

POWER GRID BANGLADESH PLC

BIDDING DOCUMENT FOR

Design, Supply, Installation, Testing and Commissioning of 400 kV Transformer Bay and 230 kV Transmission Line Diameter Extension at Kaliakoir Substation

SCHEDULE A

INTRODUCTION & PREAMBLE TO THE PRICE & TECHNICAL SCHEDULES

BRIEF DESCRIPTION OF THE WORKS

The bidder shall be deemed to have visited the site, inspected, gathered data and verified details of the as-built system in order to design, supply and interface their new equipment. All necessary materials, adjustments, dismantling, remedial and tidying-up work in order to complete the work specified shall be included in the contract price. The contractor is responsible for ensuring that all and/or any item(s) of work required for the safe, efficient and satisfactory completion and functioning of the works, are included in the Bid Price whether they be described in the specification or not.

The scope of works under this contract is: design, supply, manufacture, quality assurance, inspection and testing, delivery, new packing for export, insurance, shipment & transport to the site, complete construction and installation, jointing, terminating, bonding, earthing, painting, setting to work, site testing and commissioning, defect liability for all equipment, including all civil works of 400/230/132kV AIS substation.

All necessary works have to be included in the contract price, including all kinds of dismantling works, if any.

The civil design has to incorporate counter measures against flooding so as not to affect any substation equipment during the wet season. Given the recorded past maximum flood water level in the project area, sufficient ground level height for land formation is required at the Contractor's responsibility.

The Bidders are advised to conduct site visits, to inform themselves and to carry out their own assessment on all concerned sites according to their needs before the submission of their bids. The Employer may arrange necessary permission, if required by the Bidders.



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The geotechnical studies and soil investigations are in the Contractor's scope of work.

The Civil Design and backfilling have to consider and incorporate protection measures against flooding. The sufficient ground level height for land formation is required at the Contractor's responsibility and will be subject to the Employer's approval. Finishing Ground Level (FGL) shall be at least 500 mm above the Highest Flooding Level (HFL). The Bidders has to inform themselves about the HFL.

Generally, land development of new substation shall be made for the total substation area and perimeter wall shall be made for the total substation area.

The Contractor's responsibility is to provide that all parts of the works be completed in every respect for commercial operation, to the requirements of the Engineer.

All details, accessories etc. required for the complete installation and satisfactory operation of the works not specifically mentioned in this specification are deemed included in the contract price.

In case of extension and renovation works, not all required as-built drawings may be available for the existing plant and equipment, which required modification/renovation; the Contractor is also responsible to make drawings as required to complete the works.

The drawings provided in the bidding documents are indicative only and hence do not reflect the entire scope of works. The Bidder has to consider all Tender drawings as preliminary and for Tender purpose only. The drawings may be changed at the time of execution. All dimensions are preliminary and general. Not all equipment is shown on the drawings. Details are not shown at all. The Contractor has to do Engineering and to provide detailed calculation, detailed design and detailed drawings of the complete facilities, which will be subject of the Employer's approval.

The Bidder is deemed to have visited the site, inspected, gathered data and verified details of the as-built system in order to design, supply and interface their new equipment. All necessary materials, adjustments, dismantling, remedial and tidying-up work in order to complete the work specified shall be included in the contract price

The other ends of Transmission Lines (if any) have to be covered from the tele-communication point of view under the scope of this contract. All equipment and services have to be provided

All necessary materials, adjustments, dismantling, remedial and tidying-up work in order to complete the work specified shall be included in the contract price.

The bid price shall include supply and delivery of mandatory spare parts.

The bid price shall include all other miscellaneous works required.

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The programme of works shall be as shown in Schedule C - Times for Delivery and Completion. Within one month of acceptance of the bid, the Contractor shall submit a programme chart detailing times required for the design, supply, delivery, installation, testing and commissioning for the complete work.

The "Schedule of Requirements" for equipment, materials and services and the guaranteed technical particulars of equipment and materials will be stated in Schedule A of this bidding document shall be read in conjunction with the detailed technical specifications of equipment and materials described in Volume 2 of the bidding documents.

The "Price Schedule" for equipment, materials and services will be stated in Schedule B of this bidding document, and shall be read in conjunction with the detailed technical specifications of equipment and materials described in Volume 2 of the bidding documents

The scope of work comprises the following: -

DESCRIPTION OF WORKS

1. Kaliakoir 400/230/132kV AIS Substation

The scope of work under this Bid is design, supply, delivery, installation, testing & commissioning of one (01) new outdoor type 400kV AIS bay extension and one (01) new outdoor type 230kV AIS diameter extension at existing 400/230/132kV Kaliakoir grid substation. The configuration of existing 400kV and 230kV busbar is one and half scheme.

The scope of work also includes associated control, protection, fiber optic multiplexer equipment for communication & protection, substation automation, digital fault & disturbance recorder (DFDR), station power facilities, associated civil works for accommodating protection and control IEDs and associated equipment including towers and gantry structures, switchyard panel room, local control kiosks, cable trenches, internal roads and all other necessary substation facilities and supply of mandatory spare parts and maintenance & special tools.

The "Schedule of Requirements" for equipment, materials and services and the detailed technical specifications of equipment and materials of the Bidding Document shall be read in conjunction with the scope of work described herein. The drawings provided in the Bidding Document are indicative only and hence the entire scope of work is not fully reflected in those drawings.

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SCHEDULE A

REQUIREMENTS

Section-I Kaliakoir 400/230/132kV AIS Substation

The equipment to be designed, supplied, installed, tested & commissioned as stipulated in bid specification, shown in bid drawings (Volume 2 of 3), and other technical requirements as described in volume 3 of 3.

Item	Description
1A1	420 kV Air Insulated Switchgear (AIS)
1A1.1	One (1) set of 420kV, 4000A, 50kA/1sec, 50Hz, 1425kVp BIL, live tank type, single pole operated, SF6 gas circuit breakers with spring-stored energy operating mechanism with PIR or CSD as phase switching mechanism with support structure. (Only for Installation & Commissioning works)
1A1.2	One (1) set of 420kV, 4000A, 50kA/1sec, 50Hz, 1425kVp BIL, horizontal double break, post type, motor operated disconnectors with motor/manual operated earthing switch.
1A1.3	Two (2) sets of 420kV, 4000A, 50kA/1sec, 50Hz, 1425kVp BIL, horizontal double break, post type, motor operated disconnectors without earthing switch.
1A1.4	Three (3) nos of single-phase, 6-core, 400kV, 50kA/1sec, 4000-2000/1A, 50Hz, 1425kVp BIL, post type current transformer. [Actual Burden shall be finalized at execution time based on sizing calculation. Accuracy & VA shall have to be defined for all ratio].
1A1.5	Three (3) nos of single-phase, 3-core, 400kV, 50Hz, 1425kVp BIL, capacitor type voltage transformer (Only for Installation & Commissioning works) [Actual Burden shall be finalized at execution time based on sizing calculation. Accuracy & VA shall have to be defined for all ratio].
1A1.6	Three (3) nos of 390kV rated voltage, 312kV(rms) continuous operating voltage at 50°C, 10kA nominal discharge current, 50Hz, Heavy duty station class, gapless metal oxide type, single phase surge arresters. (Only for Installation & Commissioning works)




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- 1A1.7 Fifteen (15) nos of post type support insulators for 400kV busbar and switchgear.
- 1A1.8 One (1) lot of rigid tubular bus and/or flexible conductors, insulators, fittings including all necessary clamps and connectors required for completing extension of 400kV AIS Switchyard.
- 1A1.9 One (1) lot of steel structures for equipment supports required for completing extension of 400kV switchyard as specified in the technical specifications and bid drawings.

1B 230kV Air Insulated Switchgear (AIS)

- 1B1 Three (3) sets of 230kV, 3150A, 50kA/1sec, 50Hz, 1050kVp BIL, live tank type, single-pole operated, SF6 gas circuit breakers with spring-stored energy operating mechanism. (Only for Installation & Commissioning works)
- 1B2 Three (3) sets of 230kV, 3150A, 50kA/1sec, 50Hz, 1050kVp BIL horizontal double break, post type, motor operated disconnectors with motor-operated earthing switch.
- 1B3 Six (6) sets of 230kV, 3150A, 50kA/1sec, 50Hz, 1050kVp BIL, horizontal double break, post type, motor operated disconnectors without earthing switch.
- 1B4 Twelve (12) nos of Single-phase, 5-core, 230kV, 50kA/1sec, 3000-1500/1A, 50Hz, 1050kVp BIL post type current transformer.
[Actual Burden shall be finalized at execution time based on sizing calculation. Accuracy & VA shall have to be defined for all ratio].
- 1B5 Nine (9) nos of Single-phase, 3-core, 230kV, 50Hz, 1050kVp BIL, capacitor type voltage transformers. (Only for Installation & Commissioning works)
[Actual Burden shall be finalized at execution time based on sizing calculation. Accuracy & VA shall have to be defined for all ratio].
- 1B6 Twelve (12) nos of 198kV rated voltage, 158kV(rms) continuous operating voltage at 50°C, 10kA nominal discharge current, 50Hz, Heavy duty station class, gapless metal oxide type, single phase surge arresters. (Only for Installation & Commissioning works)

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- 1B7 Thirty-Six (36) nos 230kV post type support insulators required for completing 230kV busbar and switchgear as specified in the technical specifications and bid drawings
- 1B8 One (1) lot of rigid tubular bus [Aluminium of grade 63401 WP], flexible conductors, insulators, fittings including all necessary clamps and connectors required for completing 230kV busbar and switchgear connection as specified in the technical specifications and bid drawings. Bus capacity shall be minimum 4000A/50kA/1s. Existing Bus is Aluminium Tube with outer dia. 160mm.
- 1B9 One (1) lot of steel structures for gantry and equipment supports required for completing 230kV busbar and switchgear as specified in the technical specifications and bid drawings.

1C Power Transformers & Earthing/Auxiliary Transformers

- 1C1 Auxiliary/ Earthing transformer 33/0.415kV, 300kVA: to be supplied by power grid. But its installation, 33kV & 415V connection to it, including 33kV CT, PT, LA, CB, DS/DES & other 33kV & 415V equipment as required; necessary 33kV and 415V cables/conductors, LVAC panels as required, including incoming & outgoing feeder breakers (Nos. to be fixed at design stage), busbars and full LVAC panel arrangements shall be under this project scope.
- The primary side (33kV) of this Auxiliary/ Earthing transformer shall be connected from the tertiary side (33kV) of the existing 400/132kV, 325MVA Auto-Transformer-2, and the location of installation of this Auxiliary/ Earthing transformer shall be in close proximity to the adjacent Auxiliary/ Earthing transformer or in the free/available space beside the 132kV SPR. Modifications (if needed) of the existing arrangements 33kV switchgears (33kV switchgears that are arranged from the existing 400/132kV transformer's tertiary side to be connected with the auxiliary transformer) shall be under the scope of this project. Location of LVAC shall be in the 132kV SPR, and location of LVDC, including 1 set 110V battery system, shall be in the 400kV SPR.
- 1C2 Necessary grounding arrangements for the tertiary 33kV side of the 400/230/33kV, 520MVA Transformer (project scope), including 33kV LA, PT, and other necessary conductor/clamp-connectors.
- Technical assessment/ study shall be done for this tertiary connection/grounding arrangements, including PT, LA etc., to conform that such arrangements shall be technically sound while operating the 400/230/33kV, 520MVA Power Transformer, without connecting it to any earthing/zigzag transformer.

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1D Control, Protection, Monitoring, Substation Automation & Metering

The equipment to be supplied, installed and commissioned is shown in bid drawings are comprising of:-

400 kV Circuits

(Note: Manufacturer of existing CRP, BBP & SAS: HITACHI, DFDR: Qualitrol)

- 1D1 One (1) lot of configuration/modification of existing Control Panel for 400/230kV, 520MVA Power Transformer bay with required accessories and materials.
One BCU and Two Nos. CSD (one for mid/tie CB & other for Bus CB) will be supplied, installed and commissioned. CSD Relay to be compatible with Bus CB & Tie CB models.
- 1D1.1 One (1) lot of configuration/modification Relay Panel for 400/230kV, 520MVA Power Transformer bay. Required accessories and materials shall be supplied to complete the Protection functionality as per Power Grid Bangladesh Standard.
- 1D2 One (1) set of modification / extension of Busbar Protection including all necessary requirements.
- 1D3 One (1) lot of Tarif metering: Energy Meters (Main & Check) total 2 nos with panel

245kV Circuits

(Note: Manufacturer of existing CRP, BBP & SAS: HITACHI, DFDR: Qualitrol)

- 1D4 Two (2) sets of Control, Monitoring, Protection (Main-1 & Main-2 relay) & Substation Automation Facility including event recording function for 230KV circuits line bays.
- 1D5 One (1) set of upgradation/modification of existing CRP Panel of line feeder to use as a 230kV incomer bays of 400/230kV Transformer and to integrate SAS system.
- 1D6 One (1) lot of renovation/extension of existing Busbar protection for 230kV system.
- 1D7 One (1) lot of Tarif metering: Energy Meters (Main & Check) total 6 nos with panel.

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- 1D8 One (1) lot of extension of the existing Substation Automation System integration, including all necessary requirements.
- 1E One (1) lot of Digital Fault & Disturbance Recorder (Modification/Extension) including all necessary requirements.
- 1F **SCADA system for Telecontrol and Telemetry**
- 1F1 One (1) lot of modification/extension of SCADA hardware & software including all necessary requirements to provide the telecontrol & telemetry facilities required at the existing National Load Despatch Center (NLDC) at Rampura and backup National Load Despatch Center (BNLDC) at Siddirganj for integration of new 400kV and 230kV bays in Kaliakoir grid substation. All required electrical signals (as per signal list provided by SCADA Division) shall be integrated to SAS and transmitted to the NLDC through the Gateway of the substation. All HV breakers, motorized disconnectors etc. shall be controlled from NLDC through the Gateway of the substation using IEC 60870-5-104 protocol. **All necessary modification works in the software of the master station of NLDC are to be carried out.**
- 1G **One (1) lot of extension of Fibre Optic Multiplexer Equipment (FOME) and PLC equipment for communication and protection.**
(Note: Manufacturer of existing FOME/FOTE: HITACHI
Existing Tele-protection of Aminbazar/Birulia to kaliakoir: active with FOX 615, extension shall be done accordingly to match with Aminbazar/Birulia SS Tele-protection equipment)
- 1H **Power Cables**
- 1H1 2000 mm², 245 kV, 50kA/ 1 sec, 50Hz, 1,050/460 kV BIL, single phase XLPE cable. Four phases cable shall be laid of which one phase as spare. The quantity of XLPE cable mentioned on the price schedule is the single core cable length and may be varied and it will be finalized during detail engineering.
- 1H1 Eight (8) nos of 245 kV, 50kA/ 1 sec, 50Hz, 1050/460 kV BIL, cable terminal end & associated support structures suitable for 2000 sqmm single phase XLPE cable.
- 1I **Multicore Cables**
- 1I1 One (1) lot complete set of multicore low voltage XLPE insulated power and control cables (IEC 60502) shall be supplied, installed, landed, terminated and

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have individual cores identified to be used for connection of all equipment supplied under the Contract. The overall substation cable routing and core schedules shall also be provided. Necessary Sizing calculation shall have to be submitted for approval during the execution stage. The Bidder may use a fully computerized system for rating and routing of cables.

1J Earthing and Lightning Protection

1J1 One (1) lot of design, supply and installation of extension of earthing system for all new bays, 400/230/33kV 520MVA Transformer and SPR with necessary connectors and clamps, with design to suit the work under this contract arrangement. Calculation and GPR shall have to be shown using software like CYMGRD.

1J2 One (1) lot of design, supply and installation of lightning protection screen and lightning must (wherever needed) for new bays, 400/230/33kV 520MVA Transformer and SPR with necessary connectors and clamps, with design to suit the work under this project. Supporting calculation shall have to be shown in the Rolling Sphere method.

1K Batteries, Chargers and DC Distribution

1K1 a) One (1) lot of extension of 110 V DC distribution panels & others at 230kV new SPR and new DCDB panel to be supplied at 400kV SPR so as to be integrated with the newly supplied 110V battery system therein.

LVDC sub-distribution board (SDB) with at least 20 MCB/MCCB shall be supplied, installed and commissioned at new 230kV SPR to be constructed under this project. Source Connection of this SDB shall be from new LVDC panel to be supplied under this project (at 400kV SPR)

The DC distribution board shall be with overall spare switches for future use. All DC status excluding (DC voltage status for each bus including coupling breaker on/off status, fail with alarm, status of DC MCB/MCCB at SPR with fail alarm etc.) control & protection shall be incorporated in the substation automation system.

b) i. One (1) set of 110V Battery Banks, capacity shall not be less than 400Ah, M-Class, at the 5-hour rate of discharge.

During the execution stage the battery capacity shall be confirmed with calculation by the contractor considering international standards for the bays under scope of work and future bays as per of Volume 2 of 3 of the bidding document. The battery with higher capability if required after calculation shall be supplied by the Contractor within the same Contract price.

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ii. One (1) set of battery chargers complete, each charger shall not be less than 150A rating and input voltage three phase 50Hz, 415V AC.

The charger rating shall be based on the load & boost charging rate and during execution stage after calculation if the higher charging charger is found to be required, it shall be supplied by the Contractor within the same Contract price.

Model of the charger shall be compatible with the existing charger that is used to charge other battery set, complementary to battery set to be supplied under this contract.

1K2 One (1) lot of extension of 48V DC distribution panels & others / new DCDB panel. The DC distribution board shall be with overall spare switches for future use. All DC status including (DC voltage status for each bus including coupling breaker on/off status, fail with alarm, status of DC MCB/MCCB at SPR with fail alarm etc.) control & protection shall be incorporated in the substation automation system.

1L LVAC Distribution

1L1 One (1) lot of extension of LVAC switchboard for substation services to be supplied, installed and commissioned, to provide the 415/240V supplies to all equipment being supplied under this Bid.

LVAC sub-distribution board (SDB) with at least 20 MCB/MCCB shall be supplied, installed and commissioned at new 230kV SPR to be constructed under this project. Source Connection of this SDB shall be from new LVAC panel to be supplied under this project (3rd Aux. Transformer)

All AC status including control & protection (AC voltage status for each bus including coupling breaker on/off status, fail with alarm, status of AC MCB/MCCB at SPR with fail alarm etc.) shall be incorporated in the substation automation system.

1M Civil Works, Building and Foundation

1M1 One (1) lot of complete design, supply and construction of all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, internal roads, cable trenches, surfacing, drainage, gravel laying etc.

1M2 One (1) lot of complete design, supply and construction of all civil items and facilities required for a new one storied switchyard panel room in 230kV switchyard and modification works for Control Room and SPR room as necessary for 400kV & 230kV system.

1M3 Testing of pile Compression & uplift on random basis.

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1N Lighting, Small Power, Air Conditioning and Ventilation

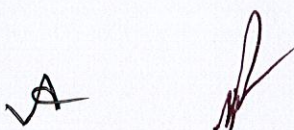
1N1 One (1) lot of complete design, supply, installation and commissioning of equipment to provide lighting, LV power supply, air conditioning system, ventilation system and emergency DC lighting system for new local control houses/SPRs. Necessary Sizing calculation with software shall have to be submitted for approval during the execution stage except for the air conditioning system.

Minimum requirement of air conditioning system capacity shall be 1Ton/80 sqft. Each air conditioner unit for the control room and SPR room shall not be less than 5 Ton and for other rooms (Office/archive/prayer) shall not be less than 2 Ton. **The air conditioning system shall be of industrial grade, cassette type and inverter system. Such Provision shall be made available that the Air Conditioning Device shall be remotely monitored & controlled. (vol 2 sec 13.30).**

1N2 One (1) lot of complete set of design, supply, installation and commissioning of equipment to provide lighting for security, roadway, switchyard and emergency DC lighting system at strategic locations for equipment operation and inspection. Necessary Sizing calculation with software shall have to be submitted for approval during the execution stage.

1O Transportation of Equipment

1O1 Transportation of Item no: 1A1.1, 1A1.5, 1A1.6, 1B1, 1B5, 1B6.

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Attachment-4.1

Source point from where the transportation shall be arranged for the equipment mentioned in item no. 1O is given below -

Item No.	Item Description	Quantity	Source Point (substation/store location)
1A1.1	420kV, 4000A, 50kA/1sec, 50Hz, 1425kVp BIL, live tank type, single pole operated , SF6 gas circuit breakers with spring-stored energy operating mechanism with PIR or CSD as phase switching mechanism with support structure	1 Set	Kaliakoir 400kV S/S- 1 Set
1A1.5	Single-phase, 3-core, 400kV, 50Hz, 1425kVp BIL, capacitor type voltage transformer.	3 Nos.	Kaliakoir 400kV S/S- 3 Nos.
1A1.6	390kV rated voltage, 312kV(rms) continuous operating voltage at 50°C 10kA nominal discharge current, 50Hz, Heavy duty station class, gapless metal oxide type, single phase surge arresters.	3 Nos.	400kV Gopalganj S/S, Grid Circle Khulna- 3Nos.
1B1	230kV, 3150A, 50kA/1sec, 50Hz, 1425kVp BIL, live tank type, single-pole operation, SF6 gas circuit breakers with spring-stored energy operating mechanism	3 Sets	Hathazari S/S- 3 sets
1B5	Single-phase, 3-core, 230kV, 50Hz, 1425kVp BIL, capacitor type voltage transformers.	9 Nos.	Hathazari S/S- 6 nos
			Kaliakoir 400kV S/S- 3 Nos.
1B6	198kV rated voltage, 158kV(rms) continuous operating voltage at 50°C 10kA nominal discharge current, 50Hz, Heavy duty station class, gapless metal oxide type, single phase surge arresters.	12 Nos.	Aminbazar S/S- 12 Nos.

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