TECHNICAL SPECIFICATION FOR 33KV & 11KV PILFER RESISTANT METERING CUBICLE

A) Technical specification of 11 KV pilfer resistant metering cubicles for 3 phase, 4 wire metering system (with various CT ratio of accuracy class-0.5).

1) **General** :- This specification covers the design, manufacture, testing and supply of 11 kV floor mounting indoor type metering cubicle having 3 nos single phase CTs and 1 no three phase PT but without meter. The tenders from only such firms shall be accepted who themselves manufacture metering cubicles of the relevant design conforming to IS 2705 (part-I & II) and IS 3156 (part-I & II) respectively and have obtained type test certificates.

2) **Construction:-**

The metering panel shall be fabricated with 2mm MS plate and shall have external dimensions of 1600x750x700mm (height x width x depth) (approx). Total height including base channel will be 1650 to 1700 mm. Height of panel is fixed. Dimension of width & depth may be increased suitably to accommodate CTs/PTs, if required. The panel should be provided with 4 Nos. lifting hooks.

The panel shall be dust and vermin proof and totally enclosed. The panel shall have two separate compartments. The upper one shall house trivector meter, energy meter and check energy meter with associated wiring and shall be termed as "Meter compartment". The upper compartment will be double door type and the arrangement for meter fixing will be in inner portion. The other section i.e. lower compartment shall house the 11 kV, 1 Ph, dry type epoxy resin casted CT (3 Nos.) and 11 kV, 3 Ph, dry type epoxy resin casted PT (1 Nos.) and shall be termed as "HT CT/PT compartment". A separate and independent vermin proof door shall be provided for each of the upper and lower compartments with provision of locking and sealing arrangement.

The Metering cubicle shall be totally enclosed and shall be provided with one no. hinged door made of MS sheet which shall rest on the collar along right sides of cubicle so that the doors remain flushed with body of the cubicle.

The door shall be provided with a handle and two no's sealing arrangement. There shall be one fixed (non-openable) window (approximate size 300 x 200mm) fitted with transparent acrylic glass to enable the meter

reader to note down the reading without opening the door of the panel. The glass shall be fitted / tightened with MS Frame from inside of window.

The metering panel shall be provided with two Nos. MS channels of size 100x 50 mm of 750 mm length on the front and rear sides duly welded at the bottom of the panel. These shall have 4 holes of 16 mm for foundation bolts at both the ends of each channel. All the joints of the metering panel shall be welded to provide strong mechanical construction both for transportation as well as during its use. The metering panel shall have arrangement to connect it will earth at two independent points. One earthing knob/bolt shall also be provided in the "Meter compartment" for connection to star point of wiring. All the three earthing bolts shall be provided with nuts and washers.

The metering panel shall be cleaned suitably and will go through phospating using seven tank dipping procedure and its surface shall be made smooth. It shall be powder coated as per relevant IS specification. The colour of paint shall be decided at the event of order. Height of panel is fixed but width & depth is minimum and may be increased suitably to accommodate CTs/PTs, if required. Thus, total height including base channel will be 1700 mm. The panel should be provided with 4 Nos. lifting hooks.

All the moving/mating edges shall be provided with synthetic/semi synthetic gasket firmly glued to surface, to make the metering panel dust & vermin proof. The metering panel shall be provided with two cable entries inside from bottom along with glands /gland plate for 11 kV XLPE cable of various sizes corresponding the CTS ratio and Short Circuit Current Rating without cable boxes. However, the provision for clamping of HT cable boxes has to be provided. There should be suitable provision so that cables boxes along with cable can be taken out of the panel without damage.

The meter compartment shall contain hanger arrangement of slotted angle for mounting main meter and check meter having flexibility for moving meters vertically or horizontally. Clearances between all parts and components of panel should comply with relevant ISS standard, which shall be checked by WESCO.

3) Sealing:-

The metering cubicles shall be completely lockable and sealable with at least one locking and two sealing arrangements of the door of each compartment. Apart from sealing arrangement of both compartments, mounting bolts of CTs and PT shall have the provisions for sealing arrangement so that removal of CTs & PTs from the installed positions in the

panel (for tampering/replacement) by the unauthorized person is not possible without breaking/tampering the sealing arrangement. The hinge arrangement, sealing of CTs and sealing of PTs shall be diagonally arranged in the base of each CTs & PTs. This sealing arrangement shall be checked by the officers at the time of checking of sample and during inspection.

The epoxy casting of 11 kV CTs & PTs coils is required to be carried out under vacuum to avoid any blow holes in the casted material. To establish this Epoxy hardener and accelerator, if any is mixed in the mixing chamber under vacuum and poured into the dyes placed in the casting chamber which is also kept under vacuum as per relevant IS specifications. The temperature as specified by the Epoxy manufacturer is maintained with thermostatic control so that all the moisture is also drained out under vacuum.

4) Electrical Components: -

i) 11 kV metering current transformers (three Nos.):

The metering CTs shall be suitable for 11 kV, 50Hz, effectively earthed neutral system. Each CT shall be suitable for single phase. The CT shall be single core, single ratio, epoxy resin cast, copper wound primary type, with rated burden 5VA/10VA and accuracy class 0.5 or better and conforming to IS 2705 (part-I & II) amended upto date. The ratio of CTs shall be as per schedule of requirement. The instrument security factor (ISF) shall be upto 5. The secondary terminals of the CTs shall be robust design so as to provide effective and firm termination. The secondary winding resistance of CTs shall be as low as possible. Colour coding viz. Red/Yellow/Blue for main and black for load side shall be used. Further, the load side wires shall be provided with red/yellow /blue PVC tape rings at both ends for identification. IS-1 and IS-2 shall be used for identification of main and load wires and ferrules shall be used accordingly. No other symbols other than IS-1 and IS-2 shall be accepted without prior approval. No link/test terminals/terminals shall be provided in wire from CTs to meter terminals. The base plate should have open slot arrangement for adjustable fixing.

ii) **11 kV Potential transformers**

The PT shall be indoor dry type epoxy resin cast, copper wound suitable for 3 phase, 11 KV 50 HZ, effectively earthed neutral system. There shall be 1 No., 11 KV three phase epoxy resin cast per cubicles with rated burden 15 VA per phase and accuracy class 0.5 or better and conforming to IS3156 (part-I&II) amended upto date. Colour coding viz Red/yellow/blue shall be used for

identification of phases and black for neutral. The PT shall be type tested in accordance with IS3156 (part-I&II) with latest amendments. The base plate should have open slot arrangement for adjustable fixing.

The PTs shall be of uniform insulating and withstand separate source 28 kV Pf. for one minute as per clause 9.3.1.1 of IS3156 (part-I).

i) CTs bus bar: - 40x6 mm copper strip
ii) PTs bus bar: - Copper wire 8 SWG or flexible copper flat strip to connect PT or CT.
iii) Wiring for CTs/PTs secondary circuits:

There should not be any joint/termination between CT/PT secondary terminals to meter terminals. Wiring of CTs and PTs should be done with 2.5 mm2 stranded copper insulated conductor, CT wiring and PT wiring should run in independent flexible PVC pipes of appropriate size from HT compartment to meter compartment. The Pipe shall be so laid that no naked wire is visible. From pipes upto the meter in the meter chamber, all wiring should be open and visible.

Short Circuit Rating of 11kv CTs

CT ratio	**Short time current rating**
5/5 A	100 STF
10/5 A & 15/5 A	3KA for 0.5 seconds
20/5A to 30/5 A	7.88 kA for 0.5 seconds
50/5A and above	13.1 kA for 1.0 seconds

Samples

One numbers sample should be ready at the firms works after issue of LOA & before issue of PO for new entrant. The sample shall be checked for its suitability and conformity with this specification before placing the order. The drawing of sample must be attached with tender showing all views of equipment installed inside the metering panel along with the sketch of sealing arrangement as mentioned above. In case order is placed on the firm the materials shall be supplied as per the approved sample and specification. However, approval of the sample shall not absolve the supplier of his responsibility to supply the material as per specifications.

Name plate:-

An Aluminium foil plate shall be affixed on front side of cubicle to indicate the following information against which the desired information is required to be painted at site:-

i) WESCO property
ii) Supplier's name
iii) PO No & date
iv) Sr No of panel
v) Panel CT ratio/accuracy class
vi) Panel PT ratio/accuracy class
vii) Meter CT ratio
viii) Meter PT ratio
ix) Consumer account No
x) Over all CT-PT multiplying factor
xi) Sanctioned load
xii) Date of release of connection

In addition to the above, one no. rating and diagram plate made of Aluminium shall be provided on the front door of the HT compartment giving details viz: Sl no. of cubicle CT and PT ratio burden, class of accuracy, year of manufacturing, total weight, P.O. No. and date etc.

CALIBRATION.

All instruments used in inspection and testing should be properly calibrated and sealed from any Govt. Test House/Reputed Agency certified by NABL and the reports shall not be less than a one year old. Calibration certifications when demanded by inspecting officers shall be provided/ produced for verification purpose.

TESTING FACILITIES

The manufacturer should have all the testing facilities at their works to carry out all the routine & acceptance tests including partial discharge test as mentioned below. List of plant & Machinery and test Equipment available at manufacturer's works should necessarily be submitted along with tender.

ROUTINE AND ACCEPTANCE TESTS:

The following shall constitute the routine tests and acceptance tests.

CURRENT TRANSFORMERS:

a) Verification of terminal marking and polarity.

b) High voltage power frequency test on Primary winding

c) High voltage power frequency test on Secondary winding

d) Over voltage inter-turn test.

e) Determination of errors according to the requirement of accuracy class (0.5)

f) Partial discharge test in accordance with IS: 11322 / 1985.

POTENTIAL TRANSFORMERS:

a) Verification of terminal marking and polarity.
b) Power frequency dry withstand test on Primary
c) Power frequency withstand test on secondary
d) Determination of errors according to the requirement of accuracy class (0.5)
e) Partial discharge test measurement test in accordance with IS: 11322/ 1985.

B) Technical specification of 33 KV pilfers resistant metering cubicles for 3 phase, 4 wire metering system (with various CT ratios & PT of accuracy class-0.2).

1) **General**:

The specification covers the design, manufacture, testing and supply of 33KV Indoor type Metering cubicle made of MS plate.

1.1) The Metering cubicle shall be totally enclosed, air insulated dust and vermin proof having two separate compartments H.T & LT provided with two separate doors, hinged inside the box. The 33KV Metering cubicle shall comply with the requirements of Indian Electricity Rules 1956 & as per relevant IS.

1.2) The Metering cubicle shall be supplied with three no. 33KV single phase epoxy resin cast CT's, three no. 33KV epoxy resin cast PT's and suitable clamping arrangement for holding 33KV incoming and outgoing cables and holding CTs & PTs.

1.3) All the equipment shall comply with the requirement of relevant I.S specification.

2.0) **Construction**:

The 33KV Metering cubicle shall be fabricated with MS sheet having thickness not less than 2.0mm. The overall dimensions of the cubicle shall be approximately 1800mm (Height) x 1400mm (Length) x 1600mm (Depth). Total height including base channel will be 1900 mm. Height of panel is fixed. Dimension of width & depth may be increased suitably to accommodate CTs/PTs, if required. These dimensions may vary slightly as per design of the manufacturer taking into care the minimum clearance of 320 mm between phases as well as between phase and earth.

2.1) All the edges and joints shall be made and welded in such a way that no access inside the cubicle shall be possible and shall thus provide strength to robust mechanical structure both during transportation and installation during it's use.

2.2) The Metering cubicle shall be totally enclosed and shall be provided with two no. hinged door made of MS sheet which shall rest on the collar along the four sides of cubicle so that the doors remain flushed with body of the cubicle.

2.3) The hinge of the doors shall be concealed type (proper welded from inside) so as to eliminate any chance of de-hinging without causing any damage to the cubicle.

2.4) The Metering cubicle shall rest upon two no MS channels support of approximate size of 100mm x 50 mm x 5mm welded at bottom along it's length (1400 mm).

2.4.1) Each of the supporting channel shall have two holes of 12 mm of dia suitable for foundation bolts.

2.4.2) The Metering cubicle shall be provided with M.S. Earthing strip of size 50 mm x 5 mm welded at the two opposite base angles provided with welded not of 6 mm dia welded from inside the cubicle. The earthing strip can be connected by tightening a bolt from outside the metering cubicle at two opposite ends.

2.5) The metering panel shall be cleaned suitably and will go through phospating using seven tank dipping procedure and its surface shall be made smooth. It shall be powder coated as per relevant IS specification. The colour of paint shall be decided at the event of order. Height of panel is fixed but width & depth is minimum and may be increased suitably to accommodate CTs/PTs, if required. Height of panel is fixed but width & depth is minimum and may be increased suitably to accommodate CTs/PTs, if required. Thus, total height including base channel will be 1700 mm. The panel should be provided with 4 Nos. lifting hooks.

2.6) The Metering cubicle shall have two separate compartments separated by MS sheet of 2.0 mm thickness as given below:-

2.6.1) **UPPER (LT) COMPARTMENT:** The upper compartment of the metering cubicle shall be called LT compartment and shall have approximate height of 550mm. The compartment shall have provision for housing a trivector meter and check energy meter (both not in scope of supply) along with its associated wiring. The upper compartment will be double door type and the arrangement for meter fixing will be in inner portion.

2.6.1.1)For fixing of KWH trivector meter and check energy meter in this compartment, four nos. MS slotted angles of suitable size shall be welded to the body from inside of partition chamber in LT compartment, two nos. slotted angles shall be bolted vertically and two nos. horizontally which shall be movable forming to adjust the distance and height of trivector meter and check energy meter to be fixed in the compartment.

2.6.1.2)The upper compartment shall be provided with one door fabricated in one piece and hinged as per clause No. 2.3 The door shall be provided with synthetic/semi synthetic gasket to make it dust & vermin proof. The door shall be provided with a handle and two nos sealing arrangement. There shall be one fixed (non-openable) window (approximate size 300 x 200mm) fitted with transparent acrylic glass. The glass shall be fitted / tightened with MS Frame from inside of window. The height of window shall be such that the reading can be taken easily from out side.

2.6.1.3) **The LT compartment shall essentially contain the following: -**

Hanger of slotted angles for mounting main meter (L&T, SECURE, PAL MOHAN,GENUS make etc) and check meter for having flexibility for mounting of meter vertically and horizontally (meter not in scope of this supply).

2.6.2) **LOWER (HT) COMPARTMENT**: - The lower compartment of Metering cubicle shall be called HT compartment and shall have approximate height of 1250 mm.

2.6.2.1) This compartment shall be housed three no. 33 KV single phase epoxy resin cast CT's for 'R', 'Y' and 'B' phases and three nos. 33 KV single phase epoxy resin cast PT's, connecting strip between CT's and PT's, bus bar with suitable clamping arrangement for incoming and outgoing 33 KV XLPE cables. There shall be two nos sealing arrangement diagonally in base of each CT & PT.

2.6.2.2)The door of lower compartment shall be provided with one door fabricated in two pieces and hinged as per clause No. 2.3 such that it becomes complete dust and vermin proof. The door shall be provided with a handle and two Nos. sealing arrangement.

2.6.2.3) The compartment should be provided with two no. cable entries with detachable plate with brass glands of appropriate size at the bottom suitable for 33 KV XLPE cable suitable for appropriate current rating.

2.6.2.4) **The HT compartment shall be essentially contain the following:-**

a) 33 KV epoxy resin cast CT's (single phase) - 03 no.

b) 33 KV /110/V epoxy resin cast PT's (single phase) - 03 no.

c) Flexible copper flat strip of 30 x 0.4 mm or 8 SWG copper wire (duly insulated) to connect PT's to busbar of CT's - 01 set

d) LT wiring for the secondary of CT & PT circuit, which should not less than 2.5 mm^2 copper in size - 01 set

An Aluminium foil plate shall be affixed on front side of cubicle to indicate the following information against which the desired information is required to be painted at site:-

WESCO

Name of consumer

Service connection no.

Sanctioned load

Date of release of connection

Type of load cont. /Non cont.

Meter no & make

Line CTR / PTR

Meter CTR/PTR

Class of accuracy of CT

Class of accuracy of PT

CT/PT M.F

Dial factor: For Energy /For Demand

Overall M.F: for Energy/For Demand

Date of last checking

In addition to the above, one no. rating and diagram plate made of Aluminium shall be provided on the front door of the HT compartment giving details viz: Sl no. of cubicle CT and PT ratio burden, class of accuracy, year of manufacturing, total weight, P.O. No. and date etc.

3.0) **ELECTRICAL COMPONENTS**:-A brief detail of the various components to be provided in the metering cubicle is given below:-

3.1) **CURRENT TRANSFORMER:-** There shall be 03 nos. single core single ratio dry type epoxy resin cast, current transformers conforming to IS: 2705/1992 of latest revision thereof as per details mentioned below:-

Sl. No.	**Particulars**	**33 KV CT unit**
1.	Nominal system voltage (KV RMS)	33
2	Highest system voltage (KV RMS)	36
3	Frequency	50 Hz
4	No. of CT	3
5	Rated out put (V.A. burden)	5VA for CT Ratio: 5/5 Amps to 30/5 Amps & 10 VA for 50/5 Amps and above

6	Rated continuous thermal current	1.2 times of rated primary current
7	Short time current rating for 1 sec.	For 5/5 A, 10/5 A & 15/5 A: 3KA for 0.5 seconds For 20/5A to 30 A: 7.88 kA for 0.5 seconds For 50/5A and above: 13.1 kA for 1.0 seconds
8	Rated dynamic current (Peak)	2.5 times of short time thermal current rating.
9	Instrument security factor	Less than 5 (five)
10	Impulse withstand voltage (KV peak) (on assembled CT PT. set)	170
11	Maximum temperature rise over maximum ambient temperature of 45 C at rated continuous thermal current at rated frequency and with rated burden.	As per IS 2705/1992 (part-II)
12	Maximum ratio error	do
	Maximum phase angle error	do
a	Type	Dry type epoxy resin cast
b	Transformation ratio/ CT ratio (schedule of requirement to be supplied with LOI/P.O	As per Price Schedule
c	No. of cores	0ne
d	Rated continuous thermal current temperature rise over ambient	As per IS: 2705/192
e	One minute power frequency voltage withstand test on secondary winding	3 KV
f	class of accuracy	0.2
g	Secondary termination	S1 & S 2 shall be clearly marked

The base plate should have open slot arrangement for adjustable fixing.

4.0 POTENTIAL TRANSFORMERS DETAILS SPECIFICATION AS PER IS 3156/1992 WITH LATEST AMENDMENTS:

Sl. No.	Particulars	33 KV PT unit
1.	No. of PT	3 nos.
2	Nominal system voltage (KV RMS)	33
3	Highest system voltage (KV RMS)	36
4	No of phases	3
5	Frequency	50 c/s
6	Transformation ratio (PT ratio)	33 KV/110 V
7	Rated out put (V.A. burden)	50 VA per phase
8	Impulse withstand voltage (KV peak) (on assembled CT PT. set)	150
9	One minute power frequency dry withstand voltage (on assembled CT.PT set Primary (KV RMS) Secondary (KV RMS)	70 3
10	class of accuracy	0.2
11	Rated voltage factor and time	1.2 times continuous and 1.5 times for 30 sec.
12	System condition	Effectively earthed system
13	Maximum temperature raise over maximum ambient temperature (which may be taken as 45 C) at rated frequency and with rated burden.	Within limit of IS 3156 with latest amendment /revision.
14	Maximum ratio error	Do
15	Maximum phase angle error	Do

The base plate should have open slot arrangement for adjustable fixing.

5.0) **ROUTINE AND ACCEPTANCE TESTS**:

The following shall constitute the routine tests and acceptance tests.

5.1) **CURRENT TRANSFORMERS:**

a) Verification of terminal marking and polarity.

b) High voltage power frequency test on Primary winding

c) High voltage power frequency test on Secondary winding

d) Over voltage inter-turn test.

e) Determination of errors according to the requirement of accuracy class (0.2)

f) Partial discharge test in accordance with IS: 11322 / 1985.

5.2) **POTENTIAL TRANSFORMERS**:

a) Verification of terminal marking and polarity.

b) Power frequency dry withstand test on Primary

c) Power frequency withstand test on secondary

d) Determination of errors according to the requirement of accuracy class (0.2)

e) Partial discharge test measurement test in accordance with IS: 11322/ 1985.

5.3 **CALIBRATION**;

All instruments used in inspection and testing should be properly calibrated and sealed from any Govt. Test House/Reputed Agency certified by NABL and the reports shall not be less than an one year old. Calibration certifications when demanded by inspecting officers shall be provided/ produced for verification purpose.

5.4 **TESTING FACILITIES:**

The manufacturer should have all the testing facilities at their works to carry out all the routine & acceptance tests including partial discharge test as mentioned below. List of plant & Machinery and test Equipment available at manufacturer's works should necessarily be submitted along with tender.

Guaranteed Technical Particulars (Table-A)

SCHEDULE OF GUARTANTEED TECHNICAL PARTICULARS OF 11 KV/ 33 KV PILFER RESISTANT METERING CUBICLE

SL. NO.	DESCRIPTIONS	Bidders Particulars	
		11KV	33KV
1	Make of Cubicle		
2	Thickness of M.S Plate used for fabrication of cubicle (mm)		
3	Overall dimensions of cubicle (mm) a) Height (Approx.) b) Depth (Approx) c) Length (Approx.)		
4	Is the cubicle dust & vermin proof?		
5	Details of arrangement for earthing of cubicle		
6	Size of Window (mm) a) Width b) Height		
7	Size of Wire mess provided on window (mm)		
8	Make and other details of insulator used for bus bar support of yellow phase.		
9	a) Size of connecting strip used between H.V cables and CT. b) Material used for connecting strip.		
10	Minimum clearance:- a) Between H.V. Live part & earth (mm) b) Between phases (mm).		
11	a) Dimension of flexible link between bus bar & PT on H.T side. b) Material used for flexible link.		
12	Size of LT wire used for secondary wiring.		
13	Hardware (Make)		
14	State Yes / No for the availability of sealing arrangement. a) Cubicle seal of LT compartment. b) Cubicle seal of H.T compartment. c) Meter reading window d) CMRI Port		

Guaranteed Technical Particulars (Table-B)

SCHEDULE OF GUARTANTEED TECHNICAL PARTICULARS OF 33&11 KV PT SUITABLE FOR 11KV/33 KV PILFER RESISTANT METERING CUBICLE

SL. NO.	DESCRIPTIONS	Bidders Particulars	
		11KV	33KV
1	Name of Manufacturer		
2	Manufacturers Type Designation		
3	Name of resin employed in manufacture of P.T		
4	Rated primary Voltage		
5	Rated Secondary Voltage		
6	Rated Burden of Secondary		
7	Class of Accuracy		
8	Temperature rise at 1.2 times rated voltage with rated Burden		
9	Temperature rise for (8 above)		
10	Rated voltage factor and time		
11	1 Minute power frequency withstand test (dry voltage)		
12	1/50 micro second impulse wave withstand test voltage		
13	1 Minute power frequency withstand voltage on secondary		
14	Total Weight (1 phase)		
15	Mounting details		
16	Overall Dimensions a) Length b) Width c) Height		
17	The PT of the offered Design and cable termination kit should have been type tested during last five years from the date of opening of the tender. It should also be indicated that when and where were they type tested?		
18	Details of test reports (to be enclosed with the tender bid Part-I)		

Guaranteed Technical Particulars (Table-C)

GUARTANTEED TECHNICAL PARTICULARS OF 11 KV CT/33 KV CT SUITABLE FOR 11KV/33 KV PILFER RESISTANT METERING CUBICLE

SL. NO.	DESCRIPTIONS	Bidders Particulars	
		11KV	33KV
1	Ratio		
2	Name of Manufacturer		
3	Manufacturers Type		
4	Name of resin employed in manufacture of C.T		
5	Rated Voltage		
6	Rated primary current		
7	Rated Secondary current		
8	Rated Secondary output		
9	Class of Accuracy		
10	Instrument Security Factory		
11	Short Time Rating (1 Second)		
12	Rated continuous Thermal current (also indicate Temp. rise over ambient Temp.		
13	Rated current Dynamic (peak value)		
14	Power frequency (dry withstand test voltage on primary winding) one second		
15	Power frequency withstand voltage on secondary.		
16	1.50 micro seconds impulse withstand test voltage		
17	Power frequency (dry withstand test voltage on primary winding)		
18	Total Weight(1 phase)		
19	Overall Dimensions a) Length b) Width c) Height		
20	The CT of the offered Design should have type tested during last five years from the date of opening of tender and it should be indicated that whom and where they type tested		
21	Details of test reports (to be enclosed with the tender with Part-I)		