

MHARASHTRA METRO RAIL CORPORATION LIMITED

Name of work: Supply of Testing Equipment for Power Supply

TENDER NO. N1(R)-Tr-10/2020

Date. 24.01.2020

CORRIGENDUM -I

SN	Section	Clause ref.	Existing description	Replaced with
1.	Section 2A, Bid Data Sheet B. Preparation of Proposals	11.2	Additional Clause Employer has the right to split the BOQ in three parts (at the max) to derive L1 bidders for each group of items to be supplied (max three) and award contract accordingly.	Bidders should quote all items of individual Group as a whole and bidder can opt to quote any one group or all groups. L1 bidder of each Group will awarded the supply contract for the items of that particular group. All items of a Group must be quoted, if any of the items of a group is not quoted, then bidder's bid will not be evaluated for that particular group.
2.	Section 5, Particular Specification	LIST OF EQUIPMENT	LIST OF EQUIPMENT	Deleted
3.	Section 6, Conditions Of Contract	6.1 Duration of Contract	The contract shall continue for a period of 03 (Four) Months from the date as mentioned in LOA. The period of the contract may be further extended after completion of contract period, as per discretion of Maha-Metro.	The contract shall continue for a period of 03(three) Months from the date as mentioned in LOA. The period of the contract may be further extended after completion of contract period, as per discretion of Maha-Metro.
4.	Section - 6 Conditions Of Contract	6.8. Validity of Offer	The offer shall remain valid for a period of Four Months , from the date of submission of this limited tender. Validity of offer is extendable with mutual consent. The Financial Offer should be given in the enclosed Annexure 'B' duly signed and stamped.	The offer shall remain valid for a period of Four Months, from the date of submission of this limited tender. Validity of offer is extendable with mutual consent. The Financial Offer should be given in the enclosed Annexure 'A' duly signed and stamped.
5.	Section-7		LIST OF DOCUMENT TO BE ENCLOSED	Deleted (List of Documents already mentioned in Section 3)

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6.	Section 5, Particular Specification	Particular Specifications	Particular Specifications Deleted (Page 68 of 99 to Page 79 of 99)	Revised as Technical Specification detailed below.
<p><u>Technical Specifications</u></p> <p><u>SN.1 Primary Current Injection Test Kit</u></p> <p><u>i. Features:</u></p> <ul style="list-style-type: none"> a. Self-contained, fully integrated unit comprising MCB, variac, isolated wound secondary injection transformer, dual ratio C.T., and ammeter – digital /analog as preferred Input with metal clad plug and socket. b. Copper bus-bar output. c. Push button operated contactor with timer. d. Powder coated MS enclosure with front panel protection by a lockable cover. e. Transportable on castor wheels. f. Incomer mains chord should be minimum 5 meter long. g. Test Leads: Kit shall be supplied along with all accessories including Copper cable set, clamps, connectors, indication lamps, power supply cable etc. all that is required for carrying out measurement for one unit. Test Cable should be long enough to inject the output current on a fully erected CT (Minimum 5 meter cable of required). h. Cable set with appropriate cross section should be supplied along with the kit to deliver the rated current of 2000A. i. Transport case for primary injection kit. <p><u>ii. Applications:</u></p> <ul style="list-style-type: none"> a. CT Ratio Testing b. Primary injection relay testing c. Effectiveness of bus bar, bus duct joints d. Suitable for 1 phase and 3 phase <p><u>iii. Specifications:</u></p> <ul style="list-style-type: none"> a. Input : 220V , 50Hz. b. Output : 0 – 5V Max (On Open Circuit). c. 0 – 2000A max at shorted output terminals (60 Sec. Rating). d. CT Ratio : 0 – 1000 – 2000/5. e. Output Current Trip at : Set At 120% Of The Selected Ammeter Range. f. MEGGER- ODEN AT/1S or SUDHARSHAN -SI-PIK-10 or MOTWANE MOT PIK-2000 or g. SCOPE PRIMA 2 or (equivalent – to match all specification). 				

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SN.2 Secondary Injection Relay Test Kit

i. Features :

- a. Simultaneous availability of AC injection current and auxiliary AC/DC outputs
- b. Suitable for both NO/ NC trip contacts of relays under test
- c. Transport Case with hard foam interior to be provided.
- d. Programmable voltage and current source
- e. Testing of all relay generations (electromechanical, static, numerical, IEC 61850 IEDS)
The testing system should preferably generate at least 3 phase AC (L-N) and 1 phase AC (L-L) independent voltage sources, 6 phase AC (L-N) current sources and 1 DC source (L-N).
- f. Relays feedback Binary Inputs - toggling of potential free contacts or DC voltage compared to threshold voltage.
- g. Test universe software/Relay testing Management Software with unrivaled manual and automatic testing functionality
- h. Protection testing library - test templates for the most important relays
- i. Package consisting of –Testing unit including kit manual, industrial Laptop with laptop bag (should be software compatible), Test kit should be communicate with laptop via LAN/USB cable and compatible with windows, Carry bag, power cord, Ethernet patch cable, USB connection cable, voltage & current cables, feedback cables, Kit earthing cable etc. with standard accessories provided by manufacturer.
- j. Basic software package must include the minimum below features
- k. Software module- distance
- l. Software module – differential
- m. software module - auto reclosure
- n. Software module - pulse ramping
- o. Training on all software packages purchased has to be given at Maha Metro premises.

ii. Applications :

- a. Testing of secondary injection testing of static-over current / earth fault relays, numerical relays /electro mechanical relays, IEC 61850, IEDS (Goose & Sampled Values)

iii. Specifications :

- a. Test kit Input : 220 – 240 V, 50HZ, 20 Amps
- b. Test kit Output : AC Setting range 0-32 Amps (per source)
- c. AC Setting range 0-300 Volts (per source)
- d. DC setting range 0 - +/- 150 Volts min (per source)
- e. MEGGER SMRT 46 or OMICRON CMC 356 or (equivalent – to match all specification)

SN.3 Micro-Ohm Meter

i. Features

- a. Direct display of micro-ohm value
- b. Supplied with rugged calibrated test lead set suitable for 4 wire measurement
- c. Additional range Of 20 m Ω (Preferred).

ii. Specification

- a. Ranges : 199.9 $\mu\Omega$, 1999 $\mu\Omega$, 19.99m Ω
- b. Resolution : 0.1 $\mu\Omega$, 1 $\mu\Omega$, 10 $\mu\Omega$
- c. Accuracy : Value \pm 1% \pm 1 Digit
- d. Current : 100 A, 200 A DC
- e. Displays : Two, 3½ Digit, ½ Inch LCD, For Current And Resistance Values
- f. Power : 230 V AC \pm 15%, 50 Hz, 75 VA
- g. MEGGER DLRO100 or SCOPE -CRM 200/CRM 200B+ or METREL- MI3252 or MOTWANE PCRM200S or (equivalent – to match all specification)

iii. Accessories

- a. Complete With Standard Accessories 1 Set
- b. Calibrated Test Cables 15 M Long, With Ck Clamps Of 75 Mm Opening-1 Set
- c. Calibrated Test Cables 5 M Long, With Ck-Clamps Of 75 Mm Opening For 19.99 M Ω 1 Set
- d. Master Earthing Cable, 7 M Long-1 Set
- e. Mains Cord, 3 M Long-1 No.
- f. Spare Fuses-1 Set
- g. Carrying Case For Test Lead Set-1 No.
- h. Instruction Manual-1 No.

iv. Optional Accessories

- a. Calibrated Test Cables 15 M Long, With Ck Clamps Of 100 Or 150 Mm Opening-1 Set
- b. Calibrated Test Cables 20 M Long, With Ck Clamps Of 75 Or 100 Or 150 Mm Opening-1 Set

SN.4 Winding Resistance Meter

i. Features

- a. Dual channel
- b. 4-terminal measurement method to eliminate error due to lead resistance
- c. Microcontroller based
- d. Inbuilt memory for data storage
- e. Suitable for heat run testing, cold resistance measurement & live switch yards
- f. Very precise with high stability & extremely low ripple
- g. 4-line high resolution large LCD backlight display
- h. Totally protected against inductive surges, kicks, over temperature and power failure
- i. Possible to measure the resistance of two windings simultaneously.

- j. The meter should contain a special power source for rapid stabilization of test results RS232 PC interface
- k. Accessories : 12m long probe set with crocodile clip & clamps, heat run testing software, instruction manual, mains cord and carrying case

ii. Specifications

- a. Display : one backlit 4 line LCD display for interactive menu, keyboard functions, messages and test results
- b. 4½ digit display for resistance
- c. 3½ digit display for test current
- d. Open circuit voltage : 30 V DC minimum
- e. Output power : approx 300 VA
- f. channels : two, for simultaneous measurement on 2 windings
- g. Discharge indication: large 10 mm flashing led
- h. Current flow alert: beeper
- i. Accuracy: value $\pm 0.5\% \pm 2$ digits
- j. Test leads : 20 m, suitable to test HV/EHV transformers
- k. Environment : 0 to 50° c max, 95 % RH(non-condensing), live EHV switchyard upto 420 KV
- l. Power : 230 VAC $\pm 15\%$, 50 HZ $\pm 10\%$, 400 VA approx
- m. range : 1999.9 $\mu\Omega$ to 1.9999 k Ω
- n. test current : 10A, 1A, 0.1A & 0.01A
- o. SCOPE - TRM-25 or MEGGER - MTO210 or (equivalent – to match all specification)

iii. Standard accessories

- a. Test cables 20 m long, with ck clamps, 75 mm opening 1 set
- b. Shorting lead, 10m long, with ck clamps, 75 mm opening 1 set
- c. Master earthing cable, 7m long 1 set
- d. Mains cord, 3 m long 1 no.
- e. Spare fuses 1 set
- f. Carrying case for test lead set 1 no.
- g. Instruction manual 1 no.

iv. With Optional accessories

- a. Test cables 20 m long, with ck clamps of 100 mm 1 set
- b. Test cables 20 m long, with ck clamps of 150 mm 1 set

SN.5 Breaker Time Interval Meter

i. Features :

- a. Circuit breaker time interval meter complete with 15 meter test lead set & data 1.0 pc downloading & analysis software.
- b. Channels: three
- c. Control of breaker: through 300V / 30A SSRs to trip and close the connected circuit

- breaker
- d. Output: 4 line 20 character backlit lcd
- e. RS 232 port for downloading data to pc
- f. Suitable for 4-pole breakers
- g. Suitable for live switch yards
- h. Simultaneous measurement of all poles
- i. Easy and portable for field use

ii. Specifications :

- a. Range: 999 milliseconds maximum
- b. Resolution: 1 millisecond
- c. Measuring accuracy: value $\pm 0.05\% \pm 1$ digit
- d. Test leads: set of 15m, wear resistant test cables
- e. Power: 230V AC $\pm 15\%$, 50HZ $\pm 10\%$, 25 VA
- f. SCOPE- SCOT M3K or MEGGER-EGIL or (equivalent – to match all specification)
- g. Circuit Breaker Time Interval Meter Complete With 15 Meter Test Lead Set & Cdata 1.0 Pc Downloading & Analysis Software.

SN.6 Fully Automatic 100 KV Oil Breakdown Voltage (BDV) Test System

i. Features:

- a. 1% accuracy. 0.01kV resolution
- b. Complete automatic operation.
- c. Input overvoltage protection.
- d. Programmable stand, stir and intermediate stand times from 0-100 min
- e. Repetitive test sequence (up to 99 iterations) and average readings (from first to last)
- f. Proof test possible with 5 break sequences
- g. Non-contact magnetic stirring
- h. User and object information included
- i. Touch panel, backlit big LCD screen for comfortable user interface
- j. Programmable voltage ramp rate from 0.5kV/sec to 5kV/sec to meet requirements of all regional standards
- k. Vacuum cast resin HV transformer designed for min 100K test cycles
- l. Integrated thermal printer
- m. Internal memory for 100 test data storage and recall via USB port
- n. Programmable 5 custom test sequences as per requirement
- o. High voltage 100kV digital meter 1% accuracy available for on site calibration
- p. Poor ground rejection
- q. Included IEC 60156, ASTM d877, ASTM d1816, UNE 21, BS 5730A, BS 148, BS 5874, VDE 0370, NFC 27, CE1344, OCT 6581, SABS 555, AS 1767, STA 8286, IP 295 standard test sequences

r. Standard accessories : test equipment – 1 no.; oil vessel with mushroom/spherical/cylindrical electrodes (choose any one) – 1 no.; go – no go gauge – 1 no.; printer roll – 1 no.; AC main cable – 1 no.; user manual – 1 no.; test certificate – 1 no.

ii. Specifications:

a. Input / Output

b. Power supply : single phase AC 200V-250V or - single phase AC 90V -150V

c. Voltage output : 0 – 100 kV (variable in steps of 100V for proof test)

d. BD voltage accuracy : 1% + 2 digits (“true BDV test”)

e. BD voltage resolution : 0.01 kV (10V)

f. Trip current : programmable from 5mA to 20mA, in steps of 1mA

g. programmable parameters

h. stand time : 0 to 100 mins

i. Stirring time : 0 to 100 mins

j. Intermediate stand time : 0 to 100 mins

k. Voltage ramp-up : 0.5 KV /sec to 5 KV /sec (variable in steps of 0.5 kv/sec)

l. Trip current : 5 to 20 mA, 1 mA step

m. Sequence repetition: 1 to 99 times

n. safety systems and interlock for zero start

o. Interlock for HT cover open and Auto trip and reset

p. POWER ELECTRONICAL- PE-AOBDV-M100 or MEGGER -OTS100AF or MOTWANE OTS-100A or (equivalent – to match all specification)

iii. Standard accessories

a. oil vessel with mushroom

b. Electrodes – 1 set,or oil vessel with spherical

c. Electrodes – 1 set,or, vessel with cylindrical

d. Electrodes – 1 set

e. Go-no go gauge (as per choice of oil vessel) – 1 no

f. Printer roll – 1 no (already loaded)

g. Connecting ac mains cable – 1 no

h. User manual – 1 no

i. Test certificate – 1 no

j. Warranty certificate – 1no (standard warranty 1 yr)

SN.7 Specifications Of Thermal Imaging Camera

i. Features:

a. On-screen reflected background: shall be available in the camera temperature compensation.

b. On-screen transmission correction: shall be available in the camera.

c. Super resolution: yes on camera and in software. Capture and combines 4x the data to create a 640x480 image.

- d. Focus : manual and laser guided auto focus based on distance measured.
- e. Thermal imager should be able to focus on the image based on the distance measured with a inbuilt laser distance meter. Multisharp™ focus focused near and far, throughout the field of view
- f. Blending of ir& visual images : shall be available in the camera
- g. Picture in picture capability : with thermal image in the centre of the screen shall be available
- h. Display : ruggedized touchscreen display (capacitive)
- i. min 3.5 in diagonal color VGA (640 x 480) LCD with backlight
- j. Measurement modes : user selectable hot spot and cold spot, and center point on the image up to three movable cursors
- k. Color alarms (temperature alarms): high-temperature, low-temperature, and isotherm (user-selectable)
- l. Palettes : standard ironbow, blue-red, high contrast, amber inverted, hot metal, grayscale, grayscale inverted & ultra contractpalatte option
- m. Level and span : auto/manual -scaling
- n. Storage medium : memory card, on-board flash memory, save-to-usb capability
- o. Memory review : thumbnail view navigation and review selection sequential image navigation and review

ii. Specification:

- a. Thermal imaging camera with minimum of the following specifications
- b. Temperature range: -20 °c to 850 °c
- c. Accuracy: ± 2 °c or 2 %
- d. On-screen emissivity correction: 0.1 to 1.0
- e. Detector type : 320 x 240 focal plane array, uncooled microbolometer
- f. Thermal sensitivity (netd): ≤ 0.05 °c at 30 °c target temp (25 mk) or better.
- g. Infrared spectral band : 7.5 μ m to 14 μ m (long wave)
- h. Visual (visible light) camera : industrial performance - 5mp
- i. Digital zoom : 2x and 4x or better
- j. Voice annotation : 60 seconds maximum recording time per image; reviewable playback on imager
- k. Text annotation : shall be possible
- l. Photo annotation : shall be possible to store up to three visual images of the object for easier identification at a later date.
- m. Streaming video output : via USB to pc and HDMI to HDMI compatible screen
- n. Electronic cardinal compass : should have an inbuilt electronic compass to record the direction along with the image.
- o. Auto capture : should be able to auto capture based on user selectable on time or temp inputs
- p. Remote operation : shall be possible to control the camera through a PC
- q. Batteries : minimum two lithium ion rechargeable batteries and show charge level
- r. Battery life : minimum 2.5 hours continuous use per battery pack
- s. Battery charge : less than 2.5 hours to full charge
- t. Ac battery charging : two-bay ac battery charger
- u. Ac operation : with included power supply (110 V AC to 220 V AC, 50/60 HZ).
- v. Rugged and reliable : engineered to withstand a 2 meter (6.56 feet) drop

Lens

- w. Standard infrared lens
- x. Field of view : 24 ° x 17 °
- y. Minimum focus distance : 15 cm

iii. General specification:

- a. Operating temperature : -10 °c to +50 °c
- b. Relative humidity : 10 % to 95 % non-condensing
- c. Safety standards : CSA (US AND CAN): C22.2 NO. 61010-1-04, UL: UL STD 61010-1 (2ND EDITION), ISA: 82.02.01
- d. Electromagnetic compatibility : should meet all applicable requirements in
- e. EN61326-1:2006C TICK IEC/EN 61326-1
- f. US FCC CFR 47, PART 15 CLASS B
- g. Vibration : 0.03 G2/HZ (3.8 GRMS), IEC 68-2-6
- h. Shock : 25 g, IEC 68-2-29
- i. Drop : 2 meter (6.5 feet)
- j. Weight (battery included) : < 1.3 kg
- k. Enclosure rating : IP54 (protected against dust, limited ingress; protection against water spray from all directions)..
- l. Warranty : minimum two-years (standard)
- m. FLUKE TIX580 or FLIR T640 or (equivalent – to match all specification)

n. Accessories to be included

Thermal imager with standard infrared lens; AC power supply and battery pack charger (including mains adapters); two, rugged lithium ion battery packs; SD memory card; USB memory card reader for downloading images into your computer; software with free software upgrades for life; rugged, hard carrying case; soft transport bag; adjustable hand strap; printed user's manual; training CD/DVD.

iv. Software

- a. Full analysis and reporting software to be included free of cost with the supply.
- b. Software shall be licence free and all upgrades for the software to be provided free of cost.
- c. The software shall have minimum of the following features
- d. complete analysis of the thermal imager
- e. Capability to add comments & remarks in the image
- f. 3d IR analysis of the thermal images
- g. generate reports automatically, add visual images in the reports

v. Guarantee

- a. The equipment shall be guaranteed for trouble free performance and against any defects in material; workmanship; design and for any abnormal behavior for period of not less than 24 months from the date of supply.

vi. Training

- a. The successful tenderer shall carry out the testing, commissioning and demonstration of the equipment in the premises of consignee.

- b. Also the tenderer shall impart the training to the staff for minimum of six persons on the equipment in connection with operation and maintenance.
- c. The training shall be imparted by a level 1 certified thermography.

SN.8 Specifications Of Battery Analyzer

- a. Battery analyzer shall confirm to cat III 600v rating for user safety. Instrument shall be IP rating of IP 40 and confirm to pollution degree II which is suitable for industrial environments.
- b. Battery analyzer shall confirm to IEC 61326 for electromagnetic interference (emc). Battery tester shall be suitable for testing flooded lead acid / SMF / VRLA / GEL / AGM type batteries.
- c. Battery tester shall be suitable for testing batteries in off-line as well as on-line condition when they are connected to ups / inverter / charger.
- d. Battery tester shall have large backlit LCD display to show multiple parameters.
- e. Battery tester shall measure battery internal impedance using 4 wire probe using 100mA, 1 KHZ signal.
- f. Battery tester shall measure internal impedance up to 3000 mΩ with 1mΩ resolution and 1% accuracy and battery terminal voltage up to 60V at same time.
- g. Battery tester shall measure voltage up to 600VAC/DC and frequency.
- h. Battery tester shall have ripple voltage measurement to check ac ripple in dc charging current and shall show ac ripple current and dc charge current at same time on LCD screen.
- i. Battery tester shall have clamp to measure ac/dc charge / discharge current & frequency.
- j. Battery tester shall have smart test probes with extenders to reach remote corners.
- k. Test probes shall have small LCD display to show readings and an inbuilt IR thermometer to check temperature of battery terminal.
- l. Battery tester shall have discharge voltage measurement mode.
- m. Battery tester shall manual / automatic data save facility in internal memory.
- n. Battery tester shall have wireless communication facility to send stored data to mobile devices like phone / tablet / pc.
- o. Battery tester be powered using internal re-chargeable li-ion battery and shall have 6-8 hours of continuous operation.
- p. Battery tester shall have USB port to transfer data to pc for record keeping and trending purpose.
- q. Battery tester shall come with test leads / test probes with remote save button, USB port, data cable, software cd, rechargeable battery & charger, magnetic hanger, belt / shoulder carry strap, spare fuses, led flash light, spare tips for probes, paper tags for battery, user manual and carry case as standard part of supply.
- r. Battery tester shall have minimum 3 years warranty and all accessories shall have at least 1 year manufacturer warranty.
- s. FLUKE - BT521 or MEGGER - BITE 3P or (equivalent – to match all specification)

SN.9 Specifications of 5 KV High Voltage Insulation Tester

- a. Insulation resistance up to $1T\Omega$
- b. Short-circuit current up to 1.5 mA
- c. Wide test voltage from 250V to 5000V
- d. Diagnosis function of PI and DAR
- e. Newly-designed alligator clip
- f. A tough hard case
- g. Filter function to reduces noise interference for obtaining stable measurement
- h. Large display with bar graph indication and backlight
- i. Live voltage warning
- j. Safety standard IEC 61010-1 CAT IV 300V / CAT III 600V
- k. All Standard accessories including line probe, 3m – 1 no.; earth cord, 3m – 1 no.; guard cord, 3m – 1 no.; hook type prod; hard case; Rechargeable battery, instruction manual etc.
- l. Optional accessories- line probe with alligator clip -3m, longer line probe with alligator clip:15 m, adaptor for recorder
- m. MEGGER MIT525 or KYORISTU 3127 or METREL MI3203/3205 or (equivalent – to match all specification)

SN.10 Earth Tester

- a. 3-Pole And 2-Pole Earth Resistance
- b. Measurement (0.01Ω - 2000Ω)
- c. Waterproof design (IP67)
- d. Rotary switch makes the user interface Very intuitive
- e. Large LCD display with backlight
- f. LED to monitor correct / non correct
- g. Auxiliary earth spike resistance
- h. Earth voltage measurement (AC/DC 0-300V) and CAT IV 100V
- i. KYORITSU 4105DL or MEGGER DET4TD2 or METREL MI3123 or (equivalent – to match all specification)

SN.11 Power Quality Analyzer

i. Features:

- a. High performance power quality analyzer
- b. 4-voltage channels with wide measurement range: 0 ... 1000 Vrms (CAT III / 1000 V);
- c. 4-current channels with support for automatic clamp recognition and “on instrument” range election;
- d. Compliance with power quality standard of relevant IEC/EN standard
- e. Complete power quality analysis including signaling and inter harmonics;
- f. Remote communication via Ethernet (GPS clock synchronization - optional).
- g. Sequence of events (SOE)
- h. Digital fault recorder (DFR)
- i. Revenue grade check meter and Phasor measurement unit (PMU)
- j. MEGGER MPQ 1000 or METREL MI2892 or ELSPEC G5DFR or (equivalent – to match all specification)

ii. Applications:

- a. Power quality assessment and troubleshooting in low and middle voltage electrical systems;
- b. Checking power correction equipment performance;
- c. Long-term analysis;
- d. Predictive maintenance;
- e. Verification of electrical system capacity before adding loads

SN.12 Relay

i. Specifications

- a. 4 Element (3 Phase + EF) over current IDMT with instant trip.
- b. Display of fault current. / Load current.
- c. Selection of Curve: Six selectable curves (Normal Inverse1 (C1), Normal Inverse2 (C2), Very Inverse (C3), Extremely Inverse (C4), Long Time Inverse (C5) & Definite Time (C6).
- d. Separate curve selection for phase and EF.
- e. Latching of fault current up-to last 5 fault.
- f. Site selectable CT secondary
- g. Programmable Annunciation Contact
- h. Trip circuit supervision function and Breaker Fail
- i. Ashida ADR 141 A

Note:

- 1. Warranty for Each equipment is to be provided as per manufacturer.
- 2. All Equipment to be provided with transport case.
- 3. All Equipment Software and Accessories as per client requirement for testing equipment to be provided.


ED Proc.

