEMA PowerTest Inc.

4379 County Line Road
Chalfont, PA 18914
USA

38. LAPEM-CFE

Jefe Departamento Distribution
CP 36630 Irapuato
GTO Mexico

39. S&C Electric Company

6601 N Ridge Boulevard
Chicago, IL 60626
USA

40. Eaton Corporation

200 Westinghouse Circle
Horseheads
NY 14845
USA

41. VEIKI-VNL

VEIKI-VNL Electric Large laboratories Ltd
Vasgolyo utca 2-4
H-1158 Budapest
Hungary

42. ZkuÅjebnictvÅ-, a.s. (ZKU)

PodnikatelskÅ; 547
190 11 Prague 9
Czech Republic

Annexure-B
(Scope of Type Testing)

Grid Station Equipment

Circuit Breaker

Scope of Type Test	Approved labs
132 kV CBs (P-193:2010)	
<ol style="list-style-type: none"> 1. Dielectric tests. 2. Measurement of the resistance of the main circuit. 3. Measurement of Temperature and Temperature-Rise. 4. Temperature rise test of control and auxiliary circuit. 5. Short-time withstand current and peak withstand current tests. 6. High Temperature test. 7. Short-circuit current making and breaking tests. 8. Critical current test. 9. Earth fault test. 10. Capacitive current switching tests. 11. Short-line fault test. 12. Out of phase making & breaking test. 13. Electrical Endurance test, performance of No. of switching operations at Max. continuous current carrying capacity of the offered circuit breaker. 	Any STL member lab
<ol style="list-style-type: none"> 14. Radio Interference Voltage Test. 15. Verification of IP coding test. 16. Tightness test. 17. Electromagnetic Compatibility (EMC) tests. 18. Mechanical operation test at ambient temperature including extended mechanical endurance test. 19. Static terminal load test. 	Any Independent lab accredited by ISO/IEC 17025
220 kV and 500 kV CBs (P-171:2008)	
<ol style="list-style-type: none"> 1. Dielectric Tests 2. Measurement of the resistance of the main circuit (contact resistance) 3. Temperature rise tests 4. Short-time withstand current and peak withstand current tests 5. Short circuit current making and breaking tests 6. Capacitive current switching tests: Line-charging current breaking tests 7. Capacitive current switching tests: Cable-charging current breaking tests 	Any STL member lab

<ul style="list-style-type: none"> 8. Low and high temperature tests 9. Critical current tests 10. Short line fault tests 11. Out-of-phase making and breaking tests 12. Electrical endurance tests 13. Test to prove operation under severe ice conditions 14. Single phase and double earth fault tests 15. Single capacitor bank switching tests 16. Back-to-back capacitor bank switching tests 17. Switching of shunt reactors 	
<ul style="list-style-type: none"> 18. Radio interference voltage (RIV) tests 19. Tightness tests 20. Electromagnetic compatibility (EMC) tests 21. Mechanical operation tests at ambient temperature 22. Verification of the degree of protection 23. Extended mechanical endurance tests 24. Humidity tests 25. Static terminal load tests 	Any Independent lab accredited by ISO/IEC 17025

Disconnecter, earth Switch and fast Earth Switch

Scope of Type Test	Approved labs
132 kV (P-128:2011)	
<ul style="list-style-type: none"> 1. Impulse voltage withstand test. 2. Power frequency voltage withstand tests on main circuit (dry & wet). 3. Power frequency voltage withstand tests on auxiliary and control circuits. 4. Measurement of the resistance of main circuit including both contacts. 5. Temperature-rise test. 6. Short-time withstand current and peak withstand current tests. 7. Short circuit making performance of earthing switches. 8. Bus-transfer current switching test. 9. Induced current switching test. 	Any STL member lab
<ul style="list-style-type: none"> 10. Radio Interference Voltage Tests 11. Verification of the protection. 12. Operating and mechanical endurance tests. 13. Test to verify the proper function of the position indicating device. 	Any Independent lab accredited by ISO/IEC 17025

220 kV and 500 kV (IEC)	
<ol style="list-style-type: none"> 1. Dielectric Tests 2. Temperature-rise test 3. Measurement of the resistance of main circuit 4. Bus Transfer current Switching tests (DS) 5. Bus Charging Switching tests (DS) 6. Induced Current Switching Tests (FES) 7. Short-circuit current Making tests (FES) 8. Short time withstand current and peak withstand current tests 	Any STL member lab
<ol style="list-style-type: none"> 9. Verification of the degree of protection 10. EMC Tests 11. Closing and opening capacity test for the switch device 12. Mechanical endurance test 	Any Independent lab accredited by ISO/IEC 17025

Potential Transformer/Capacitive Voltage Transformer

Scope of Type Test	Approved labs
132 kV PT (P-129:2011) <ol style="list-style-type: none"> 1. Lightning impulse withstand voltage test. 2. Power frequency voltage withstand test at Primary & secondary windings, between sections and for earthed terminal (dry & wet). 3. Partial discharge measurement during induced voltage test 4. Radio Interference Voltage (RIV) Test. 5. Mechanical test. 6. Transmitted Overvoltage Measurement. 7. Short-circuit withstand capability test 8. Measurement of Capacitance and dielectric dissipation Factor test. 9. Measurement of Temperature and Temperature-Rise. 10. Measurement of the resistance of primary and secondary windings. 11. Determination of percentage voltage (ratio) errors and phase displacement at 80%, 100% and 120% of rated voltage, at rated frequency and at 25% and 100% of rated burden for measuring winding and at a power factor of 0.8 lagging for measuring accuracy class. 12. Determination of percentage voltage (ratio) errors and phase displacement at 5% of rated voltage and at rated voltage multiplied by the rated voltage factor, with protective burden of between 25% and 100% of protective winding and at a power factor of 0.8 lagging for protective accuracy class. 	Any STL member lab
Metering PT/CVT (P-206:2005) - 132 kV, 220kV and 500 kV	

<ol style="list-style-type: none"> 1. Short circuit withstand capability tests 2. Temperature rise test 3. Impulse voltage test 4. Ferro resonance tests 5. Transient response tests 6. Verification of measuring accuracy at 0.8 lagging power factor 7. High frequency capacitance and equivalent series resistance measurement 8. Stray capacitance and stray conductance measurement between low voltage terminal and earth 9. Partial discharge test 10. Determination of temperature coefficient 11. Radio interference voltage test 12. Mechanical test 	Any STL member lab
220 kV and 500 kV CVT/CCVT (NESPAK)	
<ol style="list-style-type: none"> 1. Ferro resonance tests. 2. Transient response test. 3. Temperature rise test. 4. Lightning impulse test. 5. Chopped lightning impulse test (special test). 6. Switching impulse test. 7. Wet test for outdoor type transformers. 8. Determination of errors. 9. Short circuit withstand capability test 10. High frequency capacitance and equivalent series resistance measurements in the range of the rated temperature category. 11. Stray capacitance and stray conductance measurements of the low voltage terminal. 12. Discharge test. 13. Partial discharge test. 14. Determination of the temperature coefficient. 	Any STL member lab
<ol style="list-style-type: none"> 15. Measurement of radio interference voltage test (RIV). 16. Cantilever test. 17. Mechanical test. 	Any Independent lab accredited by ISO/IEC 17025

Current Transformer

Scope of Type Test	Approved labs
132 kV (P-90:2012)	
<ol style="list-style-type: none"> 1. Measurement of the resistance of primary and secondary windings. 2. Lightning impulse withstand voltage test. 3. Power frequency voltage withstand test at Primary & secondary windings and between sections (dry). 4. Power frequency voltage withstand test at Primary windings (wet). 5. Inter-turn over voltage test. 6. Partial discharge measurement. 	Any STL member lab

<ul style="list-style-type: none"> 7. Temperature-rise test. 8. Short-time withstand current and peak withstand current tests. 9. Measurement of capacitance and dielectric dissipation Factor test. 10. Determination of errors (Limits of current error, phase displacement and instrument security factor) for measuring core. 11. Determination of errors (Limits of current error, phase displacement and composite error) for protective core. 	
<ul style="list-style-type: none"> 12. Radio Interference Voltage (RIV) Test. 13. Mechanical tests. 	Any Independent lab accredited by ISO/IEC 17025
Metering CTs (P-205:2005)-132 kV, 220kV and 500 kV	
<ul style="list-style-type: none"> 1. Short –time current tests 2. Temperature-rise test 3. Lightning and switching impulse voltage tests on primary windings 4. Determination of errors 5. Wet test for outdoor type transformers 6. Radio interference voltage measurement (RIV) 7. Measurement of capacitance and dielectric dissipation factor 	Any STL member lab
220 kV and 500 kV (P-174:2008)	
<ul style="list-style-type: none"> 1. Short time current tests 2. Temperature rise test 3. Lightning and switching impulse voltage tests on primary windngs. 4. Determination of errors of protective and metering cores. 5. Wet test for outdoor type transformers. 6. Chopped lightning impulse test. 7. Measurement of capacitance and dielectric dissipation factor 8. Measuring chopped impulse test on primary winding. 	Any STL member lab
<ul style="list-style-type: none"> 9. Mechanical tests 10. Radio interference voltage measurement (RIV) test. 	Any Independent lab accredited by ISO/IEC 17025

Surge Arrester

Scope of Type Test	Approved labs
Surge Arrester (P-181:2012)	
<ul style="list-style-type: none"> 1. Insulation withstand tests on arrester housing (Dry & Wet): <ul style="list-style-type: none"> a. Lightning impulse voltage test (dry). b. Switching impulse voltage test (dry) (For type E & F arresters only) c. Power frequency voltage test (Dry & Wet). 2. Residual voltage tests; <ul style="list-style-type: none"> a. Steep current impulse residual voltage test. b. Lightning impulse residual voltage test. 	Any Independent lab accredited by ISO/IEC 17025

<ul style="list-style-type: none"> c. Switching impulse residual voltage test. 3. Long duration current impulse withstand test. 4. Operating duty tests: <ul style="list-style-type: none"> a. High current impulse operating duty test. b. Switching surge operating duty test. 5. Short circuit Test. 6. Tests of arrester disconnectors (For arresters fitted with disconnectors) 7. Internal partial discharge test. 8. Seal leak rate test. 9. Current distribution test (For multi column arresters). 10. Power frequency voltage verses time test. 11. Pressure relief test. 12. Salt fog test (For polymeric housed arresters). 	
<ul style="list-style-type: none"> 13. Artificial pollution test (For porcelain housed multi-unit surge arresters). 14. Bending moment test (For porcelain housed surge arresters for $U_m > 52kV$) 15. Environmental test (For porcelain housed surge arresters) 16. Radio interference voltage (RIV) test. 17. Weather ageing test (For polymer housed arresters). 	Any Independent lab accredited by ISO/IEC 17025
Surge Counter	
<ul style="list-style-type: none"> 1. Temperature test 2. Impulse test 3. Short-circuit test 4. Salt fog test (For polymeric housed arresters). 5. Shock test 6. Vibration test 7. Humidity test 	Any Independent lab accredited by ISO/IEC 17025

Transformer Bushings

Scope of Type Test	Approved labs
Bushing (IEC 60137)	
<ul style="list-style-type: none"> 1. Dry or wet power-frequency voltage withstand test 2. Dry lightning impulse voltage withstand test 3. Dry or wet switching impulse voltage withstand test 4. Thermal stability test 5. Temperature rise test 6. Verification of thermal short-time current withstand 7. Cantilever load withstand test 8. Tightness test on liquid-filled, compound-filled and liquid-insulated bushings 	Any STL member lab

Disc Insulators

Scope of Type Test	Approved labs
Disc Insulators (P-8)	
<ol style="list-style-type: none">1. Dry lightning impulse with stand voltage test2. Dry power frequency withstand voltage test3. Wet power frequency withstand voltage test4. Thermal-mechanical performance test5. Radio influence voltage test	Any STL member lab
<ol style="list-style-type: none">6. Galvanization7. Thermal Shock Test8. Residual-Strength Test9. Impact Test10. Cotter Key Test11. Cement Expansion	Any Independent lab accredited by ISO/IEC 17025

Post Insulators

Scope of Type Test	Approved labs
Post Insulators	
<ol style="list-style-type: none">1. Low-frequency dry flashover test2. Low-frequency wet flashover test3. Critical Impulse flashover test4. Radio-Influence Voltage Test5. Thermal-Mechanical Load Cycle Test6. Steep Wave Front7. Power Arc Test8. Artificial Pollution Performance Test	Any STL member lab

Hardware – Grid Station

Scope of Type Test	Approved labs
Connectors (P-176:2011)	
<ol style="list-style-type: none">1. Tensile strength test2. Electrical Resistance Test3. Temperature Rise Test4. Ageing/Heat Cycling Test5. Short Circuit Test6. RIV Test7. Corona Test	Any STL member lab

8. Corrosion Test 9. Conductivity test	
10. Brinell hardness test 11. Material composition test 12. Tightening Torque Test 13. Bending Test 14. Mechanical Elongation Test 15. Cantilever Test	Any Independent lab accredited by ISO/IEC 17025
Strings (P-187:2010, P-142:1996, P-143:1996, P-188:1996) Suspension & Tension	
1. Resistance test conductor On suspension and Tension clamp only 2. Corona test For complete insulator string 3. Heat cycle test Tension clamp only	Any STL member lab
4. Mechanical test On each individual item of hardware	Any Independent lab accredited by ISO/IEC 17025

GIS Main Bus

Scope of Type Test	Approved labs
1. Dielectric Tests 2. Temperature-rise test 3. Measurement of the resistance of main circuit 4. Short time withstand current and peak withstand current tests	Any STL member lab
5. Tightness Tests 6. Tests to prove the strength of enclosures 7. Tests on partitions	Any Independent lab accredited by ISO/IEC 17025

GIS Bushings

Scope of Type Test	Approved labs
1. Dielectric Tests 2. Temperature-rise test 3. Measurement of the resistance of main circuit 4. Short time withstand current and peak withstand current tests	Any STL member lab
5. Tightness Tests 6. Radio Interference voltage tests	Any Independent lab accredited by ISO/IEC 17025

GIS Switchgear

Scope of Type Test	Approved labs
<ol style="list-style-type: none"> 1. Tests to verify the insulation level of the equipment including partial discharge tests and dielectric tests on auxiliary circuits. 2. Tests to prove the temperature rise of any part of the equipment and measurement of resistance of the main circuits 3. Tests to prove the ability of the main and earthing circuits to carry the rated peak and the rated short-time withstand current. 4. Tests to verify the making and breaking capacity of the included switching devices. 5. Test to prove the satisfactory operation of the included switching devices. 6. Tests to verify the protection of persons against contact with live parts and moving parts. 7. Tests to verify the protection of the equipment against external effects due to weather and atmospheric agents applicable. 8. Tests to prove the radio interference voltage (RIV) level (if an outdoor bushing exists) 9. Tests to assess the effects of arcing due to an internal fault 10. Tests to prove the thermal stability of solid insulation (if applicable). 11. Tests to prove the satisfactory operation at limit temperature. 	Any STL member lab
<ol style="list-style-type: none"> 12. Tests to prove the strength of enclosures. 	Any Independent lab accredited by ISO/IEC 17025

Transmission Line Equipment

Sr#	Material	Type Tests	Testing Location
1	Conductor	Stress – Strain Test	Any Independent lab accredited by ISO/IEC 17025
2		Creep Test	
3		Longitudinal Smoothness Test	
1	Hardware & accessories	Corona/ RIV test	Any STL member lab
2		Power arc test	
3		Heat cycle test	
4		Resistance test	
5		Magnetic loss test	
6		Galvanization	
7		Resistance to conductor slippage test	

8		Mechanical tests	Any Independent lab accredited by ISO/IEC 17025	
1	Spacer dampers	Corona and RIV Test	Any STL member lab	
2		Simulated Short Circuit Current Test		
3		Flexibility test		
4		Energy absorbing test		
5		Simulated Oscillation Fatigue Test		
6		Conical Fatigue Test		
7		Characterization of the Elastic and Damping Properties		
8		Galvanization	Any Independent lab accredited by ISO/IEC 17025	
9		Clamp slippage test at Ambient Temperature		
10		Bolt Torque Test		
11		Electrical Resistance Test		
12		Elastomer Tests		
1	SB-dampers	Corona and RIV Test	Any STL member lab	
2		Damper Performance Tests		
3		Vertical Fatigue Test		
4		Galvanization		
5		Clamp Slippage Test at Ambient Temperature	Any Independent lab accredited by ISO/IEC 17025	
6		Bolt Torque Test		
7		Attachment of Weights to Messenger Cable Test		
8		Attachment of Clamp to Messenger Cable Test		
1	Insulators	Power frequency dry withstand test	Any STL member lab	
2		Power frequency wet withstand test		
3		Dry Lightning Impulse withstand test		
4		Corona Test		
4		Radio-Influence Voltage Test		
5		Thermal-Mechanical Load Cycle Test		
6		Steep Wave Front		
7		Power Arc Test		
8		Artificial Pollution Performance Test		
9			Galvanization	Any Independent lab accredited by ISO/IEC 17025
10			Thermal Shock Test	
11			Residual-Strength Test	
12		Impact Test		

13		Cotter Key Test	
14		Cement Expansion	