SPECIFICATIONS- TECHNICAL PROVISIONS

1. General

1.1 All design, equipment, material and workmanship shall comply with and be tested in accordance with requirements of the specifications. Equipment or parts which are not covered by the specifications shall comply with rules, codes and regulations of the international electro-technical commission or approved National Standards bodies.

1.2 The general inlet of these specifications is to require the supply of equipment and material equal or superior to those actually described herein. Unless otherwise stated, reference to the brand or manufacturer, if made, is only for the sake of comparison as to type, design, character or quality of the equipment and material desired and shall not be interpreted as eliminating other equipment and material having equal performance, quality and durability.

2. SPECIFICATIONS AND DRAWINGS

2.1 The contract shall be executed in strict conformity with the specifications and/or drawing given or mentioned in this section and the supplier do no 'work' without proper specification, instructions and/or drawings.

2.2 Specifications and/or drawings are intended to complement each other so that if anything is shown on the drawings as required but not mentioned in the specifications or vice versa, it shall be of like effect as if shown or mentioned in both. If any errors, omissions or discrepancies are found in the figures, specifications and/or drawings or, if any feature shall appear to the supplier to be indefinite or unclear, the same shall be referred to the Procuring Agency whose written explanation and/or clarification shall obtained before proceeding with the work.

2.3 The supplier shall submit to Procuring Agency/ Purchaser, within 15 days of the issuance of the Notification of Award/Letter of Acceptance, for approval of the Procuring Agency, four (4) copies of all drawings, technical literature, data, operation and maintenance instruction books and/or manuals required under the specifications and such other documents as are required in the Technical Specifications or other provisions of the bidding documents or, if the Procuring Agency deems necessary, require changes or modifications to be made therein, the Procuring Agency shall return two copies to the supplier marked "Approved", "Approved as Noted" or "Returned for correction". Each drawing which is noted "Returned for Correction" shall be resubmitted to the Purchaser after corrections.

2.4 The supplier shall then prepare and submit to the Purchaser Three (3) prints and two (2) positive reproducible(s) of the approved drawings. One print shall be stamped "APPROVED" by the Purchaser and returned to the Supplier for his record.

2.5. On completion of the Contract, the Supplier shall deliver to the Purchaser six (6) sets of prints and two (2) sets of positive reproducible of all approved drawings, technical literature, data which show the work in the final or **"as built"** condition. The Supplier shall deliver one (1) set of reproducible of all the drawings to the office of Chief Engineer (Dev) GEPCO. The said drawing and documents shall be permanent and non-fadable.

The reproducible shall be made as high-quality polyester drawings film at least 0.07mm thick or approved equivalent suitable for producing clear prints.

2.6 The Supplier shall allow 30 days for the Purchaser's approval of drawings in his schedule of work and in the time allowed for completion of the Contract. Extra time required for approval of drawings due to deficiencies in design or errors in submitted drawings shall be the responsibility of the Supplier and no extension in time will be allowed on this account.

2.7 Approval by the Purchaser does not relive the Supplier of his responsibility to do the work in accordance with the Contract.

2.8 The supplier shall be responsible for any discrepancies, errors or omissions in any drawings or other particulars supplied by him whether such drawings or particulars have been approved by the designated Evaluation/Vetting Committee or not.

2.9 All drawings and documents furnished by the Supplier in accordance with the Contract shall become the property of the Purchaser.

2.10 Wherever reference is made in the Technical Specifications to a specific standards or codes to be met by the goods and materials to be furnished or tested, provisions of the latest current edition or revision of the relevant standards or codes in effect shall apply, unless otherwise expressly stated in the Purchase Order. Where such standards and codes are national or relates to a particular country or region, other authoritative standards that ensure substantial equivalence to the standards and codes specified will be acceptable.

3. LANGUAGE

3.1 All correspondence, Technical literature/Brochures, drawings, name plates, diagrams, applicable data, equipment details, instructions and maintenance books manuals, spare parts books and descriptive data shall be in the English language.

4. UNITS OF MEASUREMENT

4.1 All dimensions and units given by the Bidder in the Bid with its associated drawings and the Approval Drawings as submitted by Bidder shall be metric system and all reference to weights, measurements and quantities shall be in metric units.

5. TECHNICAL SPECIFICATIONS

5.1 All the goods, the qualities of which are defined in Schedule of Prices for main equipment, shall be of the material in accordance with the Technical Specifications as mentioned below.

5.2 The following Technical specifications are to be strictly adhered to:

SPECIFICATION FOR RELAY TEST SET

The offered equipment shall be a **state-of-the-art, fully automatic, universal protection relay test set** suitable for testing and commissioning of **electromechanical, static, digital and numerical/microprocessor-based protection relays**.

The offered test set shall be manufactured by an established international manufacturer from **Europe, USA, Canada, UK, Japan, Switzerland, Germany, Austria, Sweden or Australia.**

TECHNICAL DATA

Parameter	Specification
Application	Portable protection relay test system
Frequency Range	DC to 3 kHz
Transient Signals	DC to 4 kHz
Frequency Resolution	0.001 Hz
Frequency Accuracy	<0.01%
Phase Angle	0–360°
Phase Resolution	0.001°
Phase Accuracy	<0.05°

VOLTAGE OUTPUTS

Parameter	Specification
4-Phase (L-N)	4 × 0–300 V / 75 VA
3-Phase (L-N)	3 × 0–300 V / 100 VA
1-Phase (L-L)	1 × 0–600 V / 150 VA
Resolution	13 mV
Accuracy	<0.05%
THD	<0.05%

CURRENT OUTPUTS

Parameter	Specification
6-Phase	6 × 0–32 A / 250 VA
3-Phase	3 × 0–64 A / 500 VA
1-Phase	1 × 0–96 A / 500 VA
Resolution	1 mA
Accuracy	<0.05%
THD	<0.05%

LOW-LEVEL SIGNAL OUTPUTS

Parameter	Specification
Number	10 outputs in 3 groups
Output Range	0–10 Vpk
Max Output Current	20 mA
Resolution	300 µV
Accuracy	<0.05%
Frequency Range	DC–3 kHz
Transient Signals	DC–4 kHz
THD	<0.05%

Frequency Resolution	0.001 Hz
Frequency Accuracy	<0.01%
Phase Angle	0–360°
Phase Resolution	0.001°
Phase Accuracy	<0.05°

DC OUTPUT

Parameter	Specification
Output Range	12–260 VDC
Output Power	50 W, Max. 2 A
Accuracy	<5%
Protection	Overload & Short-circuit

ANALOG INPUTS

Parameter	Specification
Number	2
Measuring Range	0…±20 mA
Accuracy	<0.05%
Protection	Galvanic isolation

MULTI-FUNCTION INPUTS

Parameter	Specification
Number	12
Measuring Range	2/10/300/600 VAC/DC
Frequency Range	DC–6 kHz
Trigger Threshold	0–300 VDC configurable or potential-free contact
Accuracy	<0.05%
Isolation	6 galvanically isolated groups
Safety Class	150 V CAT IV; 300 V CAT III; 600 V CAT II

BINARY & TRANSISTOR OUTPUTS

Parameter	Specification
Relay Outputs	2
AC Switching	250 VAC, 8 A
DC Switching	300 VDC, 8 A, 50 W
Transistor Outputs	2
Switching Frequency	1 kHz
Transistor Capacity	0–300 VDC, 50 mA

OPERATION & INTERFACES

Parameter	Specification

Stand-alone	5-inch resistive touch screen
Controls	3 function keys + jog wheel
Interfaces	USB, 3×Ethernet, Wi-Fi
GPS	Internal GPS receiver
Measurement Connections	4 mm safety sockets
Status LEDs	Available

POWER, MECHANICAL & ENVIRONMENTAL

Parameter	Specification
Supply Voltage	100–265 VAC, 47–63 Hz / 120–265 VDC
Power Consumption	2500 W
Housing	Portable
Protection	IP20
Storage Temperature	-10 to 60°C
Humidity	5–90%, non-condensing
Vibration	IEC 60068-2-6
Shock	IEC 60068-2-27

STANDARDS

Parameter	Specification
Safety	EN 61010-1
EMC	EN 61326-1
EMC Emissions	EN 61000-6-4
EMC Immunity	EN 61000-6-2

SPECIFICATION FOR CT / PT ANALYZER

The offered equipment shall be a **microprocessor based, fully automatic Current Transformer (CT) and Voltage Transformer (PT/VT) Analyzer** suitable for commissioning, maintenance, diagnostic testing and performance assessment of instrument transformers installed at **66/11 kV, 132/11 kV and 220kV Grid Stations**.
The instrument shall be suitable for field testing under substation conditions and shall be **compact, portable, lightweight and rugged**, with a carrying case suitable for transportation between grid stations.
The offered test set shall be manufactured by an established international manufacturer from **Europe, USA, Canada, UK, Japan, Switzerland, Germany, Austria, Sweden or Australia.**

TECHNICAL DATA

Parameter	Specification
Equipment Type	CT/PT Tester
Applications	CT Ratio Error, PT Ratio Error, Burden Measurement, Admittance Measurement, Protection CT Testing
Standards	IEC 60044-1, IEC 60044-2, IEC 60044-6, IEC 61869-2
Phase Angle	0° to 360°
Phase Resolution	0.001°
Phase Accuracy	<0.05°
Metering CT Test Range	2.5/5 to 30,000/5 or 1:1 to 6,000/1
1A CT VA Rating	Up to 150 VA
5A CT VA Rating	Up to 300 VA
Selectable Primary Current	1% to 400%
Selectable Burden	10% to 100%
Selectable Power Factor	0.5 to 1.0
Secondary Winding Resistance	>1 kΩ
Protection CT Standards	5P, 10P, PX, PR, TPX, TPY, TPZ, TPS
Admittance 50/60Hz	100 µS to 100 mS
Admittance 1.6kHz	100 µS to 50 mS
CT Burden 1A	0–25 Ω / 25 VA
CT Burden 5A	0–12 Ω / 300 VA
PT Ratio Range	0.24 kV/100 V to 330 kV/110 V
PT VA Rating	1–300 VA
Supply Voltage	110–250 VAC Nominal; 85–264 VAC Max; 50/60 Hz
Standby Power	30 W
Output Power	280 W Continuous, 2.7 kW Peak
Output Current	3 A RMS, 15 A Peak

Maximum Output Voltage	120 VAC RMS
Display	7-inch Colour TFT LCD
USB	Type-A & Type-B
Bluetooth	Optional
Memory	1000 CT + 1000 PT Records
Humidity	Up to 90%
Protection Class	IP64 Closed / IP30 Open

SPECIFICATION FOR DC HIPOT TEST SET

The equipment shall be a professional **DC High Voltage (Hipot) Test Set** designed for high-voltage insulation testing of electrical apparatus used in power transmission and distribution systems.
The test set shall be suitable for field and workshop testing of power cables, switchgear, circuit breakers, busbars, transformers, insulators, bushings and other high-voltage electrical equipment, as applicable.
The instrument shall be suitable for field testing under substation conditions and shall be **compact, portable, lightweight and rugged**, with a carrying case suitable for transportation between grid stations.
The offered test set shall be manufactured by an established international manufacturer from **Europe, USA, Canada, UK, Japan, Switzerland, Germany, Austria, Sweden or Australia.**

TECHNICAL DATA

Parameter	Specification
Equipment Type	DC High Voltage Test Set & Megohmmeter
Input	230 VAC, 50/60 Hz, 5 A
Output Voltage	0–80 kV DC
Output Current	10 mA
Output Polarity	Negative Output, Positive Ground
Rectification	Full Wave Bridge Rectification
Duty Cycle	Continuous, Capacitive Charging
Voltmeter	0–40/80 kV DC, ±2% F.S.
Current Meter	0–1.0 µA DC, ±2% F.S.
Current Meter Multipliers	×1, ×10, ×100, ×1k, ×10k
Megohmmeter Scale	100 Ω – 1 MΩ
Megohmmeter Multipliers	×0.1, ×1, ×10, ×100, ×1k
Maximum Insulation Resistance	Up to 8 TΩ

SPECIFICATION FOR WINDING RESISTANCE TEST SET

The Transformer Winding Resistance Test Set shall be microprocessor-controlled, fully automatic instrument designed for accurate measurement of DC winding resistance of power transformers, distribution transformers, reactors and instrument transformers.
The test set shall be suitable for commissioning, routine maintenance, condition assessment and diagnostic testing of transformers installed at substations.
The instrument shall be suitable for testing HV, LV and tertiary windings and shall provide stable and repeatable measurements on highly inductive transformer windings.
The instrument shall be suitable for field testing under substation conditions and shall be **compact, portable, lightweight and rugged**, with a carrying case suitable for transportation between grid stations.
The offered test set shall be manufactured by an established international manufacturer from **Europe, USA, Canada, UK, Japan, Switzerland, Germany, Austria, Sweden or Australia.**

TECHNICAL DATA:

Parameters	**Range**
Input	50Hz 550VA Max
Fuse Rating	5A,250Vac,Type-T
Test Current	0.01 to 10A DC
Test Volt	30V DC
Resistance Measurement	2 Auto Ranging Channels
Resistance Range	0.5mΩ to 2000Ω
Accuracy	±0.1% rdg, ±0.025%FS
Resolution	4-1/2digits
Printer	Built-in, 40-character wide Printer
PC Connections	Download Result via USB Port or RS-232 Connection

SPECIFICATION FOR SWEEP FREQUENCY RESPONSE ANALYZER (SFRA)

The equipment shall be a professional, portable and computer-controlled **Sweep Frequency Response Analyzer (SFRA)** designed to assess the mechanical and electrical integrity of power transformer cores, windings, clamping structures and internal connections. The system shall be capable of detecting and assisting in the diagnosis of winding deformation or displacement, core movement, loose clamping structures, shorted turns, open circuits, faulty core grounding and other mechanical or electrical abnormalities.
The offered test set shall be manufactured by an established international manufacturer from **Europe, USA, Canada, UK, Japan, Switzerland, Germany, Austria, Sweden or Australia.**

TECHNICAL DATA

Parameter	Specification
Equipment Type	Sweep Frequency Response Analyzer (SFRA)
Standard Compliance	IEC 60076-18, ANSI IEEE C57.149
Primary Application	Transformer winding movement detection and diagnostics
Additional Applications	Rotating machines, R/L/C and RLC two-terminal test objects
Measurement Frequency Range	10 Hz to 10 MHz (Selectable)
Output Voltage	Maximum 11 Vpp @ 50 Ω
Input / Output Impedance	50 Ω
Measurement Accuracy	±0.1 dB (+10 dB to -40 dB), ±0.5 dB (-40 dB to -80 dB)
Dynamic Range	>120 dB
Measuring Points	Up to 2,000 points
Frequency Scaling	Linear or Logarithmic
Measuring Channels	2 (Source & Receiver)
Communication Interface	USB 2.0
Controller	External PC (Windows 7 / Windows 10)
Grounding System	Low impedance aluminium braid (IEC 60076-18 compliant)
Measuring Clamps	Flat or circular terminals up to 60 mm diameter
Measurement Time	Approx. 90 seconds per measurement
Data Format	Proprietary
Export Formats	CSV
Import Formats	IEC 60076-18 XML, Doble (.sfra), Megger (.frax)
Measurement Templates	Single-phase & Three-phase transformers
Storage Temperature	-10°C to +60°C
Humidity	5% to 90% RH (Non-condensing)
Power Supply	5 VDC via USB or supplied power adapter
Power Adapter	110–240 VAC, 50/60 Hz to 5.5 VDC, 2000 mA

Minimum PC Requirement	Intel Core i3 / AMD Athlon II X2 or better, 1 GB RAM, USB 2.0
Minimum Screen Resolution	1280 × 800 (WXGA)
Operating System	Windows 10
Supported Measurements	Magnitude (dB), Phase (°), Impedance (Ω), Admittance (S), Ratio
Software Features	Curve comparison, Zoom, Cursor analysis, Automatic report generation
Test Sequence	Predefined transformer test sequences
Comparison Capability	Supports comparison with other manufacturers' FRA data
Scope of Supply	2 measuring clamps, 20 m twin BNC cable, 20 m receiver cable, 2 × 10 m ground tapes, USB software, instruction manual, test certificate
Applicable Standards	MIL-STD-810G Table 514.6C-II, CE Mark