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Bhutan Power Corporation Limited
(An ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified Company)
Registered Office, Thimphu
Procurement Services Department
Thimphu: Bhutan

BPC/PSD/T&P/2021/18/ 392 June 11, 2021

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Subject: **Addendum No. 2**

Reference: BPC/PSD/T&P/2021/18 for the Supply and Delivery of Tools and Plants dated 18th May 2021.

Dear Sir(s),

This is in reference to the above-mentioned tender whereby PSD, BPC would like to issue the following addendum:

i. The technical specification of Item 2: **Meter Testing Kits** under Lot 12 (Meter Testing Kits) has been revised. Please, refer *Annexure A.3* for the revised Price Schedule of Lot 12 and *Annexure A.4* for the revised Technical Specification of Item 2: Meter Testing Kits under Lot 12.

ii. Technical clarification: PSD, BPC has received queries from the bidders from which the responses are given listed below:

Item #	Description	Query	Response
Lot 18: Network Materials			
3	L2 Switches	How many ports should be there for POE?	Not required
		How many ports should be there for SFP?	Not required
		How many ports should be there for UPLINK?	24 Ports
		Sample picture attached (*Annexure A.5*)	

This addendum shall form a part of the bidding document and shall be binding.

However, due to the above inclusion and additional information, no time extension shall be granted and the submission date and time shall remain unaltered.

Thanking you,

Yours sincerely,

11/06/2021

(Nim Dorji)
General Manager

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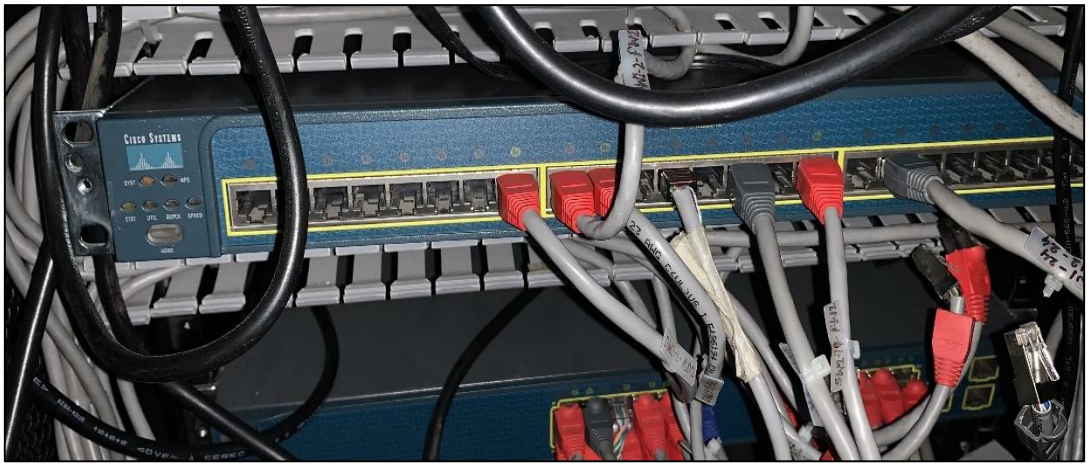
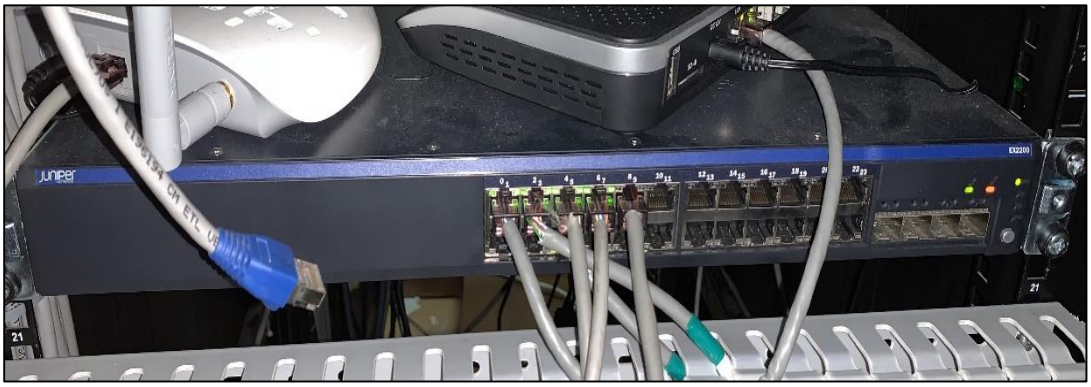
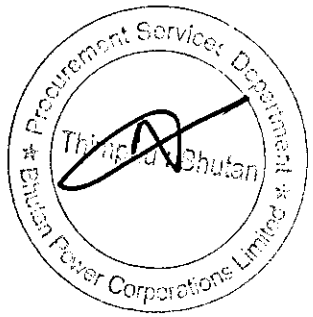




Picture 1: Item 3: **L2 Switches**, Lot 18: Network Materials

Annexure A.3: Revised Price Schedule of Lot 12 (Meter Testing Kits)

Sl. No.	Materials Description	UoM	Qty	Technical Specification	Restricted/Preferred Brand	Offered Brand & Country of Origin	Unit Price (Nu)	Total price (Nu)
1	HRC Fuse extractor with insulated handle	NO	15	*Fuse puller for NH type fuses*, sizes 00 to 03 with rubber insulated handle, 1000V, insulation standard: IEC 60900, DIN EN 60900/ VDE (0680-4); GS; CEBEC. *Refer **Annexure 12, Item 12.1.** for sample picture.*	*Restricted Brands:* Seimens/ Veeko Electricals/ Krishna Industrials/ Langir Electric/Siemens			
2	Meter Testing Kits	NO	12	*Refer **Annexure A.4: Revised Technical Specification of Meter Testing Kits** for detailed specification.*				
							Total Lot Amount (Nu)	



Annexure A.4:

TECHNICAL SPECIFICATION OF PORTABLE THREE PHASE / SINGLE PHASE ELECTRONIC REFERENCE STANDARD METER CAPABLE OF TESTING OF LT /HT METERS AND GUARANTEED TECHNICAL PARTICULARS

TECHNICAL SPECIFICATION FOR PORTABLE THREE PHASE / SINGLE PHASE ELECTRONIC REFERENCE STANDARD METER CAPABLE OF TESTING OF LT/HT/DIRECT CONNECTED METERS

1 Scope:

This specification covers the general requirement of design, manufacturing, testing before despatch, supply and delivery of Portable Electronic Reference standard Meter of accuracy of 0.1% in direct mode & 0.2% with clamp on CT's for 120A.

2 Application:

The function of the Portable Electronic Reference Standard Meter shall be suitable to measure the system parameters and verify the accuracy of three phase and single-phase energy meters in the laboratory and at site without disconnecting consumers supply when used with the clamp-on CT.

The Portable Electronic Reference Standard Meter shall be extensively used in field & laboratory for verification of the accuracy of all types of three phase whole current, LT/HT-CT operated and single-phase energy meters.

The portable reference standard shall have features to display: Colored Graphic Screen to show vector diagram (for installation check), Harmonics Analysis for selected voltage, current, Power (Active, Reactive & Apparent) from 2nd to 31th (Minimum) harmonics, for analyzing the quality of power. The instrument shall have real time waveform display for selected voltage & current circuits.

The reference standard shall have in built memory to store customer information at site. The reference standard shall have provision to preload customer information for selected customer to allocate the saved database to measured results to save time during testing at site

3 System Technical Data:

The Electronic Reference Standard Meter shall be suitable to test energy meters under the following conditions:

3.1	Voltage Range	: 46V … 300V (Phase to Neutral)
3.2	Frequency	: 45 Hz … 65 Hz
3.3	Power Factor	: zero Lag-unity-zero Lead
3.4	Current Ranges	: 1mA … 12A Direct
		: 100mA …120 A with Clamp on CT, 120A

4 Service (Climatic) conditions:

The equipment to be supplied against this specification should be capable of performing and maintaining the required accuracy for satisfactory operation under all tropical conditions mentioned below:

a) Maximum ambient temperature : 50 Deg. C

b) Minimum ambient temperature : -5 Deg. C

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c) Average daily ambient temperature : 40 Deg. C
d) Minimum relative humidity : 25%
e) Maximum relative humidity : 90%
f) Annual average ambient temperature : 40 Deg. C

5 Standard applicable:

Unless otherwise specified elsewhere in this specification, the Portable Reference Standard Meter shall confirm to relevant clause of the following standards in all respects including performance and testing thereof to the following Indian / International Standards to be read with up to date and latest amendments / revision thereof:

IEC 687	:	Alternating current static watt-Hour meters for Active Energy.
IS 12346	:	Testing equipment for AC Electrical Energy Meters.

6 General Requirements:

a. All the materials, electronic and power components and ICs used in the manufacturing of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.
b. The electronic components shall be mounted on the PCB using latest surface mount technology (SMT).
c. The Electronic Reference Standard Meter shall be of rugged construction, lightweight and shall be portable and handy. It shall have ergonomic design.
d. Clamp-on CT along with a suitable connecting cable and a set of voltage leads with suitable crocodile clips which enable the testing without isolating or interrupting the supply of the consumer shall be supplied along with the Electronic Reference Standard Meter. The error compensation for Clamp CT (120A) shall be along with the CT and not inside the equipment. This is desirable to allow any CT set to be used with any other portable equipment.
e. An error calculator shall be incorporated in the Electronic Reference Standard Meter, which shall have facility to calculate error in percentage of meter under test by feeding the meter constant and number of revolutions for which meter was tested with Electronic Reference Standard Meter, through the inbuilt key board.
f. The keyboard of the equipment shall be organized in form of alphanumeric matrix. The equipment should preferable have Human Touch Interface for easy operation.
g. The Portable reference standard shall have TFT LCD graphic Color display of minimum 3.5" size. The graphic display should be able to display voltage/current waveforms along with network analysis features: Harmonic and distortion analysis in graphic form. The resolution of display shall be VGA 320x240 pixels minimum.

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h. Reference standard shall have non-volatile memory to store measurement results, for at least 20,000 customers, along with customer data, installation data and special attribute tests related to site. It should be possible preload customer information, installation information, and special attributive tests information into the instrument for at least 5 sites. It should be possible to assign and allocate particular site and installation information to the actual measurement results.

i. The equipment shall be equipped with USB2.0 or RJ45 Ethernet port for Direct Connectivity to PC.

j. The equipment preferably should have Wi-Fi/Bluetooth Wireless Interface for connectivity with WAN/Local network. The equipment shall have webserver for connection to any mobile device.

7 Standard Rated Current and Maximum Current:

The portable reference standard current range shall be a wide one. In DIRECT mode reference standard shall have current measuring range of
1mA ... 12A whereas with external CT the current range shall be 10mA ... 120A for 120A CT clamp.

8 Measurement Mode

The offered equipment should have following measurement modes to test LT/HT CT operated Meters and direct connected type meters, using scanning heads:

a. Direct Mode: To test LT/HT-CT meters, direct mode for 1A and 5A rating shall be provided.

b. Clamp on CT mode: One set of Three clamp on type current transformer (CT) along with equipment to test direct connected meters without disconnecting them from circuit. The one CT clamp set shall be of 120A rating.

d. The Equipment should have provision to test Energy Registers of meter under test E.g. Energy Register (Dial Test). It should be possible to test Active, Reactive and Apparent Energy Registers of meter under test simultaneously.

9 Accuracy Requirement:

The class of accuracy of the offered calibrator shall be 0.1S for Direct mode (10mA...12A) and class 0.2S for Clamp CT100A mode (100mA ... 120A). The reference standard should detect appropriate CT clamp or DIRECT mode automatically.

The error compensated CT clamps set shall have error compensation as part of CT secondary cable assembly and not in the instrument internal memory.

The portable reference standard shall carry out accuracy tests using built in error calculator with Scanning head suitable for testing Electronic as well as electromechanical meters. Scanning head should be able to pick LED/LCD output in wavelength range 500 – 960 nm. The scanner should be fast enough to pick pulses of frequency as high as 400Hz.

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The Equipment should have provision to test Energy Registers of meter under test E.g. Energy Register (Dial Test) The equipment should preferable have firmware to test Active, Reactive and Apparent Energy Registers of Meter Under Test simultaneously.

10 Display:

The display of the reference standard shall be of TFT GRAPHIC VGA Color type with minimum resolution of 320x240 pixels. The display shall have size of 3.5" minimum to enable display of voltage/current waveforms in real time mode. The display should also have provision to render network analysis features like: Vector and Harmonics along with distortion measurement.

The Reference Standard Meter shall display the following system parameters namely:

- Instantaneous voltage of each phase
- Instantaneous Line current of each phase
- Simultaneous display of Active, Reactive and Apparent power
- Instantaneous power factor of each phase & total power factor
- Instantaneous frequency
- Phase sequence
- Active, Reactive (lag/lead) and Apparent three phase energies.
- Continuous update of active, reactive (lag/lead) and apparent energies on display, simultaneously.
- Instantaneous date and time

11 Display Resolutions:

Minimum resolutions of various parameters shall be as follows:

- Voltage : 0.01 V
- Current : 0.0001 (1A), 0.001 (5A), 0.01 (200A)
- Power factor : 0.001
- Energy : 0.0001 (Wh)
- % Error Resolution : 0.01

12 Automatic Checking of connection:

The equipment TFT graphic display shall be capable of indicating display for the following conditions:

- Missing potential
- Missing current
- Reverse current if any current is reverse
- Phase sequence "Forward or Reverse"
- Over current
- Over voltage
- Using vector display.

13 Memory:

The memory of the portable reference standard shall be organized to store: customer information, Site information, Tester information and measurement results and special attributive tests. The memory should be sufficient to store at least 20000 measurement results along with customers' data and date and time stamp. The portable reference standard should store:

- Customer information: Name, address, and Contact info.
- Site information: Meter serial number, meter type, CT/PT information
- Measurement results: Voltage, current, Power, %error, Dial test results □ Attributive Tests: Site installation tests like: Seal OK, Display OK

All the measured data shall be date and time stamped. The memory management unit software shall be a part of the portable reference standard firmware. This shall allow the user to manage memory (delete or erase) in case the memory is full without the use of external software.

It should be possible to preload customer database: Customer information, Site information, and Special Attributive test information into the memory of the unit. The memory should be enough to allow preload of customer database for at least 5 customers. The users should be able to assign and allocate the customer database to measurement results at site with ease. The memory management function should be a part of instrument only and not external software.

14 Auto diagnosis:

The Portable Electronic Reference Standard Meter should be capable of conducting an automatic built in internal test, which verifies all indicators whenever it is turned on

- It should do display initialization at power up.
- It should do self-test and report errors, if any.
- Reference meter should be able to detect automatically the current measurement mode: Direct or 120A CT clamp mode

15 Interface:

The reference meter should have interface provisions.

- High resolution electrical Pulse output to allow testing of portable standard against reference standard of higher accuracy.
- Scanning head input to allow counting of pulses from scanning head.
- USB2.0 or RJ45 Ethernet port to allow uploads / download of information from/to portable reference standard.
- Wi-LAN interface for WAN and near field PDA connectivity.

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- Webserver for control and display of measured parameters on portable mobile devices like: Mobile phones, tablets and Laptops

16 Dial testing

The portable reference standard shall be able to conduct multiple dial tests using the functional keys of the instrument only. It should be possible to store multiple Dial test results for a single installation only. The equipment shall have provision to perform DIAL TEST for: Active, Reactive and Apparent Energies Simultaneously. The equipment should perform Maximum Demand Test too along with Energy Registers test.

17 Safety Requirements:

The Electronic Reference Standard Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal working conditions, so as to ensure especially:

a) Personal safety against electric shock
b) Personal safety against effect of excessive temperature
c) Safety against spread of fire.

All parts, which are subject to corrosion, shall be suitably protected and any protective coating shall not be liable to damage by normal handling.

18 Case and Window:

The Electronic Reference Standard Meter should be housed in a suitable engineering plastic or metal case and any non-permanent deformation of the case shall not affect the satisfactory performance of the equipment.

19 Power consumption:

The active power consumption of the Electronic Reference Standard Meter at a reference voltage, frequency, temperature and rated current shall not be more that 1 VA per phase in current circuit for direct mode excluding the leads and 20VA per phase in voltage circuit excluding the leads.

20 Carrying Case:

Each Electronic Reference Standard Meter shall be supplied in an Aluminum/ engineering plastic carrying case suitable for easy portability, rugged used and to prevent damaged during transit. The Electronic Reference Standard Meter should be immune to vibrations and shocks in normal transportation and handling.

21 Software:

Each Electronic Reference Standard Meter shall be supplied along with PC software. The software shall be suitable for downloading the test results into IBM compatible PC

using Communication port. The software shall have facility to generate the test report for individual testing and summary report of all test reports.
The offered software shall have facility to convert all stored test results in ASCII file format. The offered software shall be user friendly and menu driven. The supplier shall impart necessary training regarding installation and used of the above software.
The software shall have a facility to upload customer information, Site information, and special attributive tests information into the memory of the reference standard from its database. It should be possible to upload and download customer database between reference standard and the software

22 Accessories:

Each Electronic Reference Standard Meter shall be supplied along with following accessories:

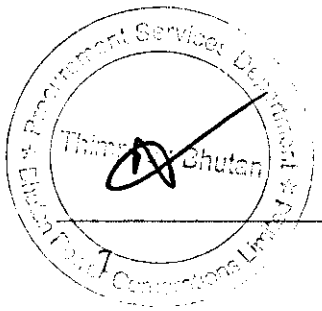
i) Common optical sensor for automatic testing, which can be used to sense disc revolutions in electromechanical meters as well as indicating LED and LCD in static meters.
ii) Mounting arrangement (clamp) for the optical sensor.
iii) Clamp on CT for on-line testing: set of 120A Current clamp iv) A set of voltage leads with insulated clips
v) Current leads to connect Electronic Reference Standard Meter in direct mode.
vi) Serial communication cord with USB/RJ45 connector to retrieve stored data from the Electronic Reference Standard Meter and upload/ download the same to a PC.
vii) Snap switch along with cable.
viii) Base Computer Software (BCS) for upload and download of information.

23 Guarantee:

The Electronic Reference Standard Meter should be guaranteed for performance for a period of 18 months from the date of commissioning or 12 months from the date of receipt in stores, whichever date is earlier. The equipment found defective within the above guarantee period shall be repaired / replaced by the supplier free of cost within one month of receipt of intimation.

24 Guaranteed Technical Particulars:

A statement of guaranteed technical particulars shall be furnished in the format attached along with the bid without which the Bid for Item 2: Meter Testing Kits under Lot 12 shall be treated as Non-Responsive.



25 After sales support and training:

The supplier shall arrange to provide free training at places as desired by the purchaser for use of Electronic Reference Standard Meter and Base Computer Software. The supplier shall provide competent and timely after sales services support.

26 Tests:

a. Type Tests:

The Electronic Reference Standard Meter should be type tested at any of the best laboratories by the bidder as per relevant standards ant this technical specification. The bidder shall furnish following type test reports along with the bid.

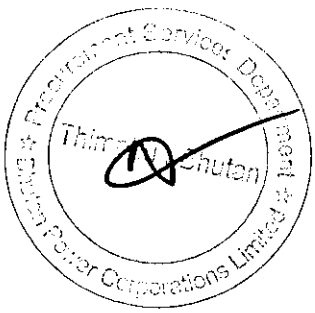
- Test of insulation properties.
- Test of Accuracy requirements.
- Repeatability of error test.
- Test of influence quantities.
- Test of operation of optical scanner
- Test of power consumption.

b. Acceptance Tests:

The Supplier shall carry out all acceptance tests as stipulated in the relevant standards and in this specification.

c. Routine Tests:

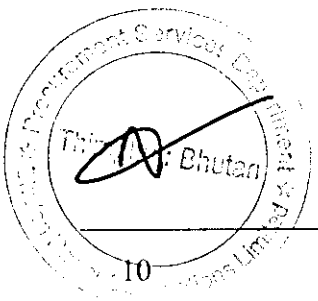
All routine tests as stipulated in the relevant standards shall be carried out and routine test-certificates / reports shall be submitted to the Purchaser for approval



Technical Particulars of Electronic Reference Standard Meter of Accuracy 0.1S/0.2s for testing of LT/HT meters.

Sl. No	Item	Requirement	Bidders to specify
1.	Makers name and country	Please specify manufacturer name	
2.	Type of meter		
3.	Accuracy class	Direct mode: 0.1S Clamp on mode, 100A: 0.2S Error Compensated CT clamps with compensation as part of CT	
4.	Parameters displayed	Instantaneous voltage, U of every phase Instantaneous line current, U of each phase a. Simultaneous display of b. active (P), reactive (Q) and c. apparent power (S) d. Instantaneous power factor of e. each phase & total power f. factor Instantaneous g. frequency. Phase sequence. Active, reactive (lag/lead) and apparent three phase energies. Continuous update of active, h. reactive (lag/lead), and apparent energies on display. i. Time j. Vectorial graphic display k. Harmonic analysis display of U, I, P, Q & l. Real time waveform display of selected voltage & current	
5.	Display resolution	a. Voltage : 0.01 V b. Current : 0.0001 (1A), 0.001 c. (5A), 0.01	

		(200 A) Power factor : 0.001 d. Energy : 0.0001 (Wh) e. % Error Resolution: 0.01	
6.	Connection check	Missing potential a. Missing current b. Reverse current if any current c. is reverse d. Phase sequence "Forward or Reverse" e. Over current f. Over voltage	
7.	Type of display	6" TFT Color display with minimum resolution of: 640x480 pixels	
8.	Interface	a. USB or RJ45 connector for connecting to the PC b. Scanning head c. Remote snap switch to count pulses d. Wi-Fi Connectivity e. Webserver for remote connectivity	
9.	Memory	Capacity of minimum 20000 test results a. Upload of customer database for at least b. 5 customers c. Memory management, part of instrument & external software d. Selection of special attributive tests	



10.	Instantaneous parameters to be logged in memory during each test	**a.** Customer information **b.** Site information **c.** Attributive Tests information **d.** Measurement results	
11.	Auto Detection of current measurement input	Automatic detection of DIRECT, 120A CT modes	
12.	Functional checks	a. Accuracy using Scanning Head (Describe) b. Register Test (Describe) c. Data Storage Function (Describe)	
13.	Scanning head	Common for rotor mark & LED pulses to sense pulses upto 500 Hz.	
14.	Snap switch	Snap switch to operate equipment remotely	
15.	Dial test facility	Test of Active, Reactive and Apparent Energy, simultaneously Test of Dial/Counter of Meter Under Test for all 3 vectors (Active, Reactive and Apparent) in one shot or simultaneously	
16.	Key Board	Alphanumeric type	
17.	Carrying case	Shall be packed in Engineering Plastic case	
18.	Weight (Without Case)	Less than 2 kg	
19.	Weight (With Case)	Less than 10 kg	
20.	Type test	Calibration report from recognized lab shall be submitted. Declaration from manufacturer for standards adopted for test of insulation, influence quantities (CE Declaration)	

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