



Maharashtra State Electricity Distribution Co. Ltd.

SPEC NO. MM CELL: CE/MSC/MSC-II/Numerical relays/02-2015.

TECHNICAL SPECIFICATION

FOR

**Non Directional Over current/ Earth fault and Differential Numerical Relays to be used in 33/22/11 kV
Control & Relay Panels for Lines and Power Transformer**

FOR

VARIOUS 33/22/11 kV SUBSTATIONS

IN

MAHARASHTRA

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Technical Specifications for Non Directional Over current/ Earth fault and Differential Numerical Relays to be used in 33/22/11 kV Control & Relay Panels for Lines and Power Transformer

SPEC NO. CE/MMC/MSC-II/ Numerical Relays/022015, Date: 25.02.2015

1. SCOPE:

This specification covers design, manufacture, assembly, testing before supply, inspection, packing and delivery and other basic technical requirements in respect of **Non Directional Over current/ Earth fault and Differential Numerical Relays to be used in 33/22/11 kV Control & Relay Panels for Lines and Power Transformer** to be installed at various 33/22/11 kV sub-stations of MSEDCL. The equipment to be supplied against this specification are 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.

- 1.1. 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.
- 1.2. 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.
- 1.3. The Tenderer/supplier shall bind himself to abide by these considerations to the entire satisfaction of the purchaser and will be required to adjust such details at no extra cost to the purchaser over and above the tendered rates and prices.

2. TECHNICAL QUALIFYING REQUIREMENTS :

- 1) The bidder shall have performance experience of minimum two years for successful operation for the offered relay in respect to implementation of IEC 61850 protocol to any SCADA/substation auto system in reputed power sector utility in India as on the due date of bid opening. The bidder shall submit copies of the purchase orders and performance certificates for the same along with the bid.
- 2) Inter-Operability Test : One sample of offered relay shall be submitted by the bidder free of cost to TQA office, Pune within 15 days from the date of tender opening. The Vendor has to arrange all required software, hardware tools etc. for carrying out inter operability test. The MSEDCL will provide only space for carrying out test. Inter operability test of the offered relay with the existing relay in MSEDCL network or other manufacture relay will be witness by Testing department, MSEDCL. Those bidders who failed to submit the sample & show inter-operability testing of offered relay, their offer shall be liable for rejection against the Tender.

3. SERVICE CONDITIONS:

3.1. System particulars:

- a. Nominal system voltage ... 33 kV, 22 kV & 11 kV
- b. Corresponding highest system voltage ... 36 kV, 24 kV & 12 kV
- c. Frequency ... 50 Hz \pm 3%
- d. Number of phases ... 3
- e. Neutral earthing ... Solidly grounded

3.2. 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. Isoceranic 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

3.3. 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.

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

3.4.1. Rating:

i.	A. C. Supply	240 volts with \pm 10% variation
ii	D.C. Supply	30 V DC / 110 V DC /220 V DC with +10% to – 15% variation
iii	Frequency	50 Hz with \pm 3%

3.5. The Relays at various sub-units/components mounted on the panels shall conform to the latest revisions of the following standards :

a)	IS 3231 / 1986 Reaffirmed 1997	Electrical relays for power system protection
b)	IEC 60255 amended up to date	Numerical biased protection relay
c)	IEC 61850	Communication Protocol

4. PROTECTIVE NUMERICAL RELAYS PRINCIPAL REQUIREMENTS:

For 33/22/11 kV lines, Non directional 3 O/C & 1 E/F relay with High set feature shall be provided. Numerical relays shall be suitable for auxiliary supply (24 V to 220 V DC/AC with $\pm 20\%$ tolerance) and shall have a reset push button and a test push button to test the relay function with provision to trip bypass push button. The relays should have following Principal Requirements:

(A) Numerical non directional 3 O/C + 1 E/F with high set feature for lines conforming to IEC 60255 & IS 3231 up to date.

Elements	3 O/C + 1 E/F + High set for both O/C & E/F separately
CT Secondary input current to relay	Selection for 1 A / 5 A through software & shall be possible at site
Operating Characteristics selectable	<ol style="list-style-type: none"> 1. IDMT – 3 Sec. 2. IDMT- 1.3 sec. 3. Very Inverse 4. Extremely Inverse 5. Definite time 6. User defined inverse 7. Long time inverse
Auxiliary supply	24 V to 220 V DC/ AC with +/- 20 % tolerance
Instantaneous O/C Plug setting	5 % to 400% in steps of 1%
Instantaneous E/F Plug setting	5 % to 200 % in steps of 1 %
High Set O/C setting	5 % to 4000 % in steps of 1 %
High Set E/F setting	5% to 2500 % in steps of 1 %
Time multiplier setting for O/C & E/F	0.02 to 2.0 in steps of 0.01.
Time delay for High set O/C & E/F	0.01 sec to 15 sec in steps of 0.01 sec.
Memory storage for fault information	Storing of latest 500 events with date & time stamping and storage of latest 10 fault records, fault amplitude, type of fault, faulty phase with FIFO feature (available on display & shall be retrievable through software)
Thermal overload function	To protect cables & transformers from the effects of long term degradation on overloading, the relay shall have the thermal overload setting as per IEC.
Auto reclose function	Four shot, three phase auto reclose facility with independent time setting shall be available

Pre-Logic	User programmable facility to achieve customized functions, create logics with external information through DI/DO etc.
Mounting	<ol style="list-style-type: none"> 1) Relay should be flush mounted with preferably DRAW OUT type model with CT shorting facility of make before break type. <p style="text-align: center;">OR</p> <ol style="list-style-type: none"> 2) Flush Mounted with fixed type connections shall also be considered 3) All relay connections shall be fixed screw type terminals with adequate spacing on back side. 4) Galvanic isolation between field connection & relay hardware.
LED indications	<p>7 programmable LEDs & 1 LED for healthy indication.</p> <p>Colour of LED</p> <ol style="list-style-type: none"> 01- Power ON – Green colour 02- Pick up – Yellow colour 03 – L1 – Red colour 04 – L2– Red colour 05 – L3– Red colour 06 – E/F– Red colour 07 – High set– Red colour
Push buttons	Reset push button for resetting the relay manually. Functional keys should be available for separate trip command.
Output contacts	The relay shall 6 NO + 2 changeover potential free and heavy duty programmable contacts. Min 8 nos relay output contacts shall be provided for specific function outputs for alarm, trip & trip circuit supervision. All output contacts should be freely programmable.
Contact rating	Continuous carry -5A, Make & carry for 0.2 sec-30A
Self diagnosis feature	Relay should have self diagnosis for its healthiness of functioning & should show indication in case of its failure
Password protection	The relay should have provision password protection for the applied settings
Selectivity of primary CT current	The relay should have facility to select the primary CT current from 50A to 1600A in steps of 50A. The relay should display the CT primary current.
Operational indicator	LED
IS reference	IEC 60255 , IEC 61850, IS 3231 amended up to date
LCD Display	Relay shall have minimum 4 line LCD backlit display
Features	Minimum 2 setting groups (3 phase and 1 phase)

Disturbances recorder	The DR shall capture waveforms of analogue channels, and all the DI channels & the DO channels. It shall be possible to configure and capture in DR, all the internal functions like overcurrent start etc. for better analysis of the fault information. It shall have a minimum storage of 10 records of 2 sec each (total memory 20 sec). It shall have facility to record information prior to fault incidence with a pre-trigger time setting of 25 % (programmable).
Communication protocol	<ol style="list-style-type: none"> 1) One No. of IEC 61850 protocol compliant Ethernet, RJ 45 port on rear side for communication with SCADA system. 2) Functioning of relay shall not hamper to fault occurring on any interconnected relay 3) One front port RS 232/USB 2.0 relay parameterization & configuration etc. with the help of PC & suitable interfacing cable with one end having RS 232 port & other end USB 2.0 to be provided to connect with PC free of cost. 4) Relay should generate GOOSE message as per IEC 61850 standard for interlocking & also ensure interoperability with third party relays.

Note: 1. LBB (Local Breaker Backup) feature shall be available in relay with time setting 0-600 sec in steps of 100 msec.

2. CT/PT connectors on relay shall be screw type .

3. Relay shall be supplied with license software & all connecting accessories for configuration/data downloading etc. Necessary software for relay setting, retrieving DR, event log, trip log shall be supplied by bidder free of cost. Necessary multiuser/corporate license software is to be supplied to MSEDCL for installation on all Testing division PC's. Bidder has to supply communication hardware for relay setting, DR downloading from front port. This device shall be compatible to USB/RS232 port on front end.

4. The bidder shall provide all necessary software tools alongwith source codes to perform addition of bays in future & compatible integration with SCADA by the user. These software tools shall be able to configure relay, add analog variable alarm list, event list modify interlocking logics etc for additional bays/equipments which shall be added in future.

For 33/11 kV transformers of rating 10 MVA, differential protection shall be provided. Transformer differential relay shall be Numerical biased differential relay, with in built current amplitude & vector group compensation feature & also with differential high set element for two winding power transformer conforming IEC 60255. The principal requirements are given below.

B) Numerical biased differential protection relay with inbuilt current amplitude & vector group compensation feature & also with differential high set element for two winding power transformer conforming to IEC 60255 -22(1-6), IEC 60255-5 amended up to date.

1.	Auxiliary voltage	24 V to 220 V DC/AC with +/- 20 % tolerance
2.	C.T. secondary input current to relay	Selection for 1 A / 5 A through software shall be possible at site for both HV & LV sides.
3.	Online display	LCD, 4 line with backlit. HV & LV phase currents & differential current on display

4.	Mounting	<p>1) Relay should be flush mounted with preferably DRAW OUT type model with CT shorting facility of make before break type. OR</p> <p>2) Flush Mounted with fixed type connections shall also be considered</p> <p>3) All relay connections shall be fixed screw type terminals with adequate spacing on back side.</p> <p>4) Galvanic isolation between field connection & relay hardware</p>
1)	Features & Programmable setting Range	
	a) Operating Current (Minimum)	Operation based on fundamental frequency with 10% to 100% in steps of 5%.
	b) Adjustable bias setting	10% to 50 % In (neutral current)
	c) Bias (Minimum) Setting	Dual bias characteristics Slope I- 10% to 50% in steps of 5% Slope II- 50% to 400% in steps of 5 %
	d) Programmable HV/LV CT ratio of T/F vector group	
	e) CT correction factor	Primary - 0.1 to 2 in steps 0.001 Secondary- 0.1 to 2 in steps 0.001
	f) Differential High set setting	100% to 4000% in steps of 50%
	g) Time delay for High set O/C & E/F	0.01 sec to 15 sec in steps of 0.01 sec.
	h) Harmonic restrain	2 nd harmonic blocking limit 10% to 80 % in steps of 5% 5 th harmonic blocking limit 10% to 80 % in steps of 5%
2)	DC burden	Quiescent condition – approx 4 watt Under trip condition – 30 Volt - approx 4 watt, 110 Volt - approx 7 watt.
3)	AC burden	Through current only – approx 0.15 VA for 1 amp & 0.30 VA for 5 amp (per bias circuit) Bias & differential Ckt only : 2.8 VA for 1 amp & 3.2 VA for 5 amp.
4)	Contact arrangements	
	a) Binary inputs	Minimum 08 nos. suitable for station auxiliary DC i.e 24 V to 220V DC/AC with +/- 20 % tolerance

	b) Outputs	The relay shall 6 NO + 2 changeover potential free and heavy duty programmable contacts. Min 8 nos relay output contacts shall be provided for specific function outputs for alarm, trip & trip circuit supervision. All output contacts should be freely programmable.
5)	Contact rating	Continuous carry -5A, Make & carry for 0.2 sec-30A
6)	Current Input	Six for differential.
7)	Disturbances recorder	To record graphic form of instantaneous values of current in all two windings in Sine analog channel during fault & disturbance for the pre-faulty & post fault period. Minimum 20 sec, 10 fault, 500 events. The disturbance recorder shall have the facility to record the following external digital channel signals apart from digital signals pertaining to differential relays. a) Backup relay operated- 01 inputs b) Buchholz/ OLTC- Alarm /trip, 4 no. inputs c) WTI/OTI/PRV - Alarm/ trip, 06 no. inputs
8)	Features	Minimum 2 setting groups (3 phase and 1 phase)
9)	Communication protocol	1) One No. of IEC 61850 protocol compliant Ethernet, RJ 45 port on rear side for communication with SCADA system. 2) Functioning of relay shall not hamper to fault occurring on any interconnected relay 3) One front port RS 232/USB 2.0 relay parameterization & configuration etc. with the help of PC & suitable interfacing cable with one end having RS 232 port & other end USB 2.0 to be provided to connect with PC free of cost. 4) Relay should generate GOOSE message as per IEC 61850 standard for interlocking & also ensure interoperability with third party relays.
5)	Standards	As per IEC 60255-22(1-6), IEC 60255-5, IEC 61850
6)	General features:	a) Relay should be numerical Type. b) Relay shall be high speed with an operating time less than 50 ms at 5 times rated current. c) Relay shall measure true RMS value. d) Relay shall have continues self monitoring & diagnostic feature for healthiness. e) Relay shall have immunity to magnetizing in rush current. f) Relay shall be stable on heavy through faults. g) Relay shall be password protected. h) Relay shall record & have memory log up to last minute 10 faults. i) The relay shall have front end Ethernet / RJ 45 communication port for compatibility to

	SCADA to use with PC/Laptop for local access to setting , event & recording in addition to scroll button for the same.
j)	The supplier shall provide customized licensed software copy & communication cable for local as well as remote communication.

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 purchaser to order out more sets, if required.

The relay manufacturers should extend necessary technical support and back-up guarantee for the satisfactory operation of the relay. The tenderer shall also furnish an undertaking confirming that the relay offered is in the current range of manufacture and will not be phased out for at least 5 years from the date of supply.

5. TESTS :

Type Test :

The relays offered in the Tender should have been successfully type tested at any 3rd party NABL Lab in line with relevant Standards IEC 60255 & IS 3231 amended up to date and the Technical Specification within the last 5(five) years prior to the date of opening of the Tender.

A. The List of type Test reports of details of Numerical relays (Back up/Differential) are as follows:

Sr. No.	Title of Type Test
1	Functional Test (Under normal operating condition)
2	Power consumption in current circuit
3	Power consumption in auxiliary circuit
4	Dielectric test
5	Impulse voltage test
6	High frequency interference test
7	Radiated radio frequency electromagnetic field immunity test
8	Surge immunity test
9	Electrostatic discharge test
10	Fast transient disturbance test
11	Vibration response test
12	Shock response test
13	Cold test (storage & operating)
14	Dry heat test (Storage & Operating)
15	Degree of protection IP 54
16	Thermal (short time thermal withstand test)
17	Drop out , pick up , ratio test
18	DC supply interruption
19	AC ripples on DC supply
20	Voltage dips and short interruptions

B. The List of routine Tests of Numerical Relays are as follows:

Operating value test
Operating time test
Communication/ SCADA compatibility conformance Test

The Copies of type test reports in respect of all offered relays shall invariably be submitted along with the offer. Incomplete type test reports will be treated as invalid and the offer will be liable for rejection.

If offered relays are type tested at any 3rd party NABL before 5 years from the opening of tender, the same will be considered for placement of order. However, bidder has to carry out these tests at his own cost at any third party NABL Lab before commencement of first supply. Undertaking in this respect will have to be submitted along with offer otherwise the offer will be liable for rejection.

The bidder shall submit copies of the valid Type Test Reports for approval immediately on receipt of LOA.

Even if the equipment/material has been type tested within five years, the purchaser reserves the right to demand repetition of one or more tests included in the list of type tests in the presence of purchaser's representative.

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 for first time failure of sample,

- Supplier shall have to replace the full quantity of the respective inspected lot supplied to various Stores and lying unused at Stores.
- 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

in respect of further supplies made against the order, if failure of samples is noticed (i.e. second time failure against the order)

- The quantity lying unused at various Stores shall be rejected.
- for the quantity already accepted against the order and used, deduction in price of 10% of the value of material supplied shall be made.
- Balance quantity against the order including the rejected qty. shall be cancelled without any liability on either side,
- The firm will be debarred from dealing with the MSEDCL upto a period of three years from the date of rejection.

The purchaser 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 purchaser'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 purchaser'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 purchaser.

C. Standard Documentation according to IEC 61850 :

- 1) MICS (model implantation conformance statement) document
- 2) PICS (protocol implementation conformance statement)
- 3) Conformance Test certificate from KEMA/CPRI

All the above mentioned certificates shall be submitted alongwith Techno-commercial bid.

6. INSPECTION:

- a. The inspection of Relays shall be carried out by the purchaser at any stage of manufacture. The successful Tenderer shall grant free access to the purchaser's representative/s at a reasonable notice when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser 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.

The supplier shall keep the purchaser informed in advance, about the manufacturing programme so that arrangement can be made for inspection. The Purchaser will depute one Executive Engineer (Inspection wing) and one Executive Engineer from Testing Division, to carry out joint inspection of Relays.

All routine and acceptance tests shall be carried out at the time of joint inspection from the offered lot of relays of each type and designation. The Relays so selected must pass all routine and acceptance tests as per relevant standards otherwise the whole lot offered shall be rejected.

- b. The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items. The supplier shall keep the purchaser informed, in advance, about such testing programme.

7. MINIMUM TESTING FACILITIES

The relay manufacturer must have adequate in-house testing facilities in their works to carry out the all routine & acceptance tests as per relevant standards on the offered relays and should be made available to purchaser's Engineers to carry out all Routine and Acceptance tests.

8. PERFORMANCE GUARANTEE:

All equipments supplied against this specification shall be guaranteed for a period of 66 months from the date of receipt at the consignee's or 60 months from the date of commissioning, whichever is earlier. However, any engineering error, omission, wrong provision, etc. which do not have any effect on the time period shall be attended to as and when observed/pointed out without any price implications.

9. ACCEPTANCE AND ROUTINE TESTS :

All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in the presence of the Purchaser's representative without any extra cost.

- a. Immediately after finalization of the programme of type/acceptance/routine testing, the supplier shall give four weeks advance intimation to the purchaser, to enable him to depute his representative for witnessing the tests.
- b. The supplier shall carryout all the relevant physical verifications and functional tests as applicable at his works on Relays. 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 relays offered for inspection, and the supplier shall arrange for the same.

10. DOCUMENTATION :

- a. After issue of letter of Award, the successful tenderer shall have to submit one sets of complete type test reports alongwith necessary certificates according to IEC 61850 as mentioned above at point 5(C) for approval to the Chief Engineer, (MM Cell), 1st floor, Prakashgad, MSEDCL, Bandra (E). If any deviations observed, the same will be conveyed to the supplier who shall submit compliance thereof accordingly final for approval shall be given. The period of commencement of delivery shall include submission and approval of Type test reports.
- b. The manufacturing of the equipments shall be strictly in accordance with the approved type test reports and no deviations will be permitted without the written approval of the Stores Section. All manufacturing and fabrication work in connection with the equipments prior to the approval of the type test reports shall be at the supplier's risk.
- c. After approval of the type test reports 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. Copies of packing lists shall also be submitted to the Chief Accounts Officer (SB), MSEDCL, alongwith the bills for payment.
- d. In case the supplier fails to furnish the required type test reports and instruction & maintenance manuals even at the time of supply of equipment, the date of furnishing of type test report /manuals will be considered as the date of supply of equipment for the purpose of computing penalties for late delivery.
- e. The type test reports, 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 Guaranteed Technical Particulars, the same shall not be binding upon the purchaser (a) for evaluation of the offer and (b) for the order, if placed.

11. TRAINING :

Suitable training shall be imparted to MSEDCL engineers on the following aspects after the discussion with S.E.(TQA) Pune & Nagpur suitably :

- 1) Relay setting & parameterization
- 2) Relay configuration with respect to I/P,O/P & functional block for protection.
- 3) GOOSE configuration
- 4) Configuration & interfacing required for third party SCADA system integration.
- 5) Diagnostic features.
- 6) Any other features as per requirement

12. PACKING AND FORWARDING:

- a. All relays shall be packed in cushion carton 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.
- b. Each consignment shall be accompanied by a detailed packing list containing the following information :
 - a. Name of the consignee
 - b. Details of consignment.

- c. Destination
 - d. Total weight of consignment
 - e. Sign showing upper/lower side of the carton.
 - f. Handling and unpacking instructions.
 - g. Bill of material indicating contents of each package.
- c. All the equipments covered in this specification shall be delivered to the stores centers of the MSEDCL as will be intimated to the successful tenderers. The equipment shall be delivered to these stores centres only by road transport, and shall be suitably packed to avoid damages during transit in the case of indigenous supplies.
- d. 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 type test report approval, etc. It is therefore, the responsibility of the successful tenderers to submit the type reports in time and get these approved by the CE (MM Cell), MSEDCL.

13. DOCUMENTS TO BE SUBMITTED ALONGWITH THE OFFER in Electronic and Physical form :

Relay catalogue, Type test reports, On line GTP , Instruction and maintenance manual etc.

Guaranteed Technical Particulars		
1. Numerical non directional 3 O/C + 1 E/F with high set relay for lines		
1	Make	Text
2	Type	Text
3	Designation	Text
4	Reference standards	Text
5	Elements	Text
6	CT Secondary input current.	Text
7	Operating Characteristics.	Text
8	Auxiliary supply range	Text
9	Instantaneous O/C Plug setting of 3 Over Current & 1 Earth Fault with high set relay.	Text
10	Instantaneous E/F Plug setting	Text
11	High Set O/C setting.	Text
12	High Set E/F setting.	Text
13	Time multiplier setting.	Text
14	Time delay for high set feature in sec.	Text
15	Memory storage for fault information	Text
16	Thermal Overload function	Text
17	Auto reclose function	Text
18	Pro –logic	Text
19	a) Flush mounted with DRAW OUT type (Yes/NO)	Boolean
	b) Flush mounted with fixed type connections (Yes/NO)	Boolean

20	LED indications.	Text
21	Push buttons provided.	Text
22	Output contacts	Text
23	Communication port	Text
24	Contact rating	Text
25	Self diagnosis feature (yes/no)	Boolean
26	Two level Password protection (Yes/No)	Boolean
27	Selectivity of primary CT current through software (yes/No)	Boolean
28	Operational indicator should be LEDs (Yes/No)	Boolean
29	Minimum 4 line LCD Backlit Display (Yes/No)	Boolean
30	Features	File
31	Disturbances recorder	File
32	Communication protocol	Text
33	Product maturity : The bidder should mention the time period for which the product is in the market.	Text
34	Expected production life, please specify clearly.	Text
35	Hardware/Firmware change notification process. Upgrades to be provided free of cost within the guarantee period, please specify clearly.	Text
36	Life span of standard tools and processes for relay configuration, querying and integration, please specify clearly.	Text
37	Whether all type tests are carried out on Relay at NABL laboratories within five years from date of opening of tender(yes/No)	Text
38	Type Test Reports No. and date	File
39	Are following Type test reports submitted with offer for offered equipment	Text
	1.Functional Test (Under normal operating condition)	Boolean
	2. Power consumption in current circuit	Boolean
	3. Power consumption in auxiliary circuit	Boolean
	4. Dielectric test	Boolean
	5. Impulse voltage test	Boolean
	6. High frequency interference test	Boolean
	7. Radiated radio frequency electromagnetic field immunity test	Boolean
	8. Surge immunity test	Boolean
	9. Electrostatic discharge test	Boolean
	10. Fast transient disturbance test	Boolean
	11. Vibration response test	Boolean
	12. Shock response test	Boolean
	13. Cold test (storage & operating)	Boolean
	14. Dry heat test (Storage & Operating)	Boolean
	15. Degree of protection IP 54	Boolean
	16. Thermal (short time thermal withstand test)	Boolean

	17. Drop out , pick up , ratio test	Boolean
	18. DC supply interruption	Boolean
	19. AC ripples on DC supply	Boolean
	20. Voltage dips and short interruptions	Boolean
40	Software/ device required for testing/setting of relays shall be provided to MSEDCL if required (Yes/No)	Boolean
2. Numerical biased differential protection relay with inbuilt current amplitude & vector group compensation feature & also with differential high set element for two winding power transformer		
1	Make	Text
2	Type	Text
3	Designation	Text
4	Reference standards	Text
5	CT Secondary input current selectable through software (Yes/No).	Boolean
6	Auxiliary voltage range	Text
7	Online display of HV & LV phase currents & differential current (yes/No)	Boolean
8	Adjustable bias setting	Text
9	Operation based on fundamental frequency (yes/No)	Text
10	Programmable HV/LV CT ratio of T/F vector group	Text
11	Minimum 4 line Backlit LCD display (Yes/No).	Boolean
12	2 nd and 5 th Harmonic Restrain feature	Text
13	Storing facility of faults & events	Text
14	Password protection (Yes/No)	Boolean
15	DC burden	Text
16	AC burden	Text
17	Contact arrangements	Text
18	Contact rating	Text
19	Current Input	Text
20	Self diagnosis feature for healthiness of relay (Yes/No)	Boolean
21	a) Flush mounted with DRAW OUT type (Yes/NO)	Boolean
	b) Flush mounted with fixed type connections (Yes/NO)	Boolean
22	Communication port for compatibility to SCADA	Text
23	Features	file
24	Disturbances recorder	File
25	Dual Bias Characteristics	Text
26	Communication protocol	Text
27	Product maturity : The bidder should mention the time period for which the product is in the market.	
28	Expected production life, please specify clearly.	

29	Hardware/Firmware change notification process. Upgrades to be provided free of cost within the guarantee period, please specify clearly.	
30	Life span of standard tools and processes for relay configuration, querying and integration, please specify clearly.	
31	Whether relay is type tested. (Yes/No),	Boolean
32	Are following Type test reports submitted with offer for offered equipment	Text
	1.Functional Test (Under normal operating condition)	Boolean
	2. Power consumption in current circuit	Boolean
	3. Power consumption in auxiliary circuit	Boolean
	4. Dielectric test	Boolean
	5. Impulse voltage test	Boolean
	6. High frequency interference test	Boolean
	7. Radiated radio frequency electromagnetic field immunity test	Boolean
	8. Surge immunity test	Boolean
	9. Electrostatic discharge test	Boolean
	10. Fast transient disturbance test	Boolean
	11. Vibration response test	Boolean
	12. Shock response test	Boolean
	13. Cold test (storage & operating)	Boolean
	14. Dry heat test (Storage & Operating)	Boolean
	15. Degree of protection IP 54	Boolean
	16. Thermal (short time thermal withstand test)	Boolean
	17. Drop out , pick up , ratio test	Boolean
	18. DC supply interruption	Boolean
	19. AC ripples on DC supply	Boolean
	20. Voltage dips and short interruptions	Boolean
33	Software/ device required for testing/setting of relays shall be provided to MSEDCL if required (Yes/No)	Boolean

SCHEDULE-I**A. The List of type Test reports for Numerical relays (Back up/Differential) are as follows:**

Sr. No.	Title of Type Test
1	Functional Test (Under normal operating condition)
2	Power consumption in current circuit
3	Power consumption in auxiliary circuit
4	Dielectric test
5	Impulse voltage test
6	High frequency interference test
7	Radiated radio frequency electromagnetic field immunity test
8	Surge immunity test
9	Electrostatic discharge test
10	Fast transient disturbance test
11	Vibration response test
12	Shock response test
13	Cold test (storage & operating)
14	Dry heat test (Storage & Operating)
15	Degree of protection IP 54
16	Thermal (short time thermal withstand test)
17	Drop out , pick up , ratio test
18	DC supply interruption
19	AC ripples on DC supply
20	Voltage dips and short interruptions

B. The List of routine Tests of Numerical Relays are as follows:

Operating value test
Operating time test
Communication/ SCADA compatibility conformance Test

SCHEDULE - II

Undertaking from Relay manufacturer:

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

i)

ii)

iii)

offered by us against your tender No. _____ are in our current range of production. We also confirm that these relays will not be phased out by us in the next 5 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 MSEDCL's tender no. _____. In this connection we hereby confirm that we would be extending all the required technical support to MSEDCL for the above mentioned relay(s).

Name & Designation : _____

Company Seal : _____