EDMS 01-101-1

SPECIFICATION

FOR

12KV SWITCH BOARD

(X) PANELS

EQUIPPED TO WORK WITH SCADA SYSTEM

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توجد بنود اختيارية (Option items) يجب تحديدها بواسطة شركة التوزيع قبل الطرح.

يلزم إرفاق المواصفات الفيه للعدادات الذكيه جهد متوسط(كود رقم EDMS 22-401-1)

CONTENTS

LIST OF TABLES

1-SCOPE

This specification covers the minimum requirements for Indoor medium voltage (12 KV) AC. metal enclosed switch board equipped to work with SCADA system without RTU , 3 phases, single copper bus bar system in accordance with the latest international standard IEC62271-200, IEC62271-100 unless otherwise specified.

The design, engineering, manufacture, testing at the manufacturer's factory, painting, packing for transport, insuring, transportation by road, and delivery at destination shall be supported.

- It should be made of sheet steel and equipped with vacuum or (sealed SF6 circuit breaker as option according to … EDC requirements), copper bus bars and all necessary connections.
- The board consists of (X) panels as follows:-
- (X1) as incoming feeder panels.
- (X2) as outgoing feeder panels.
- One Bus-coupler section (2 panels) coupler & riser.
- One service transformer panel.(option);
- One AC Low Voltage Distribution Board. (Option);
- One DC Low Voltage Distribution Board. (Option)

Note: X1 and X2 should be defined according to ….EDC.

2. DEFINITIONS

2.1 Metal- Enclosed Switchgear:
Switchgear assemblies with an external metal enclosure in which components are arranged in separate compartments with metal partitions, enclosure and partitions intended to be grounded.

2.2 Enclosure:
Surrounding part of metal- enclosed switchgear used to prevent personnel from accidentally approaching live or moving parts contained therein and to protect internal equipment against external effects.

2.3 Shutter:
A part which can be moved between a position where it permits contacts or a removable part to engage fixed contacts, and a position where it becomes a part of a cover or a partition shielding the fixed contacts.

2.4 Removable Part:
A part which may be removed entirely from the metal-enclosed switchgear, even though the main circuit is live.

2.5 Withdrawable Part:
A removable part which can be moved to a position where it provides an isolating distance or segregation, whilst remaining mechanically related to the enclosure.

2.6 Service Position(operating position):
The position of removable part when it is fully connected for its normally intended function.

2.7 Disconnected Position (Isolated Position):
A position of a withdrawable part in which an isolating distance or segregation is established. The withdrawable part remaining mechanically related to the enclosure.

2.8 Test Position:
A disconnected position in which the control circuits are connected, allowing tests of the mechanical operation of the withdrawable part.

2.9 Removed Position:
The position of a removable part when it is outside and mechanically separated from the enclosure.

2.10 Grounding Position:
A position in which the closing of a mechanical switching device cause a main circuit to be short-circuited and grounded.

2.11 Rated Normal Current:
The value of the current which a circuit of metal-enclosed switchgear is capable of carrying continuously under specified conditions of use and behaviour.

2.12 Short- Time Withstand Current:

The current that a circuit of metal- enclosed switchgear can carry during a specified short time under the prescribed conditions of use and behavior. It is expressed as an r.m.s. value.

2.13 Peak Withstand Current:

The value of peak current that a circuit of metal-clad switchgear can withstand under the prescribed conditions of use and behaviour.

2.14 Ambient Air Temperature (OF Metal- Enclosed Switchgear):

The temperature, determined under prescribed conditions, of the air surrounding the external enclosure of the metal- enclosed switchgear.

2.15 DMT

Definite minimum time over current protection.

2.16 RTU

Remote terminal unit

2.17 MDMS

Meter Data Management System (MDMS)

2.18 DCC

Distribution control center

3- ENVIRONMENTAL CONDITIONS

The performance of SWITCH BOARD should be guaranteed for following environmental conditions, any differences in the guaranteed performance should be clearly set out in the offer.

Minimum ambient temperature	-5°c.
Maximum ambient temperature	45°c (50 °c as option).
Maximum relative humidity	95%.
Maximum altitude	1000 m.

4-GENERAL DATA

Rated voltage.	12 KV
Insulation level at power frequency.	28 KV
Basic impulse level (BIL)	75 KV
Frequency.	50 HZ
System Grounding	Solidly earthed
Body Color.	Preferred (light grey)
Auxiliary voltage.	110VDC±20%
Degree of protection	IP 41
Copper purity	not less than 99.9 %
Copper Conductivity	not less than 57 MS/ m
CB Contact resistance.	less than 60 μΩ @current supplied 100A
Conductivity resistance for each panel	Less than or equal 300 μΩ
Thickness of silver plate for connection point (All main fixed and moving contacts)	Min. thickness 5μm to achieve Max. allowable temperature rise 115°C.

5-APPLICABLE STANDARDS

Unless otherwise specified in this specification, the 12 KV SWITCH BOARD equipped to work with SCADA without RTU (Remote Terminal Unit) and should be comply with the latest edition of IEC standard and should be designed, manufactured and tested in accordance with the applicable IEC standards as following table:

Table 1

S. No	Standard No.	Description
1.	IEC 62271	High-voltage switchgear and control gear Part 100: High-voltage alternating-current circuit-breakers Part 200: AC metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV Part 102: AC disconnectors and earthing switches. Part 103: switches for rated voltages above 1 kv up to and including 52 kv Part 105: Alternating current switch-fuse combinations. Part 106: Alternating current contactors, contactor-based

		controllers and motor-starters
2.	IEC 61869-1,2	Current transformer
3.	IEC 61869-1,3	Voltage transformer
4.	IEC61850	Communication protocol (Edition 2).
5.	IEC60225-27	Measuring relays and protection equipment - Part 27: Product safety requirements
6.	IEC60068-2-27	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
7.	IEC60255-21-2	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section Two: Shock and bump tests
8.	IEC 60529	Classification of degrees of protection provided by enclosures

6-CIRCUIT BREAKERS

A- The 12KV circuit breakers should be vacuum or (sealed SF6 type as option according to … EDC requirements)

B- The necessary closing, tripping and blocking coils should be (110VDC). With an electric spring charge motor drive (110VDC) or magnetic actuator mechanism consists of three coils (one per pole) and all phases connected to each other using synchronizing shaft. In case of magnetic actuator the circuit breaker should be closing vacuum circuit breaker.

C- The circuit breakers should be mechanically and electrically trip free and with provision for manual operation.

D- Necessary auxiliary contacts for controlling, signaling& free contacts (4NO-4NC) without repeater at least in low voltage compartment and all accessories needed for operation should be provided.

E- The failure of C.B in switching off during any fault should be indicated through programmed LED from the relay and (through flag relay or heavy-duty led lamp)

F- All circuit breakers should be fitted with an operation counter fixed on the circuit breaker not on the cover.

G- The minimum rupturing capacity of all the 12KV, Circuit breakers should be symmetrical short circuit current of 31.5 or 25KA (as option according to … EDC requirements) for 3 Sec at least.

H- The normal current ratings for C.B's at 40°C are as follows:

Incoming C.B's : 1250 A.
Outgoing C.B's : 1250 A (630 A as option).
Bus Coupler C.B : 1250 A

I- Closing and tripping coil of circuit breaker should be protected by anti-slam and anti-pumping for closing coil.

J- Circuit breaker should be tripped mechanically and electrically when moving from service position to test position and vice versa.

K- The incoming feeder should be equipped with three surge arrestors (gap less metal oxide) 10KA, 12KV max continuous operating voltage 10 KV± 5% (leakage path 2.5 cm/KV at least), or any other approved technology to overcome switching over voltage for cable feeders.

7-BUSBARS

A- Main Bus Bars

1. It should be insulated B.B system and made of best quality, high conductivity copper with (C.S.A. of 2×80×10 mm2 or 1×120×10 mm2 as option according to … EDC requirements) for all panels and the connectors (Droppers) should not be less than 800 mm^2, the maximum allowable temperature should be 115°.
2. The bus bar when passing from a cubicle to another should be through an insulating bushing.
3. The bus bar compartments should be placed at the upper part of the switchboard and fitted with dielectric support.
4. All main B.Bs and Droppers should be insulated by heat shrinkable tubes (Red Anti-Track) and the connection points with suitable insulated covers.
5. The entire bus and structure should be constructed to withstand the short circuit effects due to the rated short circuit current of 31.5 or 25KA (as option according to … EDC requirements) for 3 Sec at least.
6. Main B.B should be extendable and securely mechanically bonded to each unit.

7. The connection between any bars to each other or between bars and droppers should be with the same area of the bus bar cross section not part of its cross section.

B-Earth bus bar

An earth copper bar at the bottom of the switchboard extending the entire length of each distribution panel should be provided with a cross section area to withstand the rated short circuit current of the system .The bus should be extendable and securely mechanically bonded to each unit with C.S.A not less than 150 mm2 or ٢٥٠ mm2 (as option according to … EDC requirements)

8-INSTRUMENT TRANSFORMERS

1. In Incoming cubicles C.T burden should be 10VA class 0.5 for measuring and 15VA class 5P10 for protection relays (The burden is achieved for both two ratios 400-800/5/5A).
2. In coupler cubicle C.T burden should be 10VA class 0.5 for measuring and 15VA class 5P10 for protection relay (The burden is achieved for both two ratios 600-1200/5/5A).
3. In Outgoing cubicles C.T burden should be 10VA class 0.5 for measuring and 15VA class 5P10 for protection relay (The burden is achieved for both two ratios 200-400/5/5A).
4. The winding of the instrument transformers should be made of copper.
5. Current transformers for each cubicle should be single phase dry type and capable of withstanding the rated short circuit current of 31.5 or 25KA (as option according to … EDC requirements) for 3 Sec at least at rated voltage. The current transformers should be interchangeable from lower ratio to higher ratio from the secondary side only of the current transformer
6. Potential transformers should be protected by suitable H.R.C fuses on the Primary side (value should be support with documents and calculations) and they should be single phase (withdrawable type as option) with the following ratios:
   $\frac{11000}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ 100 VA, cl 0.5 for first core and 30 VA, cl 3P for second core (Voltage factor 1.9 for 8 hrs. &1.2 continuous).

* In case of no need for open delta connection, the supplier should close it by a suitable

resistance (the resistance value should be mentioned with supporting documents) or by Smart Load relay that protect the VT against the ferro-resonant phenomenon by proper and prompt damping action without creating excessive power consumption during normal operation (option).

9- TECHNICAL SPECIFICATIONS

9.1. Incoming feeder panel

Each consists of:

The cubicle with three phase copper bus bars C.S.A. of 2×80×10 mm2 or 1×120×10 mm2 (as option according to … EDC requirements) as following**:**

- Vacuum or (sealed SF6 type circuit breaker as option according to … EDC requirements) 1250A, 31.5 or 25KA (as option according to … EDC requirements) for 3 Sec at least, 12KV, provided with motor operated 110VDC, or (magnetic actuator), with operating counter at the front.
- The operating sequence of C.B should be (O-0.3sec–CO-3min-CO) or (O-0.3sec–CO-15sec-CO).
- Closing time ≤ 60 ms.
- Opening time ≤ 50 ms.
- Low voltage plugs should be made of non-hygroscopic and non-flammable materials.
- Fixed isolating contacts.
- Three Single Phase current transformers 400-800/5/5A (10VA cl 0.5 for measuring & 15VA cl 5p10 for Protection).
- The name plate should be in the front.
- Three single phase (withdrawable type as option) potential transformers: $\frac{11000}{\sqrt{3}}/\frac{110}{\sqrt{3}}/\frac{110}{3}$ 100 VA, cl 0.5 for first core and 30 VA cl 3P for second core - (Voltage factor 1.9 for 8 hrs. & 1.2 continuous).
- In case of no need for open delta connection, the supplier should close it by a suitable resistance or by Smart Load relay that protect the VT against the ferro-resonant phenomenon by proper and prompt damping action without creating excessive power consumption during normal operation (option).
- Three suitable H.R.C fuses 12KV. (value should be support with documents and calculations)

- High speed earthing switch with spring should be capable to withstand the rated short circuit current 31.5 or 25K.A (as option according to … EDC requirements) for 1 Sec at least installed on the end cable side of current transformer not on the bus bar side and connected directly to the earth bar.
- Low voltage socket.
- Low voltage plug.
- Three ammeters digital programmable type with suitable scale, accuracy class 0.5 fed from power supply of 110VDC.
- One voltmeter with scale (0-12) KV and selector switch 7 positions, digital type with accuracy class 0.5 fed from power supply 110VDC.
- One D.C. status position indicator for the circuit breaker.
- One D.C. status position indicator for earthing switch getting the signals from two separate auxiliary switches for open and close position.
- One DC status position indicator in case of withdrawable P.T at secondary side getting the signals from two separate auxiliary switches for rack in and rack out position.
- Six indicating lamps (LED TYPE) (on - off - trip - CB service position - CB test position-Trip circuit supervision) - (red - green – yellow – red – green - yellow).
- Activate the function of trip circuit supervision (TCS) from the protective relay through binary input and indicate it through yellow indication lamp.
- Three push buttons (on – off - reset of protective relay) electrical.
- Lamps for voltage phases (Ll- L2- L3) (LED TYPE).
- Three surge arrestors (gap less metal oxide) 10KA, 12KV max. Continues operating voltage 10 KV± 5% (leakage path 2.5 cm/KV at least) installed in cable compartment or any other approved technology to overcome switching over voltage for cable feeders.
- One 3 phase combined directional and Non directional over current and earth fault protection relay according to the attached specifications.
- Two suitable space heaters (2×200 Watt), their capacities should be as required to maintain the compartment and unit internal temperature above the dew point, taking into consideration the specified environmental condition, one in cable compartment and the other in C.B compartment for each panel + Hygrostat with suitable m.c.b. very close to the heater place
- One flag relay with a reset push button for each of the following (D.C loss. - AC loss – insufficient gas (In case of using sealed SF6 C.B) - any M.C.B trip -protective relay

trip) and alarm.
- Reset by push button to reset the protective relay trip flag and the contact of protective relay.

9.2. Bus coupler panel

Consists of:

The cubicle with three phase copper bus C.S.A. 2×80×10 mm2 or 1×120×10 mm2 (as option according to … EDC requirements) as following:

- Vacuum or (sealed SF6 circuit breaker as option according to … EDC requirements) 1250A, 31.5 or 25KA (as option according to … EDC requirements) for 3 Sec at least, 12KV, provided with motor operated 110VDC, or (magnetic actuator), with operating counter at the front.
- The operating sequence of C.B should be (O-0.3sec–CO-3min-CO) or (O-0.3sec–CO-15sec-CO).
- Closing time ≤ 60 ms.
- Opening time ≤ 50 ms.
- Low voltage socket
- Fixed isolating contact
- Low voltage plug
- Three ammeters digital programmable type with suitable scale, with accuracy class 0.5 fed from power supply of 110VDC.
- One DC position indicator for the circuit breaker.
- One flag relay with a reset push button and alarm for each of the following (D.C loss. - AC loss – any M.C.B trip– insufficient gas (In case of using sealed SF6 C.B) - protective relay trip).
- Suitable space heaters (2×200 Watt), its capacity should be as required to maintain the compartment and unit internal temperature above the dew point, taking into consideration the specified environmental condition + Hygrostat with suitable m.c.b very close to the heater place + three phase MCB 32A, 10KA for the main supply of heaters.
- Six indicating lamps (LED TYPE) (on - off - trip - CB service position - CB test position-Trip circuit supervision) - (red - green - yellow – red – green - yellow).
- Activate the function of trip circuit supervision (TCS) from the protective relay through binary input and indicate it through yellow indication lamp.

- Three push buttons (on- off- reset of protective relay) electrical operation.
- One 3 phase combined directional and Non directional over current and earth fault protection relay according to the attached specifications.
- Reset by reset push button to reset the protective relay trip flag and the contact of protective relay.

9.3. Bus riser Panel Consists of:

The cubicle with three phase copper bus bars C.S.A. of 2×80×10 mm2 or 1×120×10 mm2 (as option according to … EDC requirements) as following:

- Three Current transformer 600-1200/5/5A (l0 VA cl 0.5 for measuring & 15VA cl 5 p10 for protection) with name plate at the front.
- One MCB four pole for low voltage 400 v AC.
- Two MCB 2 pole for dividing the auxiliary supply 110 V DC for each section.
- One horn fed from power supply 110VDC fitted on the riser cabinet to give alarm during the following cases:
  a. DC loss in any panel.
  b. Protection relays trip.
  c. Insufficient gas pressure. (In case of using sealed SF6 C.B)
  d. AC incoming feeder 11 KV loss for any incoming panel
  e. Any M.C.B trip

  The horn should be held by dual reset from push bottom and timer then a yellow lamp indicate the status of horn reset.

- Barriers should be fitted between bus riser and bus coupler

9.4. Outgoing feeder panels:

Each consists of:

The cubicle with three phase copper bus bars C.S.A. of 2×80×10 mm^2 or 1×120×10 mm2 (as option according to … EDC requirements) as following:

- Vacuum or (Sealed SF6 circuit breaker as option according to … EDC requirements), 1250A or 630A as …..EDC requirements, 31.5 or 25 KA(as option according to …

EDC requirements) for 3 Sec at least, 12KV, provided with motor operated 110VDC, or (magnetic actuator), with operating counter at the front.

- The operating sequence of C.B should be

(O-0.3sec–CO-3min-CO) or (O-0.3sec–CO-15sec-CO).

- Closing time ≤ 60 ms.
- Opening time ≤ 50 ms.
- Fixed isolating contacts.
- Three single phase current transformers 200-400/5/5 A (10VA cl 0.5 for measuring & 15VA cl 5 p10 for Protection), the name plate should be in the front.
- One high speed earthing switch with spring should be capable to withstand the rated short circuit current 31.5 or 25KA (as option according to … EDC requirements) for 1 Sec installed on the end cable side of current transformer not on the bus bar side and connected directly with the earth bus bar.
- Low voltage socket
- Low voltage plug.
- Three ammeters digital programmable type with suitable scale, accuracy class 0.5 fed from power supply of 110VDC.
- One D.C position indicator for the circuit breaker.
- One D.C position indicator for the earthing switch getting the signal from two separate auxiliary switches from the earth switch.
- Six indicating lamps (LED TYPE) (on - off - trip - CB service position - CB test position -Trip circuit supervision) - (red - green – yellow – red – green - yellow).
- Activate the function of trip circuit supervision (TCS) from the protective relay through binary input and indicate it through yellow indication lamp.
- Three push buttons (on- off- reset of protective relay) electrical operation.
- One 3 phase combined directional and Non directional over current and earth fault protection relay according to the attached specifications.
- Two suitable space heaters (2×200 Watt), its capacity should be as required to maintain the compartment and unit internal temperature above the dew point, taking into consideration the specified environmental condition, one in cable compartment and the other in C.B compartment for each panel + Hygrostat with suitable m.c.b. and fitted very close to the heater place
- One flag relay with reset push button and alarm for each of the following :

(D.C loss- any M.C.B trip - insufficient gas (In case of using SF6 sealed C.B) - protective relay trip).

- Reset by push button to reset the protective relay trip flag and the contact of protective relay.

❖ Notice:

- Smart Meters will be at every incoming & outgoing panel.
- The….EDC should attach the technical specification of the required smart meter.
- The Smart meter should be one of the approved types with the Egyptian Electricity Holding Company and meet all specifications of the unified smart meter specification for medium voltage applications **(code no.: EDMS 22-401-1)**

10-DESIGN CRITERIA

1. The switchboard should be consist of Metal Enclosed Classified LSC2B and Partition Class PM as per IEC62271-200 cubicles of air insulated switchgear withdrawable vacuum or (SF6 sealed C.B as option according to … EDC requirements).
2. Each cubicle should be built as a self-supporting structure from rolled steel sheets of 2.5mm thickness before paint at least or with a mechanical impact class not less than IK07and should support by certificate.
3. The width of the cubicle should not be less than 70 cm or according to … EDC requirements.
4. The cubicles should be bolted together.
5. Each cubicle should be divided into four sealed and isolated compartments: (The bus bar compartment, cable connection compartment, circuit-breaker compartment and a fully isolated low-voltage compartment).
6. When moving the circuit-breaker out from the operating position the primary fixed contacts coming from the other two compartments should be covered automatically by metallic (insulating material as option) safety shutters, complete compartmentalization should be maintained in all operating condition of switchgear.
7. Shutters should be open and close by mechanical operating mechanism. The mechanical operating mechanism should be latched mechanically in open position and not affected by Gravity when CB is in service and should be fully closed when circuit

breaker at test position.

8. Each compartment should be internally arc proofed (IAC AFLR 31.5 or 25KA as option according to … EDC requirements) for 1 Sec and should be provided with pressure relief.
9. Flipper circuit should be installed in each cell as a dedicated system for arc protection independent of the protection relay.
10. Electrical and Mechanical interlock will be between any incoming feeder panel for each section and coupler.
11. Mechanical interlock should be introduced against the following:
    A. Moving the truck with the circuit-breaker closed.
    B. Switching the circuit-breaker in any other position except the "Locked", "Operating", or "Test" position.
    C. Moving the C.B. into the "OPERATING" position with the low voltage plug disengaged.
    D. unplug CB LV Socket in case of CB in operating position
    E. Engaging the earthing-switch-with the C.B. in-the "OPERATING" position and moving the truck into this position with the earthing switch engaged.
    F. Opening of the C.B compartment door with the C.B in operating Position.
    G. Move CB into operating Position with CB Door Opened
    H. Opening of the cable compartment door with the earthing switch opened.
    I. Disconnecting Earthing Switch with the cable Door opened.
12. All metallic parts not carrying current should be connected to an earthing copper bus bar of suitable cross-sectional area. Earthing of circuit-breaker truck should be secured till it is completely moved outside its cubicle.
13. All equipments (push buttons– indicating lamps – sockets and plugs – terminal blocks for C.Ts & P.Ts and control …etc) should be made of hygroscopic and non-flammable material.
14. All the circuit carrying current parts of the switch board component should be made of high-grade copper, the windings of instrument transformer should be made of copper.
15. Cable connections should be put from the below rear or front of the cubicles arrangement should be enough for connection of three single phase aluminum cable of cross-sectional area up to 3x1x 500 mm^2 or 3x500 mm^2 to each incoming cubicle and the connection of three phase aluminum cable of different cross-sectional area up to 3x300 mm^2 for each outgoing cubicles.

16. Wiring of secondary circuits should be executed using 450/750 V non-flammable PVC-insulated Flexible copper conductors of cross-sectional area not less than the following:
    - Voltage circuits 1.5 mm^2 with opening slides terminal block
    - Current circuits 3 mm^2 with short circuits slides terminal block
    - Main heaters circuits 6 mm^2

Wiring Color code:

- [1] For CT & VT: R ph : Red - Y Ph: Yellow - B Ph – Blue - Neutral: Black. [2] For DC & AC: black. [3] Earth: green.
- Laser Printed: At both ends of wire with stated marking.
- Lugs: Tinned copper, pre-insulated, fork type and pin type as applicable.
- Circuit function letters: [1] CP: current wires for protection. [2]CM: current wires for metering. [3] V: 110 Vac wiring. [4] D: 110 Vdc wiring. [5] X: control wiring.

17. The secondary circuits of circuit-breaker should be connected by means of flexible copper wires into a flexible metallic conduit and by multi-pin plug and socket of suitable size.
18. The insulation of secondary circuit should be withstand at least a test voltage 1 KV, 50 c/s for 1 minute.
19. All relays should be of DC version i.e timing relays, auxiliary relays and tripping relays should be 110VDC operated.
20. All the contacts in the control, protection and signaling circuits should be properly selected to be capable to interrupt and switch on the currents flowing through them during their operation.
21. The voltage secondary circuits should be protected by suitable automatic M.C.B.
22. The universal motor should be protected by 2 pole MCB.
23. The metal enclosed structure should be treated against rust or anti rust material, and provided with priming, intermediate and finishing coats of electrostatic painting powder. The external coat is generally light grey color for required parts to be painted.
24. The instruments should be of flush type and mounted on hinged door at the front of each cubicle.
25. The switch board should be designed according to IEC62271-200 LSC2B to give maximum reliability and safety in service concerning operation, inspection and maintenance and all operations can be performed from panel front.
26. The switchboard has to be designed to be safe against spread of fire, formation of internal excessive pressure (each compartment should be provided with its own pressure relief device with the use of dedicated system for arc protection independent of

the protection relay), contact of live parts, ingress of dust and splashing liquid, thus degree of protection has to be not less than IP41.

27. Every incoming and outgoing feeder, cubicle should be equipped with a high speed earthing switch with spring with full making capacity 31.5 or 25 KA (as option according to … EDC requirements) for 1Sec and connected directly with the earth bus bar
28. The construction of switchboard and the C.B's should comply with these specifications and IEC62271-200, IEC62271-100.
29. The leakage path for fixing insulators, P.T's and C.T's and should not less than 22 cm.
30. The permissible (guaranteed) number of switching (ON/OFF) cycles of C.B's mechanism should be $\geq$ 10000 cycle.
31. The indicating lamps & push button should be heavy duty.
32. Indicating lamps (LED) for voltage phases (L1, L2, L3) should be fed from capacitive divider.
33. All measuring instrument should be digital type with range not less than 120 % of their nominal rating.
34. The meters should be supplied with their software and cables needed for communicate it with any computers.
35. All current transformers should be provided with a current continuous factor = 1.5

11-DRAWINGS AND CATALOGUES

The tenderer should be delivered with the offer a complete copy of outline drawings, single line diagram and a complete catalogue (and a wiring diagram at delivery) for each component containing the full technical data in order to allow complete study of his offer.

12-GUARANTEE TABLES

The tenderer should be filled in all the guarantee tables attached with these specifications accurately. The offer which will not be accompanied with a complete copy of drawings, catalogues and filling guarantee tables will not be considered.

13-MARKING

Marking of the cubicles and their components should be done according to IEC standards.

14-TESTING

a. Type tests should be as per IEC62271.
b. Routine tests:
   - Routine tests of all components should be carried out according to latest IEC standards by the manufacturer, a representative of Distribution Company will attend these tests before acceptance – (attached list of the routine tests to be carried out
   - Minimum Medium voltage switchgears checklist for routine tests according to ….EDC specifications and approved S.L.D (….EDC have the right to add any test during delivery to check the quality of the product):

Panel's Type:		Panel's Name	
DESCRIPTION OF TESTS		Pass(P) , Fail (F) , Un-completed (U) , Not available (NA)	
A	**IDENTITY CHECK/VISUAL CHECK**	الفحص الظاهري	**Evaluation**
1	**Nameplate of SWG**	تركيب ومراجعه لوحة البيانات	
2	**layout of SWG (Arrangement of cubicles, Type & dimensions of each c**	مراجعه الLayout(ترتيب الخلايا ، الابعاد ، .....)	
3	**Availability of components according to SLD and control drawing and specifications**	وجود المكونات باللوحه طبقا للرسومات والمواصفات (S.L.D) و (Control)	
4	**Installation of devices according the layout**	تركيب المكونات طبقا للرسومات (S.L.D) و Control)	
5	**revising of installation , ambient temperature and sheets thickness**	مراجعه الTechnical data (درجه الحراره ، سمك الصاج)	
6	**cross section of bus bars and thickness of sheet plate according to technical data and Addition**	وسمك الصاج طبقا للرسومات مساحه مقطع البارات والمواصفات	
7	**additions of busbars if required (Silver, tin-plated or insulated by raycha**	الاضافات (القصدره ، الريكم، التفضيض،،)	
8	**Verification of the earthing of the voltage transformers**	التأكيد من توصيل الارضى للمحولات الجهد	
9	**Check the painting for painted parts and the touch up necessity**	مراجعه جوده الدهانات و الTouch up	
10	**Earthing of doors and checking the strengh of**	التأكد من الرباط و التوصيل اسلاك الارضى على الضلف	

	earthing connetion		
11	**Earthing of devices and checking the earthing labels**	التأكد من الرباط و التوصيل اسلاك الارضى للأجهزه ومسمى الارضى	
12	**Easiness of reach to devices operated by customer**	سهوله وصول العميل للاجهزه التى يتم التعامل معها	
13	**Apparent quality of devices and components**	الجوده الظاهريه للاجهزة والمكونات	
14	**Completeness of accessories**	استكمال الاكسسوارات	
15	**Overall cleanliness inspection**	نظافه اللوحات	
16	**Completeness of labels according to S.L .D , control drawings and specifications**	استكمال المسميات طبقا للرسومات والمواصفات	
17	**Installation of the mimic diagram according to the drawings.**	مراجعة تركيب الرسم التخطيطى طبقا للرسومات	
18	**Alarm and horn operation**	التاكد من تشغيل وعمل دوائرالانذار	
19	**Certified copper quality and copper purity From an accredited laboratory**	شهادة معتمدة بجودة النحاس ونسبه نقاءة من معمل محايد	
B	**WIRING CHECK**	فحص الاسلاك	
1	**Completeness of control connection (wiring)**	استكمال اعمال الكنترول	
2	**Cable cross section according to control diagram suitability**	مساحه مقطع اسلاك الكنترول طبقا للتيار و رسومات الكنترول والمواصفات	
3	**Insulated wires are not laying at sharp edges or live parts**	عدم ملامسه الاسلاك للأجزاءالحاده و الكهرباء	
4	**Apparent quality of cables and wires' insulation**	الجوده الظاهريه للكابلات و العزل	
5	**Cables and wires are neat**	تنظيم الاسلاك	
6	**Flexibilty of wires**	مرونه الاسلاك	
7	**Numbering of wires and terminal blocks**	ترقيم الاسلاك و الروزيتات	
8	**Unity of cable terminals**	توحيد الترامل	

9	Verification of the strong connection of wires on terminal blocks	قوه تثبيت الاسلاك على الاجهزه و الروزيتات	
10	Color code of wires according to drawings	الالتزام بالوان الاسلاك طبقا للرسومات والمواصفات	
11	The conformity of auxiliary and control circuits to the circuits diagrams and wiring diagrams shall be checked	التحقق من مطابقة الدوائر المساعدة ودوائر التحكم رسومات الدوائر ورسومات الأسلاك	
C	MECHANICAL TESTS	الاختبارات الميكانيكية	
1	Mechanical operation of C.B in ON/OFF positions	التشغيل الميكانيكي في أوضاعon/off/triP	
2	Mechanical movement of CB in Test/Service positions	الحركه الميكانيكيه فى اوضاع(Test/Service)	
3	Easiness of the mechanical movement of the earthing socket	سهولة الحركة الميكانيكية لدخول يد السكين	
٤	Mechanical operation of earthing switches in ON/OFF positions	التشغيل الميكانيكيه للسكينة(on/off)	
٥	Mechanical interlock between C .B and door	الربط الميكانيكى بين القاطع والباب	
٦	Mechanical interlock between C.B and earthing switch	الربط الميكانيكى بين القاطع والسكينة	
٧	All mechanical parts work properly	جميع الاجزاء الميكانيكية تعمل بحالة جيدة	
٨	Fixing of devices ,C.B . ,contactors …etc. in the low voltage compartm	تثبيت المكونات	
٩	Doors function (hinges & locks….)	حركه الابواب و الضلف	
D	POWER FREQUENCY VOLTAGE WITHSTAND TEST		
	No flash over for 12 KV(28KV/MIN)	تحقيق عدم وجودSpark	
1	Main circuit L1 where L2&L3 are earthed	اختبار الفازة L1 وتوصيل بالارضىL2,L3	
2	Main circuit L2 where L1&L3 are earthed	اختبار الفازة L2 وتوصيل بالارضىL1,L3	
3	Main circuit L3 where L1&L2 are	اختبار الفازة L3 وتوصيل بالارضىL2,L1	

	earthed		
E	**ELECTRICAL TESTS**	الاختبارات الكهربيه	
1	**Electrical operation of C.B in ON/OFF positions**	تشغيل القاطع ON/OFF	
2	**Electrical operation of C.B in Test/Service positions**	تشغيل القاطع Test/Service فى وضع ON/OFF	
3	**Testing of control circuit devices according to the control diagram**	اختبار دائره الكنترول طبقا للرسومات	
4	**opportunity of devices with required control circuit (voltage/ampere/burden)**	مناسبه الاجهزه طبقا لدائره الكنترول (الفولت ، التيار، burden)	
5	**availability of devices protection with fuses/MCBs with suitable ratio**	وجود حمايه للأجهزه من خلال الفيوزات و المفاتيح بقيم مناسبه	
6	**availability of control circuits protection with fuses/MCBs with suitable**	وجود حمايه للدائره من خلال الفيوزات و المفاتيح بقيم مناسبه	
7	**function of control circuit according to the circuit diagram's proper d**	الوظيفه المطلوبه للدائره طبقا للتصميم الصحيح (تعديلات)	
8	**Protection relays and devices are parameterized/programmed**	برمجه اجهزه الكنترول و الوقايه	
9	**Verification of the protection relays functions**	تحقيق الحمايات المطلوبه من خلال اجهزه الوقايه	
10	**Check the signal list availability on the binary input of the protection relay**	التاكد من اتاحة واستقبال قائمة الاشارات بالمدخلات بأجهزة الوقاية	
11	**Testing of circuit breaker timing (close/open)**	اختبار زمن الفصل والتوصيل للقاطع	
12	**Measure and control all signals from the protection relays by mean of RTU**	قراءه وتحكم فى الأشارات الواصله لأجهزه الوقايه بواسطه وحده طرفيه (RTU)	
13	**Measuring the contact resistance of the circuit breaker**	قياس مقاومة التوصيل للقاطع	
14	**primary injection test for Current and voltage transformers (C.T's &V.T)**	الحقن الابتدائى لل(C.T's & V.T's)	
15	**Secondary injection test for protection relays and metering device**	الحقن الثانوى لأجهزه الوقايه و العدادات	

16	**Testing of heaters**	اختبار السخانات	
17	**Partial Discharge measurement (IEC61869-2/3)**	قياسات التفريغ الجزئي	
18	**Thickness of silver plate for connection point**	قياس سمك طبقة الفضه التي يتم طلاء نقاط التوصيل بها بالموزع	
19	**Measurement of conductivity resistance of the panel**	قياس مقاومه التوصيل للخليه	

N.B

In case of delivering C.B's of magnetic actuator type, it should be delivered two control module units for each switch board free price.

15-PROTECTION RELAYS

Protection for all cubicles (Incoming, Outgoing and Bus Coupler) should be through 3-phase combined directional and non-directional digital protection relay (over current + earth fault)

With timer in one unit connected to three single phase current transformers and three single phase voltage transformers of the protected object and suitable for resistance earthed neutral system fulfilling the following requirements and specifications:

1- General characteristics:-

1.1-The protection relay is based on a multiprocessor digital type.

1.2-The modern technology should be applied in both hardware and software solution.

1.3-The relay should be designed for protection against (O.C. & E.F & S.C) in parallel feeders from S/S to distribution board and for outgoing from distribution board to kiosk and include the following:

- The current unit should be supplied from 3-single phase current transformers ($I_R - I_S - I_T - I_N$)
- The voltage unit should be supplied from 3-single phase voltage transformers (11000 /√3/110/ √3 / 110/3) volt. ($V_R - V_S - V_T - V_0$)

- Nominal current I_n= 5A / 1 A , frequency 50 Hz
- Nominal voltage V_n (110-100) volt , frequency 50 Hz
- Reset factors $\geq$ 95%
- Operating temp. From -5 C° to +55 C°.
- Humidity > 90% non-condensation
- Auxiliary supply: (48-250 Vdc ± 10 %; 100-240 Vac ± 10 %) and should be able to operate without intended delay.
- Indication and Programmable LEDs
  - Each start and trip from every protection function should be clearly indicated.
  - It should also be possible to transfer the start and trip signals to the binary outputs if required.
  - It should be possible to transfer them to an upper level system via communication link.
  - The resetting of indications and alarm LEDs should be easy, preferably by pressing one button only.
  - Operation indication, with hand reset and automatic reset for tripping order and include one LED for each fault type and monitoring at least 4 programmable led besides LEDs of ready of protection and trip indication.
- Self-monitoring and blocking for internal faults with alarm contact and led indication.
- The relay should be flush mounted, having withdrawn out facility without removing wire connection or with withdrawable connectors with an automatic short-circuit mechanism in the CT connector. Therefore, detaching the plug-in unit will not open the secondary circuit of the CT which could cause dangerously high voltages.
- Special attention should be paid in minimizing the replacement time of a defective unit, preferably by means of ”plug-in” units. The relay should have full flexibility in terms of assigning any binary input and output signal to the internal logic circuits.

- Binary Inputs and Outputs
  - The number of inputs/outputs should be enough to interface the relay to the external circuits in order to enable the full use of the protection relay functionality excluding the dedicated relay internal fault output.

- The threshold voltage of the binary inputs should be settable using a dedicated parameter with rated voltage operating range of (48-250 Vdc ± 10 %; 100-240 Vac ± 10 %) supply with a threshold voltage of (16 to 176 ± 20% V AC/DC Supply).
- Grouping of binary inputs under a common ground potential is allowed, as far as more than one common ground potential is available.
- The inputs should be fully isolated from the protection relay internal circuits.
- It should be possible, by software, to freely assign the binary inputs and outputs to the protection relay internal function logic.
- A possibility to introduce simple logic functions in the form of AND and OR gates, including signal inversion, in front of the binary inputs and outputs should also be foreseen. As an example, a possibility to energize a binary output from a number of internal relay signals (OR gate) should be available.
- The numbers of the binary inputs should be 14 binary inputs at least

- Output contacts (Tripping contacts) (tripping contacts) should cover the following specification:
  - Rated voltage (250 V AC/DC) with ripple content (3-4) %.
  - Continuous carrying capacity 5 A DC.
  - Making and carrying current capacity for 0.5 sec $\geq$ 25 A.
  - Make and carry for 3.0 sec $\geq$ 10 A.
  - Free contacts at least (1 N.O for O.C & 1 N.O for E.F and 1 N.C for signaling).
  - Two trip contacts and two configurable contacts and one contact for relay healthy per relay
- Phase discontinuity protection for three phases
- Three-phase thermal protection
- The relay should have the inrush current blocking based on the second order harmonic percentage which can be used in all protection stages, without using multiplayer
- The relay should be of a numerical communicating type offering extensive protection, control and measuring functions in one enclosed unit.
- The relay should meet the latest revision of IEC publication 60255.
- The relay should meet standard Relays and Relays System ANSI C.37.90.
- All parameters and events can be set or read by P.C and manually by keypad
- Smaller dimensions preferred
- Tender should supply with offer detailed instruction and catalogue

- The relay should include event recorder and should be read by screen.
- Conductor broken from consumer (open circuit fault): 46 bc.
- Zero sequence ground
- Original software, firmware, plug connections to (PC and / or laptop) for all protection relays and test plugs should provide by the contractor.
- Continuous self-supervision and self-diagnosis of electronics and software
- User-selectable password protection for HMI
- Display of primary / secondary (current & voltage) values
- Housing degree of protection IP 52 according to IEC60529
- The relay should be supported by standard protocol IEC61850 (Edition 2)–and Modbus protocol.
- The protection relay basic design and data modeling should be based on the IEC61850 standard
- The relay should have four setting tables at least.
- Circuit breaker failure protection (0.1……..1) sec including C.B. time failure and S.C. function time
- Output contacts can be programmed by keypad and PC.

1.4-Standard tests

a. Insulation tests :

- Dielectric tests :

according to the IEC60225-27 or equivalent, tests voltage 1KV , 50 HZ, 60 sec.

- Impulse voltage test:

according to the IEC60225-27 or equivalent, tests voltage 5KV, unipolar impulses, waveform 1.2/50µs

- Insulation resistance measurements:

according to the IEC60225-27.

b. High frequency interference withstands:

According to class III IEC60225-5

c. Overload

- Current circuit temporary $\geq$ 60 In for 1.0 sec
- Polarization temporary $\geq$ 1.3 Ur max (Ur = 3 Uo)

d. Mechanical tests

- Vibration test (sinusoidal) according to the IEC60068-2-6 (test Fc) / IEC60255-21-1).
- Shock and bump test according to the IEC (test Ea shock) / IEC60068-2-27(test Eb bump) / IEC60255-21-2)

1. 5 The relay should be including the following protection

- I > Three-phase low-set over current stage with definite–time and inverse definite minimum time characteristic (IDMT)
- I >> Three-phase high-set over current stage with the instantaneous or definite time characteristic.
- Io > low-set non-directional earth –fault stage with definite-time or inverse definite minimum time characteristic (IDMT).
- Io >> High-set non-directional earth-fault stage with instantaneous or definite –time characteristic.8

2-Parameterization

The parameter can be set either locally over HMI or exeternally via the serial or RJ45 communication using relay software compatable with all new version of windows.

3-Nonvolatile memory

The protection relay should be equipped with a nonvolatile memory for preserving important data during auxiliary supply failure. The relay setting and programming should be stored in EEPROM. The memory does not need batteries, and a lifelong service is guaranteed and following data is stored:

- Date and Time
- Setting values
- Disturbance records
- Record last five fault data (with all fault parameters).
- At least, Last 50 events recorded
  - Recorded values are stored from start, trip and other important external input.
  - At least, the last 50 events that occurred before the auxiliary power supply breaks can be viewed in the HMI event buffer. Time and date for the events are also restored.
  - Disturbance recorder with the following features:

- Nonvolatile memory for disturbance records all data should be kept even for switch off D.C. power supply.
- Eight analogue channels for (Ia , Ib , Ic , Io) – (Va , Vb , Vc , Vo) .
- Eight digital channels at least.
- The relay should keep minimum of 5 records which can be stored.
- Recording time capacity ≥ 15 sec.
- Recording time up to three seconds duration for each storage fault.
- Pre event and post event recording and memory time adjustable.
  - Oscillography recorder: voltage and current waves should be recorded so that can be analyzed oscillography through PC for all abnormal.
  - Fault recording from prefault up to fault clearing stage with all electrical parameters.

4-The real-time clock

The relay should be supported by a real-time clock (RTC) with time synchronization facility which used for time stamping of events. It is also running during auxiliary power breaks.

When the supply is re-established, the relay sets the right time and new events are stamped accordingly.

All relays should be incorporated with all communication interfaces to enable time synchronization through satellite (GPS system).

5-Setting values and ranges

Nominal voltage (Un): 100-110 v, Fn: 50 HZ and In: 5 A / 1A.

Each protection function should be consisting of three separate settable stages covering wide setting ranges

The operation of the three stages should be settable to either definite time or inverse time mode supporting various type of inverse curves including user definable one

It should be possible to operate the directional stages in non-directional mode

5.1. Three-phase directional over current protection

- Setting current range : (0.05 -4) In , with steps≤ 0.05 In
- Start voltage: (2%) Un
- Operate time in DT mode : (0.05 : 3) sec with step ≤ 0.01 sec
- Basic angle φ (0 : 359° with step ≤ 5°) or (-90° : +90°)with Operation Direction (Forward & Reverse)
- Min. voltage of polarizing quantity for operation (sensitivity) should be ≤ 2% Un

5-2- Directional earth fault protection

- Setting current range : (0.01 : 0.6) In with steps ≤ 0.01 In
- Start voltage: (2%) Un
- Operate time in DT mode : (0.05 : 3 sec) with steps ≤ 0 .01 sec
- Basic angle φ (0 : 359°) at step ≤ 5° or (- 90° : + 90°) with Operation direction (Forward & Reverse)
- The polarizing quantity should be the zero-sequence voltage which the relay itself can reconstitute from the output voltage of the three single phase voltage transformers.

5-3- Three-phase non-directional over current protection

5-3-1- Current stages

- Low set over current I > (0.05 - 5) In with steps ≤ 0.05 In.
- High set over current I >> (0.1- 25) In with steps ≤ 0.05 In.

5-3-2 Operating time ranges

- Operating time in DT mode:(0.05-3)sec with step ≤ 0.01 sec
- Low set over current stage I > : (0.05- 3) sec with step ≤ 0.01 sec
- High set over current stage I >>: instantaneous or operating time (0–3) sec with step 0.01sec.

5-4- Non-directional earth fault protection

5-4-1- Current stages

- Low set earth fault Io > (0.01 – 0.6) In with steps ≤ 0.01 In.

- High set earth fault Io >> (0.1 - 10) In with steps ≤ 0.01 In.
- Sensitive earth fault: (0.005 - 0.5) In (option) by mean of core ring CT.

5-4-2-Operating time ranges

- Definite time
- Low set earth fault (0.05 – 3) sec with steps ≤ 0.01 sec.
- High set earth fault (0 – 3) sec with steps ≤ 0.05 sec.
- Sensitive earth fault (0-3) sec (option)

5-5- Voltage Protection

5-5-1- Over voltage stages U >

- Over voltage setting range : 60 : 150 % Un (with steps ≤ 2. 5% Un)
- Definite time characteristics :
  Operating time : 0.05:300 (With steps ≤ 0.05 sec.)

5-5-2- Under voltage stages U <

- Under voltage setting range : 30 : 120 % Un (with steps ≤ 2. 5% Un)
- Definite time characteristics :
  Operating time : 0.05: 300 (with steps ≤ 0.05 sec.)

6- Diagnosis and Supervision

6-1- Supervision function for energizing current input circuit.
6-2- Supervision function for energizing voltage input circuit.
6-3- Trip circuit supervision.
6-4- Self test diagnostic

7-Measurement

There should be measurements functions and indication in the relay HMI for analogue inputs (current and voltage) connected to the relay, as per the followings:

- Phase current.
- Residual current.
- Current sequence component.
- Three phase voltage phase and line voltages measurements.

- Residual voltage
- Voltage sequence component.
- Active Power, reactive power, total power, frequency and power factor.
- KWH and KVAR (Energy measurements)

8-Communications

Support a range of communication protocols including but not limited to:

- The IEC61850 communication protocol (Edition 2) + Modbus.
- Local communication (PC or Laptop through RS-232 (RJ45) or other))
- Remote communication (through two redundant ports Ethernet RJ-45) to be connect in loop (RSTP) + {(HSR) or (PRP)} with RTU (in the future).
- Communication between protection relays installed in each LV cabinets of MV cells to retrieve analog values (voltage/current) and available status through Digital Inputs.
- IEDs_will be connected in loop (RSTP) + {(HSR) or (PRP)} to communicate with RTU (in the future) over TCP/IP using IEC61850 and Modbus protocols.

16-SPARE PARTS (OPTIONAL)

Separate price of spare parts list should be delivered with the tender only original spare parts to be guaranteed by the tenderer.

Spare parts list should be offered as following:

1- One incoming circuit breaker complete with truck.
2- One out going circuit breaker complete with truck.
3- Three current transformer 200-400/5-5 A (as delivered).
4- Three current transformer 400-800/5-5 A (as delivered).
5- Three voltage transformers (as delivered).
6- One 3 pole earthing switch (as delivered).
7- (9) Digital Ammeter (as delivered).
8- One Digital voltmeter (as delivered).
9- Two combined directional & non direction (O.C+E.F+S.C) relay as delivered.
10-(6) Bus bar supporting insulators.
11-(6) H.V fuses for P.T (as delivered).
12-Two spring charging motor 110VDC (as delivered) or control module in case of magnetic actuator.

13-Two space heaters (as delivered).
14-Two tripping coils (as delivered) in case of spring charge motor C.B. type.
15-Two closing coils (as delivered) in case of spring charge motor C.B. type
16-Two Blocking coils for incoming cell (as delivered) in case of spring charge motor C.B. type
17-Two complete magnetic actuator units with three magnetic coils in case of magnetic actuator C.B. type (as delivered).
18-Six movable contacts of circuit breaker (as delivered)
19-Six fixed contacts of cubicle (as delivered)
20-Four flowerboxes (2 upper + 2 lower) (as delivered)

❖ Notice: the items from 3 to 20 should be delivered in suitable wooden container.

17-TRAINING (OPTIONAL)

….EDC reserves its right to claim a priceless training for (3) three of its representatives on the vendor's factory, site, lab or as per mutually agreed.
The training should include and not limited to the following:

1. Installation.
2. Testing & Commissioning.
3. Troubleshooting.
4. Operating and Maintenance.

18-AFTER SALE SERVICE (OPTIONAL)

The tenderer should have a licensed service center in Egypt covers all its deliverables.
….EDC reserves its right to claim a free after sale service all over the warranty period guaranteed by the tenderer that covers all its deliverables, after sale services should include and not limited to the following:

1. Technical support.
2. Maintenance.
3. Original Spare parts.
4. Submittals.

- All the services, spare parts, materials and accessories will be needed during the after-sale maintenance should be guaranteed by the tenderer immediately and wherever required (Warehouse – Site – Lab. ….etc.)

19-FACTORY VISITS & FABRICATION INSPECTION (OPTIONAL)

….EDC reserves its right to instruct the tenderer to arrange a priceless fabrication inspection and a factory visit for (3) of its representatives or as per mutually agreed to ensure the tenderer/vendor compliance with the tender.

20-THE FOLLOWING DATA (SERVICE TRANSFORMER + AC AND DC PANELS) CAN BE CHANGED DUE TO ...EDC REQUIREMENTS

Service Transformer Cubicle Panel as option according to …..EDC requirements:

The cubicle with copper bus-bars C.S.A. of 2×80×10 or 1×120×10 (as option according to …..EDC requirements) with the following:

- Air or sf6 load break switch 400 A with (H.R.C) fuse 10 A
- One earthing switch for earthing the end cable.
- Mechanically interlock should be provided.
- Position indicator for load break switch and the earthing switch
- One second thermal with stand current, r.m.s.:٢٥ K.A
- Dynamic with stand current:٦٢.٥ K.A

It's necessary to isolate each compartment and the front of panel in proper way.

Low voltage 0.4KV AC Distribution Cabinet (as option according To ....EDC requirements):

Made of sheet steel, Complete with copper bus-bar and all connections and consists of:

- Two for (incoming + outgoing) feeder (M.C.C.B):63A
- Two outgoing feeder (M.C.C.B):40A (both for lighting)
- One outgoing feeder (M.C.C.B):32A (as spare feeder)
- Three Digital Ammeter suitable class (0.5)
- Digital Voltmeter (500V) class (0.5) with digital selector switch 7positions, with indicating lamps.
- Alarm Circuit with Buzzer for dc loss
- Alarm Circuit and indication lamp with any m.c.b. Trip or 380 v absence
- One (3 phase) 4-wire digital meter, accuracy class 0.5 for active and 1 for reactive
- Three indication lamp (L1, L2, L3).

110 V D.C Distribution Cabinet (as option according To ....EDC requirements):

Made of sheet steel, Complete with copper bus-bar and all connections and consists of:

- One 2 pole miniatures circuit breaker 63 A

- Digital D.C. Ammeter (60A) class (0.5).
- Digital D.C. Voltmeter (150V) class (0.5), with indicating lamps d.c.
- One 2 pole miniatures circuit breaker 63A from battery
- Four 2 pole miniatures circuit breaker 32A.
- Alarm Circuit with horn for ac loss and any MCB trip.

٢١ - شروط هامة يجب مراعاتها فى جميع خلايا الموزع.

١. يجب ان لا يتغير وضع تشغيل قواطع الجهد المتوسط بخلايا الموزع (الفصل-التوصيل) في الحالات التالية:
   - فصل الجهد المستمر عن جميع خلايا الموزع.
   - فصل الجهد المستمر بأي خلية بالموزع.
   - فصل الجهد المستمر عن جهاز الوقاية بأي خلية.
   - عند إعادة توصيل الجهد المستمر للموزع.
   - عند إعادة توصيل الجهد المستمر لأي خلية.
   - عند إعادة توصيل الجهد المستمر لجهاز الوقاية بأي خلية.
٢. يجب أن يعمل الموزع يدويا وكهربيا وليس أتوماتيكيا مع مراعاة وجود الانترلوك بين خلايا الدخول وخلية الربط.
٣. يجب أن يتم تشغيل (توصيل وفصل) جميع القواطع (الخروج- الدخول – الربط بالموزع) يدويا وباب الخلية مغلق.
٤. يلزم عند فصل أحد مفتاحى الدخول التى تعمل بالتوازى بالموزع على قصر ألا يتأثر المفتاح الآخر ويكون تشغيل كل مفتاح دخول مستقل عن الآخر وذلك للحفاظ على إستمرارية التغذية عن طريق أحد خطى التوازي.
٥. يلزم توريد قطع الغيار الخاصة بكل موزع على حده في صندوق خشبي (البند من ٣ – 20 قطع الغيار) مدون عليه رقم الموزع.
٦. يلزم أن يتم توريد مشتملات تركيب كل موزع على حدة فى صندوق خشبى مدون عليه رقم الموزع.
٧. يجب أن تكون أجهزة الوقاية المستخدمة بالموزع قد سبق توريدها واستخدامها بشركات توزيع الكهرباء وأداؤها سليم بالموقع أما بالنسبة للأجهزة التي لم يسبق توريدها فيتم إختبارها من قطاع الوقاية المركزية وإعتمادها من الشركة القابضة للكهرباء مصر.
٨. يجب أن تكون أجهزة الوقاية لا تتأثر الذاكرة بها بفصل الجهد المساعد للتشغيل (DC volt).
٩. يجب تقديم عدد (٢) كتالوج أصلى للقواطع وأجهزة الوقاية والقياس ومحولات التيار والجهد والرسومات التنفيذية ودوائر الوقاية والقياس - عند التوريد.
١٠. ان تكون لمبات البيان ومفاتيح الفصل والتوصيل من النوع الذي يتحمل الخدمة الشاقة (من النوع LED).
١١. أن تكون تغذية جميع المهمات على واجهة أي خلية مباشرة من الروزتات داخل الخلية وبأسلاك كنترول مرنة بحيث تكون روزيته لكل سلك وعدم تركيب كباري (Bridges) بين المهمات (لمبات البيان المختلفة - مفاتيح التشغيل) على باب الخلية لتجنب ظاهرة غياب الجهد المستمر عن هذه المهمات.
١٢. تركيب مفتاح عمومي ثلاثي (M.C.B) للسخانات داخل خلية الربط وتقسيم الأحمال على كل وجه (Phase) مع تركيب مفتاح 2-pole لكل سخان داخل كل خلية لحماية السخان.

١٣. جميع الروزتات تصنع من مواد Halogen free غير قابلة الاشتعال.
١٤. يجب إن يتم تركيب ترامل مكبس لكل أسلاك الكنترول مع الترقيم.
١٥. يجب أن تكون الروزتات على الدوائر الثانوية لمحول تيار مكونة من مجموعتين الأولي للقياس والثانية للوقاية وتكون مزودة بوسيلة لقفلها في اي وقت لتغيير العدادات أو جهاز الوقاية.
١٦. يلزم أن تكون ألوان أسلاك محولات التيار مختلفة عن ألوان أسلاك محولات الجهد ومختلفة عن ألوان أسلاك دوائر الجهد المستمر DC.
١٧. ترقيم الروزتات بطريقة غير قابلة للمحو.
١٨. جميع الروزتات والترامل تصنع من نحاس عالي الجودة ويكون مطليا بالقصدير.
١٩. لكل موزع يجب توريد عدد ١ برنامج (software) نسخة تشغيل أصلية لأجهزة الوقاية المركبة بالموزع وعدد ١ حاسب شخصي متنقل حديث وكذا عدد ٤ كابل ربط بالحاسب الشخصي لكل موزع على أن يتم تدريب مهندسي الوقاية على استخدام برامج (software).
٢٠. (في حالة توريد موزعات cassette type) يتم توريد عدد ٤ تروللي لكل موزع لإخراج وإدخال القواطع وعدد ٤ مجموعات يد (دخول – خروج) القاطع وتعشيق سكينة الأرضي أثناء عملية الصيانة والمناورات.
٢١. يجب أن يكون التصميم الميكانيكي والكهربي لملفات الفصل والتوصيل بكل قاطع بالموزع محمي ذاتيا من الأتربة ولا يتأثر بها ولا يؤدي إلي زيادة زمن الفصل والتوصيل المقنن لاي قاطع.
٢٢. يجب أن يكون غطاء ظهر الخلية من الخلف مرقم ومكون من أكثر من جزء لسهولة التعامل مع المكونات الداخلية للخلية أثناء عملية الصيانة أو تغييرها أو إحلال بعض منها.
٢٣. يلزم مراجعة وضبط نهاية مشوار الدخول للمفاتيح مع النقاط الثابتة على البارة على أن يتم تركيب Shunt release أخر لضمان استكمال مشوار الفصل في حالة الحاجة لذلك.
٢٤. يجب ألا يفتح باب الخلية والمفتاح في وضع التشغيل.
٢٥. يجب أن يكون تصميم الموزع يحقق سهولة التعامل مع محولات التيار لاختبارها وكذلك محولات الجهد لسهولة تغيير فيوزاتها.
٢٦. يجب تاريض أبواب الخلايا وتأريض أجهزة القياس والوقاية من خلال باره الأرضى وليس من خلال جسم الموزع.
٢٧. يجب أن يتوافر بكل خلية بالموزع (دخول – خروج – ربط) روزتات منفصلة مجهزه كى يتم توصيلها مع التحكم الآلي من خلال اجهزه الوقايه على ان يتم توصيل الملامسات المساعده (auxiliary contact) و (limit switches) داخل القاطع والخليه من خلال الروزتات الخاصه بها للوصول للاوضاع التاليه وتوصيلها بجهاز الوقاية عن طريق ال binary input:

- وضع التوصيل للقاطع
- وضع الفصل للقاطع
- وضع التوصيل لسكينه الأرضى
- وضع الفصل لسكينه الأرضى
- وضع الخدمه للقاطع
- وضع الاختبار للقاطع
- وضع Flipper switch

- حاله وضع الجهد المساعد AC من محولات الجهد
- حاله الفصل لأي قاطع منمنم (MCB)
- حاله وضع سوسته الشحن
- حالة insufficient gas فى حاله sealed SF6 CB

٢٨. يجب عمل عدد ٤ فتحات بجميع الخلايا لإمرار عدد ٤ الخرطوم الحساس الخاص بالإطفاء التلقائي بغرف الباسبار لكابلات الكنترول بحيث يكون ارتفاع مستوى الخرطوم أعلى الباسبار وأعلى محولات التيار ١٢:١٠ سم أو تركيب نظام لإنهاء الشرارة الداخلية حال حدوث قصر داخل الموزع.

٢٩. يجب ان تقوم سكينة الارضى بجميع خلايا الخروج والدخول بالموزع بتأريض رؤوس الكابلات بكل خلية اى تأريض محولات التيار من جهة رؤوس الكابلات وليس جهة الباسبار.

٣٠. يجب أن تتم تجربة تشغيل خلايا الدخول والربط واختبار الانترلوك بينهما بدون وجود الجهد المتوسط على خلايا الدخول وذلك فى وضع الإختبار وفى وضع التشغيل.

٣١. يتم توريد عدد ١ وصلة كاملة (socket + plug) منفصلة للقاطع للاختبارات لكل موزع وبدون سعر.

٣٢. يتم تزويد عدد ٢٥ % (spare) من كل نوع من الروزتات المركبة بكل خلية مع تزويد ٢٥ % (space)إمكانية التزويد مستقبلا عند الحاجة. (اختياري)

٣٣. إمكانية الفصل والتوصيل من خلال جهاز الوقاية binary output + binary input

<u>بنود إضافية يلزم توافرها</u>

- فيما يخص ظهر الخلايا يلزم تقسيم صاج ظهر الخلايا إلى نصفين منفصلين جزء منهما يخص البارات وجزء يخص المحولات والكابل.
- يلزم تركيب بقاطع التيار second shunt release لضمان إستكمال مشوار الفصل
- يجب ضمان عدم توصيل المفتاح (يدوي أو كهربي) في حالة عدم استكمال مشوار دخول القاطع.
- لمبه بيان حالة لتوضيح حالة دخول المفتاح في وضع تشغيل ولمبة بيان حالة خروج المفتاح في وضع الاختبار.
- يلزم ترقيم الخلايا من الأمام والخلف بأرقام واضحة كبيرة.
- يلزم عمل جيب من الامام والخلف يوضع فيه اسم الخلية ويسمح باعادة التسمية.
- يلزم وجود عدد (٢) limit switch علي كل قاطع لبيان وضع المفتاح تشغيل او اختبار مع وجود عدد (٢) لمبة بيان لذلك.
- يلزم وجود عدد (٢) limit switch علي سكينة الارضي لبيان وضع السكينة مع وجود لمبة بيان لذلك
- يلزم وجود عدد (٢) limit switch لبيان وضع عربة محولات الجهد في حاله with drawable V.T. مع وجود لمبة بيان لذلك.
- يلزم تركيب لكل خلية مفتاح 2pole لكلا من charging motor, signaling, tripping and close كما يتم تركيب مفتاح 4 pole بكل خلية-دائرة محولات الجهد لامكانية تركيب العدادات.
- يتم وضع seloniod بخلايا الدخول يمنع توصيل سكينة الارضي أثناء وجود جهد علي كابلات الدخول.

- يلزم ان تكون الـ lables علي الاسلاك directional توضح From/To.
- يلزم إضافة وسيلة لفتح باب الخلية علي القاطع وسكينة الارضي أثناء وضع service في حالات الطواريء (Triggered).
- يلزم تركيب Test Blocks لدوائر التيار والجهد.
- يلزم أن يكون دوائر ال Interlock من خلال Blocking coil بخلايا الدخول وموصل القضبان
- يلزم أن تحتوى أجهزة الوقاية على خاصية Cold load pickup
- تمييز أسلاك دوائر التيار ودوائر الجهد بألوان مميزة وروزتات مميزه .
- يلزم عمل mimic diagram يوضح وضع القاطع ووضع سكينه الأرضى ووضع محولات الجهد.
- فى حاله غياب التغذيه من خلال من محولات الجهد (١١٠ فولت متغير) بدوائر الدخول من احد القاطعين باللوحه وتوصيل رابط القطبان يتم توفير استمراريه التغذيه من محولات الجهد من القطاع الثانى لجميع خلايا القطاع الأول.
- الربط بين البارات وبعضها تكون بنفس مساحه مقطع البارات وليس جزء منه
- يلزم عزل أذرع القواطع بوسيلة عزل مناسب (ريكم) أو غطاء عزل مناسب

- **يلزم مراجعه واعتماد الرسومات الخاصة بالموزع ودوائر الكنترول قبل التصنيع من قبل شركة توزيع الكهرباء.**

N.B:

1. Communication between protection relays installed in each LV cabinets of MV cells to retrieve analog values (voltage/current) and available status through Digital Inputs. IEDs (intelligent electronic devices) will be connected in loop (RSTP)+{(HSR) or (PRP)} to communicate with RTU (in the future) using IEC61850 protocols + and Modbus protocols.

2. The switch board should be supplied with ID panel with water proof cover on the front outer enclosure of each cell.

3. If the back door is opened while the panel is energized then, the alarm horn should be operated immediately with the circuit breaker trip and should not be switched on again locally or remotely until the back door is closed.

4. Operation instructions of the panel should be declared on a sticker on front door of each panel (in arabic)

22-OPTIONS LIST

The following table should be filled/attached by …EDC during tendering.

NO.	Option	Needed	Not Needed
1	Ambient temperature: 50°C		
2	C.S.A. of bus bar 2×80×10 mm^2		
3	C.S.A. of bus bar 1×120×10 mm^2		
4	C.B. Outgoing feeder panel 630A		
5	Sealed SF6 C.B.		
6	Potential transformers should be withdrawable type		
7	من كل نوع من الروزتات المركبة بكل خلية مع تزويد ٢٥ %(spare)تزويد عدد ٢٥ %(space)		
8	Sensitive earth fault function		
9	Spare Parts		
10	Training		
11	After sale Service		
12	Factory Visits & Fabrication Inspection		
13	One service transformer panel		
14	One AC Low Voltage Distribution Board		
15	One DC Voltage Distribution Board		
16	C S A for earth bus bar (150 mm2 or ٢٥٠ mm2)		
17	(X1) No. of incoming feeder panels……, (X2) No. of outgoing feeder panels…….		

23-SIGNAL LIST

….EDC reserves its right to Add/Delete or Modify/Rearranged signals according to operation requirements

Signal List for Medium voltage Switchgear

Items	Description	
Measurements		
3 phase currents	Analog signal from PR	Com. Link from protection relay
3 phase fault currents	Analog signal from PR	Com. Link from protection relay
3 phase voltages	Analog signal from PR	Com. Link from protection relay
Frequency	Analog signal from PR	Com. Link from protection relay
Power Factor	Analog signal from PR	Com. Link from protection relay
Active Power	Analog signal from PR	Com. Link from protection relay
Reactive Power	Analog signal from PR	Com. Link from protection relay
Active Energy	Analog signal from PR	Com. Link from protection relay
Reactive Energy	Analog signal from PR	Com. Link from protection relay
Others		
Status Indication		
CB ON Position	Digital input to PR	Com. Link from protection relay to RTU
CB OFF Position	Digital input to PR	Com. Link from protection relay to RTU
CB Test Position	Digital input to PR	Com. Link from protection relay to RTU
CB Service Position	Digital input to PR	Com. Link from protection relay to RTU
Earth Switch ON	Digital input to PR	Com. Link from protection relay to RTU
Earth Switching OFF	Digital input to PR	Com. Link from protection relay to RTU
Motor Spring Charged	Digital input to PR	Com. Link from protection relay to RTU
Commands		
CB Switching ON	Digital Output from PR	Com. Link to protection relay from RTU
CB Switching OFF	Digital Output from PR	Com. Link to protection relay from RTU
Alarms		
OC Trip	Digital Signal from PR	Com. Link from protection relay to RTU
DOC Trip	Digital Signal from PR	Com. Link from protection relay to RTU
EF Trip	Digital Signal from PR	Com. Link from protection relay to RTU
DEF Trip	Digital Signal from PR	Com. Link from protection relay to RTU
OV alarm	Digital Signal from PR	Com. Link from protection relay to RTU
UV alarm	Digital Signal from PR	Com. Link from protection relay to RTU
Protection Relay Faulty	Digital Signal	Hard Wire to RTU
DC Auxiliary Supply Loss	Digital Signal	Hard Wire to RTU
LV Auxiliary supply loss	Digital signal	Hard wire to RTU
VT Failure	Digital input to PR	Com. Link from protection relay to RTU
Flipper Trip	Digital input to PR	Com. Link from protection relay to RTU
Any MCB OFF or Tripped	Digital input to PR	Com. Link from protection relay to RTU
Insufficient SF6 Gas	Digital input to PR	Com. Link from protection relay to RTU
Feeder Common Alarm	Digital Signal	Hard Wire to RTU
Battery Charger Common Alarm	Digital Signal	Hard Wire to RTU

GUARANTEE TABLE NO. (1) / (EQUIPMENT DATA)

1- CUBICLES :-

Maker's name	……
Type	……
Rated voltage	……KV.
Insulation level at power frequency	……..KV
Basic impulse level	……..KV
Frequency	……HZ
Aux. Voltage	……V
Material	……
Thickness of sheet steel + IK degree	…… mm + IK ……
Dimensions: Width* Depth* Height	……mm *……mm *……..mm
Body color	……
Mimic diagram	……Yes / no.
Degree of protection (IP)	……

2- Environmental :-

Minimum ambient Temperature	……°C.
Maximum ambient Temperature	……°C
Maximum relative humidity	……%
Maximum altitude	……..m

3- MAIN BUS BARS :

Material	……
Copper purity	……..%
Copper Conductivity	……..MS/ m
Number and Size per phase	……/……mm x mm
Short circuit current (for 3 sec.)	…… KA.
Withstand impulse voltage (peak)	…… KV.
One minute A.C 50 c/s test voltage	…… KV.
Max. Allowable temp.	……..°C
Insulation by heat shrinkable tube (anti truck)	……Yes / no

4- CONNECTORS :-

Material	……
No. / size per phase	……/……mm x mm
Copper purity	…… %
Insulation by heat shrinkable tube (anti truck)	……Yes / no

5- EARTH BUS BAR :-

Cross section area	……mm* mm

We guarantee the data given above for the equipment offered

Signature: ……

Date: ……

GUARANTEE TABLE NO (2) / CIRCUIT BREAKERS. 12KV

1. Maker 's name ……
2- Standard specification ……
3- Type of (Vacuum or sealed sf6) ……
4- Type of main contacts:
   a- Fixed ……
   b- Moving ……
5- Rated voltage ……KV
6- normal current rating at 40°C ……A
7- Rated breaking capacity at normal operating voltage (for 3 sec) ……KA
8- Type of operating mechanism
   a- Closing ……
   b- Tripping ……
9- Closing time ……..…… m.Sec
10- Opening time ……..… m.Sec
11- Creapage distance of insulation ……cm
12- One-minute power frequency:
   - Withstand voltage rms …… K.V
13- 1.2/50 micro second impulse
   - Withstand voltage rms …… K.V
14- Weight of the breaker complete ……KG
15- Indication of C.B failure in switching off during fault ……
16- Tripping of C.B when moving from test to service and vice versa ……...
17- No. of auxiliary contacts for controlling, signaling& free contacts …… ……..
18- operation counter fixed on the circuit breaker not on the cover. ……
   YES/NO
19- Contact resistance/C.B. ……..µΩ
20- Thickness of silver plate for connection point ……µm

We guarantee the data given above for the equipment offered

Signature: ……
Date: ……

GUARANTEE TABLE NO. (3) / CURRENT TRANSFORMERS

1- **Maker's name** ……
2- **Type** ……
3- **Standard specification** ……
4- **Rated voltage** ……**KV.**
5- **Rated frequency** ……**HZ**
6- **Rated ratio :-**
   - **For incoming panels** ……**A**
   - **For coupler panel** ……**A**
   - **For outgoing panels** ……**A**
7- **Rated burden for:**
   a- **Measuring** ……**VA**
   b- **Protection** ……**VA**
8- **Accuracy class for :-**
   a. **Measuring** ……
   b. **Protection** ……
9- **Short circuit strength.**
   a- **For one second** ……**KA**
   b- **For three seconds** ……**KA**
10- **rated current factor and corresponding rated time** ……
11- **Power frequency withstand voltage r.m.s** ……**KV**
12- **Impulse test voltage 1.2/50,µs rms** ……**KV**
13- **Approximate weight** ……**Kg**
14- **Leakage path** ……**Cm**

We guarantee the data given above for the equipment offered

Signature: ……
Date: ……

GUARANTEE TABLE NO. (4) / POTENTIAL TRANSFORMERS

1- Maker's name / Type	……
2- Type (Fixed or withdrawable)	……
3- Standard specification	……
4- Rated voltage	……K. V.
5- Rated frequency	……HZ
6- Rated ratio	……
7- Rated burden	
a- First core	……VA
b- Second core	……VA
8- Accuracy class for:	
a. First core	……
b. Second core	……
9- rated voltage factor and corresponding rated time	……
10- Power frequency withstand voltage(r.m.s)	……K. V.
11- Impulse test voltage (1.2/50)µS (r.m.s)	……K. V.
12- Approximate weight	…… KGS
13- Leakage Path	……cm
14- Position indicator (in case of withdrawable V.T) :	……YES / NO

We guarantee the data given above for the equipment offered

Signature: ……

Date: ……

GUARANTEE TABLE NO. (5) / (Accessories)

1. **SURGE ARRESTERS :-**
   - . No. of surge arresters :
   - i. Nominal current …… KA.
   - ii. Max continuous operating voltage : …… KV.
   - iii. operating voltage : …… KV.
   - iv. leakage path : …… CM/ KV.
2. **HEATERS :-**
   - v. No. of heaters in each cubicle : …….....
   - vi. Rated power : …… watt.
   - vii. Hygrostat : ……YES / NO
   - viii. Rated current of m.c.b for each heater : …… A.
   - ix. Rated current of main m.c.b : …… A.
3. **Horn the bus coupler panel working in the following conditions :-**
   - x. DC loss in any panel. ……YES / NO
   - xi. AC loss in any incoming panel. ……YES / NO
   - xii. Protection relay trip. ……YES / NO
   - xiii. Any M.C.B trip. ……YES / NO
   - XIV. Insufficient gas (In case of SF6 C.B.) ……YES / NO

We guarantee the data given above for the equipment offered

Signature: ……

Date: ……

GUARANTEE TABLE NO. (6) / Measuring instrument

A. AMETERS :-

a. Type ……

b. Accuracy ……

c. Percentage of over range above normal rating ……%

B. VOLTMETER :-

a. Type ……

b. Accuracy ……

c. Selector switch 7 position YES / NO

d. Percentage of over range above normal rating ……%

We guarantee the data given above for the equipment offered

Signature: ……
Date: ……

GUARANTEE TABLE NO. (7) / AC, DC , SERVICE TRANSFORMER PANELS.

I. AC PANEL :-

a. NO of C.B and its ratings ……
b. Alarm Circuit and indication lamp with any m.c.b. Trip or 380 v absence YES/NO
c. Alarm Circuit with Buzzer for dc loss YES/NO
d. Three indication lamp (L1, L2, L3) YES/NO

II. DC PANEL :-

a. NO of C.B and its ratings ……
b. Alarm Circuit with horn for ac loss and any MCB tri Yes / no

II. SERVICE TRANSFORMER PANEL :-

a. Type of load break switch Air / sf6
b. Rated ……
c. (H.R.C) fuse ……A
d. One second thermal with stand current, r.m.s ……
e. Dynamic with stand current ……

We guarantee the data given above for the equipment offered

Signature: ……

Date: ……

GUARANTEE TABLE NO. (8) / PROTECTIVE RELAYS.

DESCRIPTION:

1-	Maker 's name	……
2-	Country of manufacture	
3-	Type and designation	……
4-	Standard specification with which relay complies	……
5-	Relays characteristics	……
6-	Range of relay setting	I……(A) ……T…..(Sec)
7-	Current rating of relay coil	……
8-	Voltage rating of relay coil	……
9-	range of Auxiliary supply	……DC
10-	Relay order number	……..
11-	Standard reconfiguration functionality	……
12-	The relay should meet the latest revision of IEC publication 60255.	YES/NO
13-	The protection relay basic design and data modelling should be based on the IEC61850 standard	YES/NO YES/NO
14-	Circuit breaker failure protection (0.1……..1) sec including C.B. time failure and S.C. function time	YES/NO
15-	(intelligent electronic devices) will be connected in loop (RSTP) + {(HSR) or (PRP)} to communicate with RTU over TCP/IP using IEC61850 and MODBUS protocol .	

We guarantee the data given above for the equipment offered

Signature: ……

Date: ……