

TECHNICAL SPECIFICATION

FOR

CONTROL & RELAY PANEL FOR 33 KV LINES

SPECIFICATION FOR 33 KV C&R PANELS

1.0 SCOPE:

- 1.1. This specification covers design, manufacture, assembly, testing before supply, inspection, packing and delivery and other basic technical requirements in respect of control and relay panels for 33 kV lines, 33/11KV Power Transformers without differential protection and 33/11KV Power Transformers with differential protection to be installed at various 33/11 kV sub-stations in Maharashtra. The equipment to be supplied against this specification is required for vital installations where continuity of service is very important. The design, materials and manufacture of the equipment shall, therefore, be of the highest order to ensure continuous and trouble-free service over the years.
- 1.2. The equipment offered shall be complete with all parts necessary for their effective and trouble-free operation. Such parts will be deemed to be within the scope of the supply irrespective of whether they are specifically indicated in the commercial order or not.
- 1.3. It is not the intent to specify herein complete details of design and construction. The equipment offered shall conform to the relevant standards and be of high quality, sturdy, robust and of good design and workmanship complete in all respects and capable to perform continuous and satisfactory operations in the actual service conditions at site and shall have sufficiently long life in service as per statutory requirements. If the dimensional drawings attached with this specification and the notes thereto are generally of illustrative nature. In actual practice, notwithstanding any anomalies, discrepancies, omissions, in-completeness, etc. in these specifications and attached drawings, the design and constructional aspects, including materials and dimensions, will be subject to good engineering practice in conformity with the required quality of the product, and to such tolerances, allowances and requirements for clearances etc. as are necessary by virtue of various stipulations in that respect in the relevant Indian Standards, IEC standards, I.E. Rules, I.E.Act and other statutory provisions.
- 1.4. The Tenderer/supplier shall bind himself to abide by these considerations to the entire satisfaction of the employer and will be required to adjust such details at no extra cost to the employer over and above the tendered rates and prices.

2.0 SERVICE CONDITIONS:

- 1.5. System particulars:
- | | | |
|---|-----|------------------|
| a. Nominal system voltage | ... | 33 kV & 11 kV |
| b. Corresponding highest system voltage | ... | 36 kV & 12 kV |
| c. Frequency | ... | 50 Hz±3% |
| d. Number of phases | ... | 3 |
| e. Neutral earthing | ... | Solidly grounded |
- 1.6. Equipment supplied against the specification shall be suitable for satisfactory operation under the following tropical conditions :
- | | | |
|---------------------------------|---|--------------|
| a. Max. ambient air temperature | : | 50 °C |
| b. Max. relative humidity | : | 100 % |
| c. Max. annual rainfall | : | 1450 mm |
| d. Max. wind pressure | : | 150 kg/sq.m. |

- e. Max. altitude above mean sea level : 1000 mtrs.
- f. Isoceraunic level : 50
- g. Seismic level(Horizontal acceleration) : 0.3 g.
- h. Climatic Condition Moderately hot and humid tropical climate conducive to rust and fungus growth.
- i. Reference Ambient Temperature for temperature rise : 50 deg C

1.7. The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.

1.8. Auxiliary supplies available at the various sub-stations are as follows:-

1.8.1. Rating:

i.	A. C. Supply	240 volts with $\pm 10\%$ variation
ii	D.C. Supply	30 V DC with +10% to – 15% variation
iii	Frequency	50 Hz with $\pm 3\%$

1.9. The control & Relay Panels and various sub-units/ components mounted on the panels shall conform to the latest revisions of the following standards :

a)	IS 12063/1987	Degree of Protection provided for enclosure of electrical equipment.
b)	IS 5/2004	Colours for ready mixed paints & enamels.
c)	IS 3231 / 1986 & 1987	Electrical relays for power system protection
d)	IS 8686/1977	Static Protective Relays
d)	IS 1248/2003	Indicating instruments
e)	IS 13779/1999 CBIP SPEC.88	Multi Function Electronic meter
f)	IS 6875 amended up to date	Control switches
g)	IS 4794/1968 & 1986	Push buttons
h)	IS:5578/1984	Marking of insulated conductors.

3.0 CONSTRUCTIONAL DETAILS :

- 3.1 The C&R panels against this specification shall be simplex type with all controls, indications, meters and protective relays mounted on the front.
- 3.2 Each C&R panel for 33 kV lines shall accommodate all the necessary equipment required for one 33 kV feeder circuits.
- 3.3 Control and relay panels meant for 33/11 kV transformers shall accommodate all the necessary equipment for one transformer circuit.
- 3.4 The panels shall be freestanding, floor mounting type suitable for indoor installation. Panels shall be completely metal enclosed, and shall provide degree of protection not less than IP 30 in accordance with IS 12063/1987. Type test report in this respect shall be furnished with offer.
- 3.5 Panels shall be made of folded construction rigid structural frames enclosed completely with smooth finished rolled sheet steel of thickness not less than 3 mm for front portion of panel and 2 mm for other portions of panels. Sufficient re-

- inforcement shall be provided for level surfaces, so as to have resistance to vibration and rigidity during transport, installation and operation.
- 3.6 Each simplex panel shall have suitable hinged doors at the back. The doors shall be provided with 3-point locks operated by suitable handle. Bottom plates of the panels shall be fitted with removable gland plates to allow cable entries from the bottom. Gland plates shall be suitable for fixing the cable glands at an elevated height of at least 100 mm above the ground level. Terminal Connectors and Test terminal blocks for cables shall be fixed at an elevated height of at least 200 mm above the Bottom plate.
- 3.7 Design, materials selection and workmanship shall be such as to result a neat appearance both inside and outside with no welds, rivets or bolt heads apparent from outside. Steel sheets shall be suitably treated to achieve neat appearance and also long life. Final painting of panels shall be done with Light Grey colour to shade no.631 as per IS-5, for both interior and exterior. Epoxy powder coating method shall be used for painting, and shall have matt finish.
- 3.8 All wiring shall be carried out with 1100 volts grade single core, multistrand flexible tinned copper wires with PVC insulation. The conductor size shall be 2.5 sq. mm. (minimum). Wiring troughs shall be used for routing the cables. Wire numberings and colour code for wiring shall be as per IS IS:5578/1984. The wiring should be encased in suitable width PVC casing. The wiring diagram for various schematics shall be made on thick and durable white paper in permanent black ink and same should be encased in plastic cover thermally sealed. It should be kept visibly in a pocket of size 350 x 400 mm of MS sheet of 1 mm thickness, on the interior surface of rear door marked
- 3.9 Terminal blocks shall be of clip-on design made out of non-trackable insulating material of 1100 V grade. All terminals shall be stud type, with all current carrying and live parts made of tinned plated brass. The studs shall be of min 4 mm dia brass. The washers, nuts, etc. used for terminal connectors shall also be of tinned plated brass.
- 3.10 The terminal connector/blocks shall be disconnecting type terminal connectors with automatic shorting of C.T. secondary terminals shall be provided in CT secondary circuit. All other terminal connectors shall be non-disconnecting type. Terminal should be shock protected in single moulded piece. Terminal block should have screw-locking design to prevent loosening of conductor.
- 3.11 At least 20% spare terminals shall be provided. All terminals shall be provided with ferrules indelibly marked or numbered and identification shall correspond to the designations on the relevant wiring diagrams. The terminals shall be rated for adequate capacity, which shall not be less than 10 Amps for control circuit. For power circuit it shall not be less than 15 Amps.
- 3.12 MCBs of appropriate rating shall be provided for DC positive and negative of each circuit/sub-circuit. MCBs shall also be provided for AC (240V) circuits. However HRC fuses of suitable rating shall be provided for PT circuits.
- 3.13 All front mounted as well as internally mounted items including MCBs shall be provided with individual identification labels. Labels shall be mounted directly below the respective equipment and shall clearly indicate the equipment designation. Labeling shall be on aluminium-anodised plates of 1 mm thickness, letters are to be properly engraved.
- 3.14 Each panel shall be provided with cubicle illumination lamp in shrouded holder, controlled by door-operated switch. Space heater of 80 w rating alongwith control switch shall be provided inside each panel. Cubicle lamp and space heater shall be suitable to work on 240 V AC supply. In each panel, one 3-pin 10 Amp industrial type power plug alongwith control switch shall be provided for extending 240 V AC supply.

- 3.15 Each panel shall be provided with one earth bus of size 25 x 3 mm (minimum) . The earth bus shall be of tinned plated copper, and all metallic cases of relays, instruments etc. shall be connected to this earth bus independently for their effective earthing. The wire used for earth connections shall have green insulation.
- 3.16 The panels shall be of overall dimensions 700 x 750 x 2310 (W x D x H) mm. The height 2310 mm is inclusive of the height of base frame. The height of base frame is generally 100 mm, and shall be painted black.
- 3.17 The constructional details and mounting arrangement for various front mounted equipments shall be as per the enclosed drawings. The centerlines of any relays, if additionally provided, shall not be less than 450 mm from ground level.
- 3.18 In addition to the main circuit lable, each panel shall be provided with a lable indicating the following details:
- Name of supplier:
 - Order ref: (T- dtd.)
 - DC voltage:
 - Panel sr. no :
- 3.19 This label shall be provided on the rear side close to the door handle. A sticker type lable indicating the above details shall be provided on the packing case for easy identification.

4.0 PROTECTIVE RELAYS AND CONTROL / INDICATION EQUIPMENTS :

- 4.1 The relays, switches, meters and other accessories offered shall be subject to a maximum of three reputed make and of proven design. The bidders may offer more than one alternative, for each equipment, provided all the alternatives meet the requirement of the technical specification. In case any or all the alternatives offered is/are found to be not acceptable to MSEDCL, the bidder shall be ready to offer any alternative equivalent which is acceptable to MSEDCL.

4.1 PROTECTIVE RELAYS :

- 4.1.1 For 33 KV lines, non-directional IDMT over current and earth fault relays shall be provided for protection. One Three element relay having two O/C elements and one E/F element shall be provided for this purpose. All these relays shall be of 3 seconds IDMT characteristics, the O/C elements having current setting variable from 50% to 200% of CT secondary ratings, and the E/F elements having current setting variable from 10% to 40%.
- 4.1.2 For 33/11 kV transformers of rating 10 MVA, differential protection shall be provided. Transformer differential relay shall be numeric type differential relay, with built-in high-set instantaneous units, suitable for 2-winding transformer.
- 4.1.3 The relays meant for panels shall be suitable for 30 V DC.
- 4.1.4 In case any special software/devices are required for the testing/setting of the protective relays, the bidder shall include one set of such accessories in the offer free of cost. The unit price for such items shall be indicated in the offer so as to enable the employer to order out more sets if required.
- 4.1.5 Relays shall be suitable for flush mounting, with only the flanges projecting on the front and connections at the back. Relays shall have dust-tight covers removable from the front. Protective relays shall have built-in test terminals. The relay shall conform to electromagnetic compatibility requirements as per relevant IEC/other international standards.

- 4.1.6 In case the protective relays offered are not manufactured by the tenderer, an undertaking from the respective relay manufacturer indicating his readiness to extend necessary technical support and back-up guarantee as brought out in Schedule-V for the satisfactory operation of the relay shall be furnished by the tenderer in his offer. The tenderers shall also furnish an undertaking (from the relay manufacturers) confirming that the relay offered is in the current range of manufacture and will not be phased out for at least 10 years from the date of supply.

5 MIMIC DIAGRAM:

- 5.1 Mimic diagrams depicting the bus and the relative position of circuit breakers and isolators shall be provided on each control panel. Mimic diagram shall be neatly painted with the below listed colours to shades mentioned below. The mimic shall have 10 mm width. Non-Discrepancy controls switch for the C.B. shall be mounted within the mimic, indicating the C.B. ON/OFF status.

Sr. No.	Voltage grade	Colour	Shade no.
1	33 kV	Brilliant green	221 as per IS 5
2	11 kV	Traffic yellow	368 as per IS 5

6 CIRCUIT BREAKER CONTROL SWITCH :

- 6.1 Non- discrepancy type T-N-C type switch shall be provided for remote operation of circuit breaker. The switch shall be mounted in the mimic diagram itself such that the stay-put ('N') position will render the continuity of the mimic. One green LED for 'breaker open' indication and one red LED for 'breaker closed' indication shall also be provided adjacent to the T-N-C switch.
- 6.2 Switches should have finger touch proof terminals. For the convenience of maintenance, screw driver guide should be from top/bottom of the switch and not from the side. Terminal wire should be inserted from the side of the switch terminal.
- 6.3 Terminal screws must be captive to avoid misplace during maintenance.
- 6.4 Switch shall be with 48 mm x 48 mm escutcheon plate marked with Trip & Close.
- 6.5 Trip-neutral-close, with pistol grip handle must be pushed in to spring return to either trip or close position from Neutral position for safety and not just turn to trip.
- 6.6 One contact to close in each position of Trip and Close. Contact not required in Neutral position. Contact rating shall be 12 A at 30 V DC.

7 SEMAPHORE INDICATORS :

- 7.1 When semaphore indicators are used for equipment positions, they shall be mounted in the mimic, such that the equipment closed position shall complete the continuity of the mimic. Similarly, when control switch of discrepancy type is used for equipment control, it shall be mounted in the mimic such that the equipment closed position (i.e. control switch knob) shall complete the continuity of the mimic.
- 7.2 Semaphore indicators shall be provided for isolators. The semaphore indicators shall be three position type, having one intermediate position to indicate the "DC supply fail" condition.

8 ANNUNCIATORS:

- 8.1 12 Window annunciators suitable for the visual and audible alarm annunciation shall be provided on the control panel. These shall be micro processor based units using bright LEDs.
- 8.2 Annunciator facia units shall have translucent plastic windows for each alarm point.

- 8.3 Annunciator facia plate shall be engraved in black lettering with respective alarm inscription as specified. Alarm inscriptions shall be engraved on each window in not more than three lines and size of the lettering shall be about 5 mm. The inscriptions shall be visible only when the respective facia LED is glow.
- 8.4 Annunciator facia units shall be suitable for flush mounting on panels. Replacement of individual facia inscription plate and LED shall be possible from front of the panel.
- 8.5 Unless otherwise specified, one alarm buzzer meant for non-trip alarms and one bell meant for trip alarms shall be provided in each control panel (mounted inside).
- 8.6 Each annunciator shall be provided with 'Accept', 'Reset' and 'Test' push buttons, coloured red, yellow and blue respectively.
- 8.7 Special precaution shall be taken by the supplier to ensure that spurious alarm conditions do not appear due to influence of external magnetic fields on the annunciator wiring and switching disturbances from the neighbouring circuits within the panels.
- 8.8 In case 'RESET' push button is pressed before abnormality is cleared, the LEDs shall continue to glow steady and shall go out only when normal condition is restored.
- 8.9 Any new annunciation appearing after the operation of 'Accept' for previous annunciation, shall provide a fresh audible alarm with accompanied visual, even if the process of "acknowledging" or "resetting" of previous alarm is going on or is yet to be carried out.
- 8.10 Provision for testing healthiness of visual and audible alarm circuits of annunciator shall be available.

12 Window Annunciation Scheme to indicate following functions.		
i)	Differential protection operated	1 no.
ii)	Back up protection (O/C+E/F) operated ..	1 no.
iii)	Oil Temp. Alarm for transformer	1 no.
iv)	Oil Temp. Trip for transformer	1 no.
v)	Winding Temp. Alarm for transformer	1 no.
vi)	Winding Temp. Trip for transformer	1 no.
vii)	Buchholz Alarm for transformer	1 no.
viii)	Buchholz Trip for transformer	1 no.
ix)	OLTC Buchholz alarm for transformer	1 no.
x)	OLTC Buchholz Trip for transformer	1 no.
xi)	Spare	1 no.
xii)	Spare	1 no.

Mounting	Flush
No. of facia windows	12
No. of windows per row	6
Supply voltage	30 V DC

No. of LEDs per window	2
Lettering on facia plate	Properly engraved

9.0 INDICATING LEDs :

- 9.1 Indicating LEDs shall be panel mounting type with rear terminal connections. LED shall be provided with series connected resistors preferably built-in in the LED assembly. LEDs shall have translucent LED covers to diffuse lights, coloured red, green, amber, clear white or blue as specified. The LED cover shall be preferably of screw-on type, unbreakable and moulded from heat resisting material.
- 9.2 All indicators shall have bright LEDs having long life. Conventional bulbs are not acceptable.
- 9.3 The indicating LEDs with resistors shall withstand 120% of rated voltage on a continuous basis.

10.0 TRIP CIRCUIT SUPERVISION SCHEME :

- 10.1 Trip circuit supervision scheme shall be such that testing of trip circuit healthiness is possible irrespective of whether the C. B. is in the closed or open position. **The Trip Circuit Healthy LED should glow continuously in CB 'ON' Position and on demand in C.B. 'OFF' position. The rating of dropping resistance in series with Trip Circuit Healthy LED shall be such that the Trip Coil should not get damaged because of continuous current flowing through it.**

11.0 MASTER TRIP RELAYS :

- 11.1 The trip relays shall be high speed, hand reset type. The relay shall have heavy duty contacts suitable for tripping function. Relay shall have minimum 2NO + 2NC contacts.

12.0 Principal requirements of protective relays, metering equipments, auxiliary relays breaker control switches etc. are as follows:

12.1 AMMETER:

- 12.1.1 Each circuit one ammeter and associated selector switch shall be provided.

Mounting	Flush
Size	48 x 96 sq. mm. case
Response Time	1 second
Operating Temperature	Up to 55°C
Dielectric Strength	2 kV RMS for 1 minute
Frequency	50 Hz
Operating Current	1 A from CT Secondary.
Type	Panel Mounting with 3 ¹ / ₂ Digital Display

12.2 AMMETER SELECTOR SWITCH:

- 12.2.1 Ammeter Selector switch shall be a four-position (3 way with off) rotary type with R, Y, B and 'OFF' positions marked clearly on 48x48 mm brushed aluminium plate with black handle. Switch should be single hole mounting and not screw mounting. Switches should have finger touch proof terminals. Terminal wire should be inserted

from the side of the switch terminal. Terminal screw must be captive to avoid misplace during maintenance.

Rated Insulation Voltage	1100 V
Rated Impulse withstand voltage	6 kV
Rated Operational Current	12 A

12.3 VOLT METER:

Mounting	Flush
Size	48 x 96 sq. mm. Case
Response Time	1 second
Operating Temperature	Up to 55°C
Dielectric Strength	2 kV RMS for 1 minute
Auxiliary Supply	110 V
Frequency	50 Hz
Operating Voltage	110 V from PT Secondary.
Type	Panel Mounting with 3 ¹ / ₂ Digital Display

12.4 VOLT METER SELECTOR SWITCH:

12.4.1 Voltmeter Selector Switch shall be seven position type (6 way & off) with 3 phase to phase and 3 phase to neutral position marked clearly on 48x48 brushed aluminium plate with black handle. Switch should be single hole mounting and not screw mounting. Switches should have finger touch proof terminals. Terminal wire should be inserted from the side of the switch terminal. Terminal screw must be captive to avoid misplace during maintenance.

Rated Insulation Voltage	1100 V
Rated Impulse withstand voltage	6 kV
Rated Operational Current	12 A

12.5 FREQUENCY METER:

Mounting	Flush in 96 sq.mm. case
Size	96 mm x 96 mm x 70 mm
Range	45 Hz to 55 Hz
Dielectric Strength	2 kV RMS for 1 minute
Power Consumption	Less than 6 VA
Type	Electronic 4 Digit Digital frequency meter.
Display	Seven segment red colour LED Display with 0.5" hight
IS Referencee	IS:1248

12.6 HEATER:

Capacity	80 Watts
Voltage	240 V AC

Type	Strip type
------	------------

12.7 SEMAPHORE INDICATOR :

Type	3 Position type or Equivalent
Mounting	Flush
Coil rating	30 V DC
Burden	Less than 2 VA
Terminals	3 nos, central terminal is common for negative, positive is connected to 1 or/and 2.

12.8 SELF RESETTING BUZZER

Self resetting buzzer should sound for fixed time of 60 seconds interval and stop automatically

12.9 THREE ELEMENT COMBINED NON DIRECTIONAL 2 O/C + 1 E/F RELAY.

Setting for O/C	50% to 200% of Base Current
Setting for E/F	10% to 40% of Base Current
CT Secondary current	1 Amp.
Characteristics	0-3 Sec.
Contacts	2 set of Self Reset N/O Contacts
Mounting	Flush.
Auxiliary voltage	30 V DC
Size	Cutout 138x138, Bezel: 160x160 mm approximately
Operational indicator	Flags
IS reference	3231

12.10 AUXILIARY RELAY FOR CONTROL & RELAY PANEL FOR TRANSFORMER

Coil Rating	30 V D.C.
Operating Time	20-25 m. seconds at nominal rated voltage
Burden in watts (Max)	3 VA
Thermal rating	70% to 110% of rated coil voltage.
Operational indicators	Mechanical Flag in window : Hand Reset Type
Contacts	4 pair of self reset contacts in combination of '2 make' & '2 break'
Case	Cut out 92x186 mm, Bezel : 110x203 mm approximately
Type of mounting	Flush

12.11 HIGH SPEED MATER TRIP RELAY

Type	High speed of operation.
General Design	Electromechanical
No of poles	3

Operation setting	50% to 120% of rated coil voltage
Coil Rating	30 V DC
Time setting	Instantaneous
Frequency	50 Hz
Aux contacts	Minimum 2NO+2NC of Hand reset
Case size	Cut Out 92x92 mm, Bezel 110 x 110 mm approximately
Aux voltage	30 V D.C.
Operational indicator	Mechanical Flag in window : Hand Reset Type
Mounting	Flush
IS reference	3231

12.12 HIGH SPEED DUAL BIASED DIFFERENTIAL RELAY FOR TRANSFORMER ONLY

Type	Numerical Relay
Operating Current	15% - 100% Adjustable
Bias adjustable at	15 – 30 or 45%
Starting Current	Programable.
CT Secondary	1 amp.
Auxiliary Voltage	30 V DC
Operating Time	Instantaneous.
Frequency	50 Hz
Aux contacts	2 pair of NO contacts. Hand reset
Operational indicator	LED
Mounting	Flush
IS reference	3231

13.0 METERING :

13.1 MULTIFUNCTION ELECTRICITY METER:

13.1.1 3 Phase 4 wire Static Tri-vector Meter having kWh element of class 0.5 accuracy with following parameters.

Class of accuracy	0.5
IS	13779
C.T. Ratio	i) 100/1A for feeder panels ii)100/1A for Transformer Panels
V.T. Ratio	33000/110V
Type	Static
Mounting	Flush
Measuring parameters	kWh, kVArh, kVAh, instantaneous P.F., kW, kVA, supply frequency, phase voltages and phase currents.

Make	Secure Meters/L&T/L&G/Elster or Equivalent.
Display	Customised backlit liquid crystal display

- 13.1.2 The meters shall have digital display unit. The digits shall be clear and bright. The unit shall have number of digits not less than six (6). The design shall be such that the digits shall not reset for atleast 5 years.
- 13.1.3 The meter shall be direct reading type, that is, without involving any external multiplying factor.
- 13.1.4 It shall be possible to programme the meter, at site, to suit the actual CT & PT ratios. However, inadvertent resetting/ changing of the selected CT/PT ratio shall be prevented through suitable software or hardware interlock.
- 13.1.5 M.F.E. meter shall be flush mounting type having all connections from the rear. Provision shall be available for in-situ testing/calibration of the meter.
- 13.1.6 Meters shall be suitable for 50 Hz AC system with 1A CT secondary and 110V PT secondary rating and shall be 3 Phase 4-wire type capable of reading electrical parameters correctly even when used for unbalanced loads. No transducer /external interfaces shall be included between the instrument transformer (secondary) and the meter.
- 13.1.7 Feather-touch push buttons shall be provided on the meters for enabling selection of various system parameters to be read. The parameter being displayed shall be identified on the display unit. Normal scroll mode shall also be available, and the parameters to be displayed shall be programmable.
- 13.1.8 MFE meters shall preferably be self-powered type. Meters shall have non-volatile memory using EEPROM so as to retain the recorded parameters during power failure/ storage. In case the meter is having built-in self-chargeable type battery back up to support the retention of energy recording during storage/aux. supply failure, the same shall have a life not less than 10 years.
- 13.1.9 The meter shall be tamper-proof, having suitable locking arrangement. Locking by method of password may also be offered to prevent tampering by un-authorized persons.
- 13.1.10 The meters shall be of proven design and having been in satisfactory service in any similar (CT/PT operated) system for more than 12 months. Relevant performance certificates shall be submitted alongwith the offer. For each circuit one multi-function electricity meter (M.F.E. Meter) shall be provided.

14.0 GENERAL REQUIREMENTS :

- 14.1 The panels shall be delivered to the various consignees of the MSEDCL as will be informed to the successful tenderers. The panels shall be transported only by road and shall be suitably packed to avoid damages during transit.
- 14.2 Equipment covered in this specification shall be guaranteed for a period of 60 months from the date of commissioning. However, any engineering error, omission, wrong provision, etc. which do not have any direct effect on the time period shall be attended to as and when observed/ pointed out, without any extra price.
- 14.3 Three sets of drawings shall be submitted for approval within 30 days from the date of issue of the Letter Of Award. The suppliers shall furnish 3 sets of the final drawings with copies of technical literature and commissioning manuals along with panel. All drawings shall be A3 size.

15.0 TESTS :

- 15.1 TYPE TEST :

- 15.1.1 Control & Relay Panels offered in the Tender should have been successfully type tested at NABL in line with relevant Standards and the Technical Specification within the last 5(five) years prior to the date of opening of the Tender.
- 15.1.2 Protective relays, MF meter, annunciator, etc. should have been successfully type tested at Independent Government Laboratories in line with relevant Standards and the Technical Specification within the last 5(five) years prior to the date of opening of the Tender.
- 15.1.3 Copies of type test reports in respect of all offered equipment/material shall be invariably submitted.
- 15.1.4 If offered equipments/ materials are type tested beyond 5 years from the opening of tender, the same will be considered for placement of order. However, bidder has to carry out this test at his own cost before commencement of first supply. Undertaking in this respect have to be submitted along with offer otherwise the offer will be liable for rejection.
- 15.1.5 The bidder shall submit copies of the valid Type Test Reports for approval immediately on receipt of LOA.
- 15.1.6 Even if the equipment/material has been type tested within five years, the employer reserves the right to demand repetition of one or more tests included in the list of type tests in the presence of employer's representative.
- 15.1.7 The MSEDCL shall have the option to carry out various tests including type tests as per specification on the samples selected at random from the supplies effected, to ensure that the supplies conform in quality and workmanship to the relevant specification. The testing shall be done at independent laboratory at MSEDCL's cost. Due notice shall be given to supplier for such sample selection and such testing thereof to enable him to be present for the same if so desired by him. If the supplier or his authorized representative fails to attend the sample selection and testing, the same shall be carried out unilaterally by the MSEDCL and the result thereof shall be binding upon the supplier. In case the sample selected from the supplies fails to withstand the required tests, then
- 15.1.8 For first time failure of sample,
- 15.1.8.1.1 Supplier shall have to replace the full quantity of the respective inspected lot supplied to various Stores and lying unused at Stores/ Sites.
- 15.1.8.1.2 For the quantity already accepted against the order and used, deduction in price of 10% of the value of material supplied shall be made
- AND
- 15.1.9 In respect of further supplies made against the order, if failure of samples is noticed (i.e. second time failure against the order)
- 15.1.9.1.1 The quantity lying unused at various Stores/ Sites shall be rejected.
- 15.1.9.1.2 for the quantity already accepted against the order and used, deduction in price of 10% of the value of material supplied shall be made.
- 15.1.9.1.3 Balance quantity against the order including the rejected qty. shall be cancelled without any liability on either side,
- 15.1.9.1.4 The firm will be debarred from dealing with the MSEDCL upto a period of three years from the date of rejection.
- 15.1.10 The employer reserves the right to conduct tests included in the list of Type Tests on requisite number of samples/items from any of the lots during the tenure of the supply, at the employer's cost in the presence of manufacturer's representatives. If the equipment/material does not withstand the type test, then the equipment/material

supplied till then will be liable for rejection. The supplier, in such an eventuality, shall be allowed to modify the equipment and type test the same again at his cost in the presence of the employer's representative. These type tests shall however be conducted by the supplier within 15 days. After successful passing of the type tests, all the equipments/materials supplied earlier shall be modified in line with the equipment/materials, which have successfully passed the type test. In case the supplier fails to carry out the Type Test within reasonable time or does not agree to carry out the type tests at his cost, his equipment/material supplied earlier shall be rejected and the order placed shall be cancelled and payments made earlier for these supplies shall be recovered by the employer.

16.0 INSPECTION:

- 16.1 The inspection may be carried out by the employer at any stage of manufacture. The successful Tenderer shall grant free access to the employer's representative/s at a reasonable notice when the work is in progress. Inspection and acceptance of any equipment under this specification by the employer, shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.
- 16.2 The supplier shall keep the employer informed in advance, about the manufacturing programme so that arrangement can be made from stage inspection.
- 16.3 The employer reserves the right to insist for witnessing the acceptance/routine testing of the bought out items. The supplier shall keep the employer informed, in advance, about such testing programme.

17.0 PERFORMANCE GUARANTEE:

The equipment shall be guaranteed for the period of five years from the date of commissioning. The equipment found defective within above guarantee period shall be replaced / repaired by the supplier free of cost, within one month of receipt of intimation. If defective equipments are not replaced / repaired within the specified period as above, the Employer shall recover an equivalent amount plus 15% supervision charges from any of the bills of the supplier.

18.0 ACCEPTANCE AND ROUTINE TESTS :

- 18.1 All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in the presence of the Employer's representative without any extra cost.
- 18.2 Immediately after finalization of the programme of type/ acceptance/ routine testing, the supplier shall give four weeks advance intimation to the employer, to enable him to depute his representative for witnessing the tests.
- 18.3 The supplier shall carryout all the relevant physical verifications and functional tests as applicable at his works on all the finished C&R panels. Copies of these test certificates duly endorsed by the supplier's testing engineer shall be furnished to the inspecting officer of the MSEDCL. The inspecting officer reserves the right to insist for repetition of functional tests on any or all of the panels offered for inspection, and the supplier shall arrange for the same:

19.0 DOCUMENTATION :

- 19.1 After issue of letter of Award, the successful tenderers shall submit 3 sets of complete drawings alongwith detailed bill of materials for approval of the employer. If any modifications are required on these, the same will be conveyed to the supplier who shall modify the drawings accordingly and furnish final drawings for approval. In normal practice, the documents submitted for approval will be commented upon or approved if in order, within 30 days from the date of receipt of the same. The period

- of commencement of delivery shall include submission and approval of drawings/ BOM.
- 19.2 The manufacturing of the equipments shall be strictly in accordance with the approved drawings and no deviation will be permitted without the written approval. All manufacturing and fabrication work in connection with the equipments prior to the approval of the drawings shall be at the supplier's risk.
- 19.3 After approval of the drawings and bills of materials, the suppliers shall submit detailed packing lists for approval. After approval, copies of these packing lists shall be forwarded to the respective consignees.
- 19.4 In case the supplier fails to furnish the required drawings and manuals even at the time of supply of equipment, the date of furnishing of drawings/manuals will be considered as the date of supply of equipment for the purpose of computing penalties for late delivery.
- 19.5 List of drawings to be submitted is as under:
- 19.5.1.1.1 GA drawing for C & R panel.
 - 19.5.1.1.2 Schematic drawing.
 - 19.5.1.1.3 Typical single line diagram.
 - 19.5.1.1.4 Bill of material for complete C & R panel.
 - 19.5.1.1.5 Terminal block details .
- 19.6 The drawings, technical literature and manuals submitted by the tenderer alongwith his offer shall be treated as purely and generally informative in nature and unless the details incorporated in them are clearly and specifically brought out in the various Schedules for Guaranteed Technical Particulars and Schedules of Deviations, the same shall not be binding upon the employer (a) for evaluation of the offer and (b) for the order, if placed.

20.0 PACKING AND FORWARDING :

- 20.1 Duly wired-up C & R panel with all relays and equipments mounted, shall be packed in crates suitable for vertical/horizontal transport as the case may be and the packing shall be suitable to withstand handling during the transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit due to improper and inadequate packing. The easily damageable materials shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by the supplier within 7 days without any extra cost.
- 20.2 Each consignment shall be accompanied by a detailed packing list containing the following information :
- 20.2.1.1.1 Name of the consignee
 - 20.2.1.1.2 Details of consignment.
 - 20.2.1.1.3 Destination
 - 20.2.1.1.4 Total weight of consignment
 - 20.2.1.1.5 Sign showing upper/lower side of the crate.
 - 20.2.1.1.6 Handling and unpacking instructions.
 - 20.2.1.1.7 Bill of material indicating contents of each package.
- 20.3 All the equipment covered in this specification shall be delivered to the various stores/ sites of the MSEDCL as will be intimated to the successful tenderers. The

equipment shall be delivered to these stores/ sites only by road transport, and shall be suitably packed to avoid damages during transit in the case of indigenous supplies.

- 20.4 The tenderers shall quote delivery periods for various equipment, and shall stick up to the committed delivery. It may clearly be noted that the delivery periods will under no circumstances be linked up with other formalities like drawing approval, etc. It is therefore, the responsibility of the successful tenderers to submit the drawings, bill of materials, packing lists, etc. in time and get these approved.

21.0 DOCUMENTS TO BE SUBMITTED:

The tenderers shall invariably submit the following documents:

- 21.1 Bill of Material (schedule-IA/ IB/ IC).
- 21.2 Undertakings from relay manufacturer regarding :
- 21.3 Non-phasing out of the relays for at least 10 years from the date of supply (Schedule-III,a)
- 21.4 For extending technical support and back-up guarantee (when the relay is not manufactured by the tenderer) (Schedule-III, b)
- 21.5 Undertakings from meter manufacturer regarding :
- 21.6 Non-phasing out of the relays for at least 10 years from the date of supply (Schedule-IV, a)
- 21.7 For extending technical support and back-up guarantee (when the relay is not manufactured by the tenderer) (Schedule-IV, b)
- 21.8 Detailed catalogue/technical literature in respect of all components/accessories including bought-out items.
- 21.9 List of drawings to be submitted alongwith the offer is as under:
 - 21.9.1.1.1 GA drawing for C & R panel.
 - 21.9.1.1.2 Schematic drawing.
 - 21.9.1.1.3 Typical single line diagram.
 - 21.9.1.1.4 Bill of material for complete C & R panel.
 - 21.9.1.1.5 Terminal block details .
- 21.10 Names of supplier of bought out item.
- 21.11 List of testing equipment available with the manufacturer.

SCHEDULE-I A

(To be submitted, duly filled in, alongwith the offer)

BILL OF MATERIALS FOR 33 KV FEEDER C&R PANELS

Sr.No	Description	Quantity	Make and Type design
1	Circuit label	1 No.	
2	Mimic section (Brilliant green paint to shade No.221 of IS 5 to be used)	1 No	
3	T-N-C type control switch for circuit breaker.	1 No.	
4	Semaphore indicators for Isolators.	2 Nos	
5	Indicating LEDs for Spring charge indication (white) Trip circuit healthy indication.(Amber) Breaker 'ON' indication (Red) Breaker 'OFF' indication (Green)	1 No. 1 No. 1 No. 1 No.	
6	Push button for Trip circuit test Alarm Accept	1 No 1 No.	
7	Static non-directional IDMT over current and earth fault relay with highset instantaneous trip feature.	1 No.	
8	High speed tripping relay (H/R type)	1 No	
9	Multi function electricity meter and TTB.	1 Set	
10	Frequency Meter		
11	Ammeter (48 mm x 96 mm.) & selector switch.	1 Set	
12	Voltmeter (48 mm x 96 mm.) & selector switch.	1 Set	
Internally mounted			
1	Space heater and control switch	1 Set	
2	Cubicle illumination lamp and door switch.	1 Set	
3	Power Plug, socket and control switch	1 Set	
4	Alarm bell for trip	1 No.	
5	Alarm cancellation relay	1 No.	
6	Alarm buzzer for non trip with auto-stop feature (with variable time setting 0-60 seconds)	1 No.	
7	MCBs, fuses, links, control wiring, etc.	As required	

SCHEDULE-I B**BILL OF MATERIALS FOR 33/11KV TRANSFORMER C&R PANELS WITH DIFFERENTIAL PROTECTION.**

Sr.No	Description	Quantity	Make and Type design
1	Circuit label	1 No.	
2	Mimic section (Brilliant green paint to shade No.221 of IS 5 to be used)	1 Set	
3	T-N-C type control switch for circuit breaker.	1 No.	
4	Semaphore indicators for Isolators.	1 No.	
5	Indicating LEDs for		
	Spring charge indication(white)	1 Nos.	
	Trip circuit healthy indication.(Amber)	1 Nos.	
	Breaker 'ON' indication(Red)	1 Nos.	
	Breaker 'OFF' indication(Green)	1 Nos.	
6	Push button for		
	Trip circuit Healthy test	1 No.	
7	Static non-directional IDMT over current and earth fault relay with highset instantaneous trip feature.	1 Nos.	
8	Multi function electricity meter and TTB.	1 Sets	
9	Frequency Meter		
10	Ammeter (48 mm x 96 mm.) & selector switch.	1 Sets	
11	Voltmeter (48 mm x 96 mm.) & selector switch.	1 Sets	
12	Transformer differential numerical relay	1 No.	
13	12 window annunciation scheme with accept, reset and LED test push button with self resetting audible alarm.	1 No.	
14	High speed tripping relay (H/R type)	1 No	
16	Auxiliary relay for Buchholz Alarm/trip (2-element)	1 Set	
17	Aux. relay for winding temp Alarm/trip(2-element)	1 Set	
18	Aux. relay for oil temp Alarm/trip(2-element)	1 Set	
19	Aux. relay for OLTC Buchholz Alarm/trip(2-element)	1 Set	
Internally mounted			
1	Space heater and control switch	1 No.	
2	Cubicle illumination lamp with door switch.	1 No.	
3	Power plug with control switch	1 No.	
4	MCBs, fuses, links, control wiring, etc.	As required.	

SCHEDULE-I C

(To be submitted duly filled in alongwith the offer)

Bill of materials for 33/11KV Transformer C&R panels without differential protection.

Sr.No	Description	Quantity	Make and Type design
1	Circuit label	1 No.	
2	Mimic section(Brilliant green paint to shade No.221 of IS 5 to be used)	1 Set	
3	T-N-C type control switch for circuit breaker.	1 No	
4	Semaphore indicators for Isolators.	1 No	
5	Indicating LEDs for		
	Spring charge indication(white)	1 Nos.	
	Trip circuit healthy indication.(Amber)	1 Nos.	
	Breaker 'ON' indication(Red)	1 Nos.	
	Breaker 'OFF' indication(Green)	1 Nos.	
6	Push button for		
	Trip circuit Healthy test	1 Nos	
7	Static non-directional IDMT over current and earth fault relay with highset instantaneous trip feature.	1 Nos.	
8	Multi function electricity meter and TTB.	1 Sets	
9	Frequency Meter		
10	Ammeter (48 mm x 96 mm.) & selector switch.	1 Sets	
11	Voltmeter (48 mm x 96 mm.) & selector switch.	1 Sets	
12	12 window annunciation scheme with accept, reset and LED test push button with self resetting audible alarm.	1 No.	
13	High speed tripping relay (H/R type)	1 No	
15	Auxiliary relay for Buchholz Alarm/trip (2-element)	1 Set	
16	Aux. relay for winding temp Alarm/trip(2-element)	1 Set	
17	Aux. relay for oil temp Alarm/trip(2-element)	1 Set	
18	Aux. relay for OLTC Buchholz Alarm/trip(2-element)	1 Set	
Internally mounted			
1	Space heater and control switch	1 No.	
2	Cubicle illumination lamp with door switch.	1 No.	
3	Power plug with control switch	1 No.	
4	MCBs, fuses, links, control wiring, etc.	As required.	

SCHEDULE - III
UNDERTAKING FROM RELAY MANUFACTURER

We hereby confirm that the protective relay(s) type _____

i)

ii)

iii)

offered by us against your tender No. _____ through M/s. _____ are in our current range of production. We also confirm that these relays will not be phased out by us in the next 10 years from the date of supply. Necessary repairs/replacements if necessary during this period will be made available by us.

Name & Designation : _____

Company Seal : _____

We have offered our relay(s) type _____

i)

ii)

iii)

to M/s. _____ against MSEDCL's tender no. _____. In this connection we hereby confirm that we would be extending all the required technical support and back-up guarantee to M/s. _____ for the above mentioned relay(s).

Name & Designation : _____

Company Seal : _____

SCHEDULE - IV**UNDERTAKING FROM METER MANUFACTURER**

We hereby confirm that the Meter(s) type _____

i)

ii)

iii)

offered by us against your tender No. _____ through M/s. _____ are in our range of production. We also confirm that these meters will not be phased out by us in the next 10 years from the date of supply. Necessary repairs/replacements if necessary during this period will be made available by us.

Name & Designation : _____

Company Seal : _____

We have offered our meter(s) type _____

i)

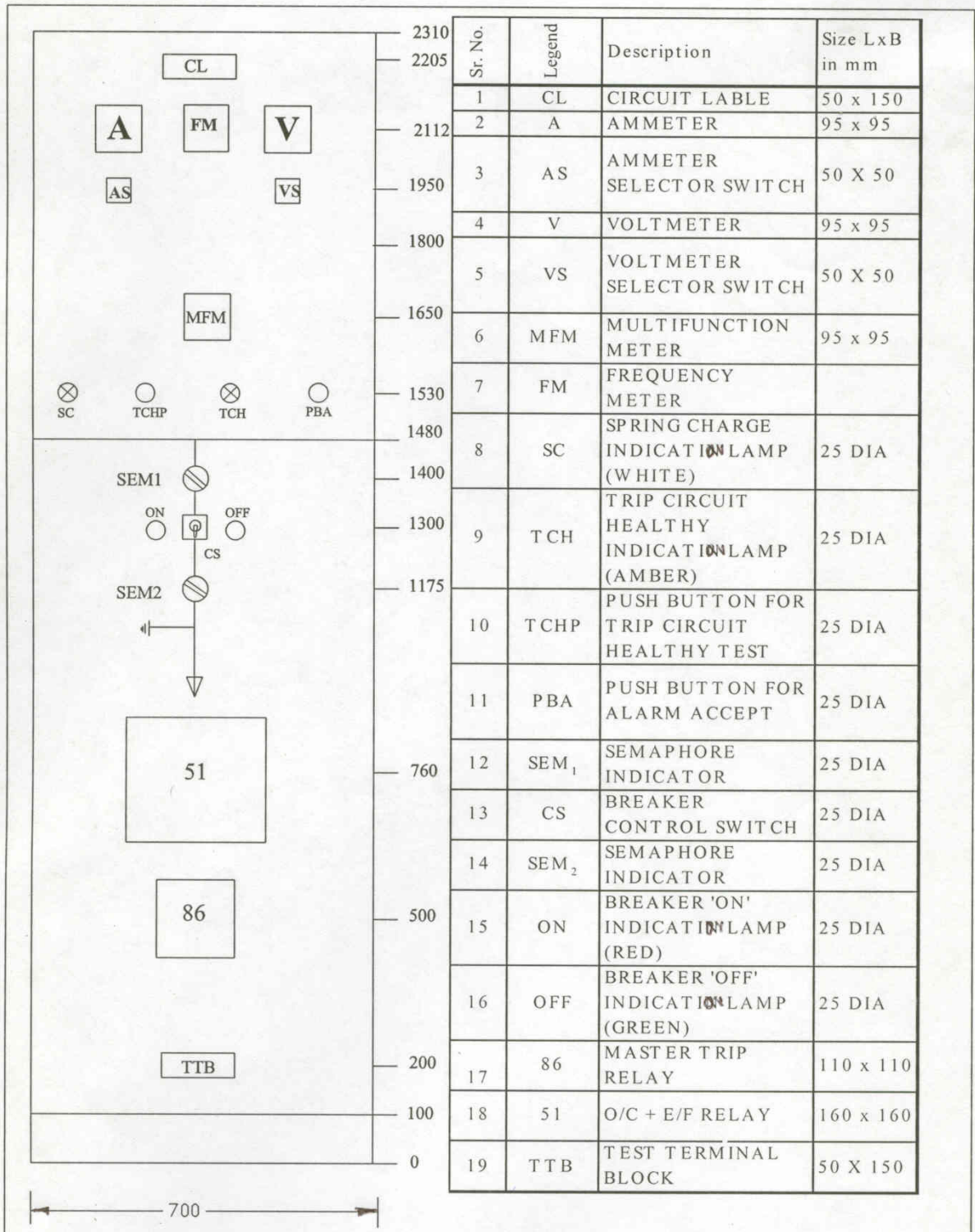
ii)

iii)

to M/s. _____ against MSEDCL's tender no. _____. In this connection we hereby confirm that we would be extending all the required technical support and back-up guarantee to M/s. _____ for the above mentioned relay(s).

Name & Designation : _____

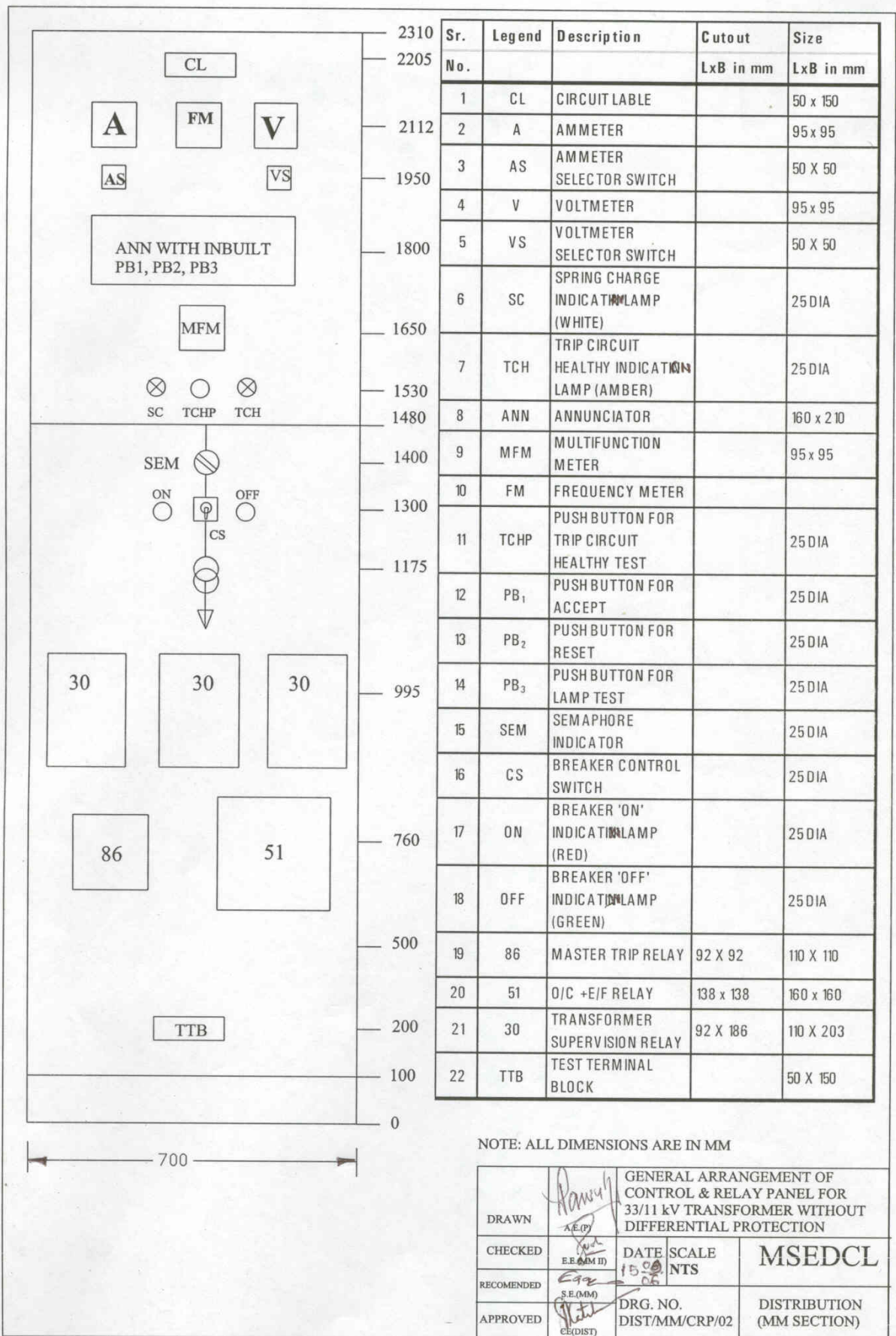
Company Seal : _____



Sr. No.	Legend	Description	Size LxB in mm
1	CL	CIRCUIT LABLE	50 x 150
2	A	AMMETER	95 x 95
3	AS	AMMETER SELECTOR SWITCH	50 X 50
4	V	VOLTMETER	95 x 95
5	VS	VOLTMETER SELECTOR SWITCH	50 X 50
6	MFM	MULTIFUNCTION METER	95 x 95
7	FM	FREQUENCY METER	
8	SC	SPRING CHARGE INDICATION LAMP (WHITE)	25 DIA
9	TCH	TRIP CIRCUIT HEALTHY INDICATION LAMP (AMBER)	25 DIA
10	TCHP	PUSH BUTTON FOR TRIP CIRCUIT HEALTHY TEST	25 DIA
11	PBA	PUSH BUTTON FOR ALARM ACCEPT	25 DIA
12	SEM ₁	SEMAPHORE INDICATOR	25 DIA
13	CS	BREAKER CONTROL SWITCH	25 DIA
14	SEM ₂	SEMAPHORE INDICATOR	25 DIA
15	ON	BREAKER 'ON' INDICATION LAMP (RED)	25 DIA
16	OFF	BREAKER 'OFF' INDICATION LAMP (GREEN)	25 DIA
17	86	MASTER TRIP RELAY	110 x 110
18	51	O/C + E/F RELAY	160 x 160
19	TTB	TEST TERMINAL BLOCK	50 X 150

NOTE :- ALL DIMENSIONS ARE IN MM

DRAWN	<i>[Signature]</i> A.E.(P)	GENERAL ARRANGEMENT OF CONTROL & RELAY PANEL FOR 33 kV FEEDER	
CHECKED	<i>[Signature]</i> E.E.(MM II)	DATE	SCALE
RECOMENDED	<i>[Signature]</i> S.E.(MM)	15/08/08	NTS
APPROVED	<i>[Signature]</i> E.E.(DIST)	DRG. NO.	DISTRIBUTION (MM SECTION)
		DIST/MM/CRP/01	



NOTE: ALL DIMENSIONS ARE IN MM

DRAWN	<i>Ramya</i> A.E.(P)	GENERAL ARRANGEMENT OF CONTROL & RELAY PANEL FOR 33/11 kV TRANSFORMER WITHOUT DIFFERENTIAL PROTECTION		
CHECKED	<i>E.E.(MM II)</i>	DATE	SCALE	MSEDCL
RECOMENDED	<i>E.g.g</i> S.E.(MM)	15/08/06	NTS	
APPROVED	<i>[Signature]</i> E.E.(DIST)	DRG. NO.	DISTRIBUTION (MM SECTION)	
		DIST/MM/CRP/02		

