POWER GRID COMPANY OF BANGLADESH LIMITED

BIDDING DOCUMENT
FOR
PROCUREMENT OF

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

(Contract No. PGCB/SS/132/MNK_TNG)

VOLUME 3 OF 3

Issued on : November 14, 2017
Invitation for Bids No. : PGCB/Sec(SSD & QC)/2017/7143
Employer : Power Grid Company of Bangladesh Limited
Country : Bangladesh

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SCHEDULE A
INTRODUCTION & PREAMBLE TO THE PRICE & TECHNICAL SCHEDULES

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SCHEDULE A

INTRODUCTION & PREAMBLE TO THE PRICE & TECHNICAL SCHEDULES

BRIEF DESCRIPTION OF THE WORKS

The bidder shall be deemed to have visited 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 tiding-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 and 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 work comprises the following: -

DESCRIPTION OF WORKS

The scope of work under this turnkey bid is design, supply, delivery, installation, testing & commissioning of Two (02) new 132kV GIS Bay extension at existing Maniknagar 230/132kV Substation and One (01) new 132kV AIS bay extension at existing Tongi 230/132kV substation.

The scope of work also includes design, supply, delivery, installation, testing & commissioning of associated control, automation, protection & fiber optic multiplexer equipment for communication & protection, and civil works.

Scope 1: EXTENSION OF 132KV GIS LINE BAY AT MANIKNAGAR 132/33KV SUB-STATION:

Design, supply, delivery, installation, testing & commissioning of two (02) line bay extension with new outdoor type 132kV GIS at Maniknagar 230/132kV AIS Substation (which is situated at the South-east side from the Capital city Dhaka).

132kV Gas Insulated Switchgear (GIS):

Complete two (02) number of 132kV outdoor GIS line bays. The configuration of the 132 kV busbar shall be double busbar scheme. Existing 132kV AIS busbar shall be connected to GIS Busbar through Air insulated bushing. Jointing plugs shall be kept for adding future bays and jointing plugs required for connecting GIS

of different makes.

Control, Protection & Metering:

Associated control, metering, protection equipment and synchronizing scheme for complete substation.
The existing busbar protection of 132kV double busbar at Maniknagar Grid substation is ABB, Switzerland make REB500. This existing busbar protection system for the protection of busbar 1 & 2 of the 132kV switchyard shall be extended with two (2) sets of ABB, Switzerland make REB500 Bay units for two new GIS bays. The existing busbar protection is not functional. Under the scope of this project the existing busbar protection shall be activated and commissioned along with incorporation of two new bay units.

Fibre Optic Multiplexer Equipment for Communication and Protection:

Indoor type Fibre Optic Multiplexer and communication Equipment for protection & communication and integration with existing communication network of PGCB.

DC and LVAC System:

Complete set of 110V DC & 48V DC and LVAC system with all necessary materials required for the plant being installed. The system shall be comprising with a backup/standby set.

Land Development, Civil Works, Building and Foundation:

Complete design, supply and construction of all civil items required for land development.
Complete design, supply and construction of all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, entrance & internal roads, outdoor lighting system, cable trenches, earth filling, surfacing, drainage, security fences, earthing & lightning protection, switchyard lighting, etc.

SCADA system for Telecontrol and Telemetering:
Complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetering facilities required at the existing National Load Despatch Center(NLDC) at Rampura for integration of new extended GIS Line Bay. All required electrical signals shall be transmitted to the NLDC through the Industrial Gateway of the substation automation system. All HV breakers, motorized disconnectors, etc. shall be controlled form NLDC through the Gateway of the substation automation system using IEC 60870-5-104 protocol. All necessary modification works in the software of master station of NLDC are to be carried out.

Mandatory Spares, Maintenance tools & Test Equipment:
Supply of complete mandatory spare and spare parts of switchgear, control equipment, protection relays, meters, maintenance tools & test equipment. The materials shall have to be handed over to the designated store as per instruction of the Engineer.

Scope 2: EXTENSION OF 132KV AIS LINE BAY AT TONGI 230/132KV SUBSTAION:

Design, supply, delivery, installation, testing & commissioning of One (01) line bay extension with new outdoor type 132 AIS at Tongi 230/132 kV AIS substation (which is situated at the North side from the Capital city Dhaka).

132kV Air Insulated Switchgear (AIS):

Extension of one (01) number of 132kV AIS line bay with associated switchgear. The configuration of the 132 kV busbar shall be breaker and a half scheme. In the existing 132kV outdoor switchyard one (01) diameter has the provision for extension of one bay.

Control, Protection, Substation Automation & Metering:

Associated control, metering, protection equipment, synchronizing scheme and substation automation system for complete substation.

Digital Fault & Disturbance Recorder (DFDR):

Not applicable

Fibre Optic Multiplexer Equipment for Communication and Protection:

Indoor type Fibre Optic Multiplexer and communication Equipment for protection & communication and integration with existing communication network of PGCB.

DC and LVAC System:

Complete set of 110V DC & 48V DC and LVAC system with all necessary materials required for the plant being installed. The system shall be comprising with a backup/standby set.

Land Development, Civil Works, Building and Foundation:

Complete design, supply and construction of all civil items required for land development.
Complete design, supply and construction of all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, entrance & internal roads, outdoor lighting system, cable trenches, earth filling, surfacing, drainage, earthing & lightning protection, switchyard lighting, etc.

SCADA system for Telecontrol and Telemetering:

Complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetering facilities required at the existing National Load Despatch Center(NLDC) at Rampura for integration

of new extended GIS Line Bay. All required electrical signals shall be transmitted to the NLDC through the Industrial Gateway of the substation automation system. All HV breakers, motorized disconnectors, etc. shall be controlled form NLDC through the Gateway of the substation automation system using IEC 60870-5-104 protocol. All necessary modification works in the software of master station of NLDC are to be carried out.

Mandatory Spares, Maintenance tools & Test Equipment:

Supply of complete mandatory spare and spare parts of transformer, switchgear, control equipment, protection relays, meters, maintenance tools & test equipment. The materials shall have to be handed over to the designated store as per instruction of the Engineer.

SCHEDULE A1
REQUIREMENTS

SCOPE 1: EXTENSION OF 132KV GIS LINE BAY AT MANIKNAGAR GRID SUBSTAION:

The equipment to be designed, supplied, installed, tested & commissioned as per detail technical specification and as shown in bid drawings (volume 2 of 3 of this bid document):

Item	Description
1A	**132 kV Outdoor Type Gas Insulated Switchgear (GIS)**
	The 132 kV outdoor type GIS shall comply with the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and shall comprise the following: -
1A1	Two (2) sets of 132kV underground cable circuit bays (1250A), 50kA/3sec, 50Hz, 650kVp BIL including GIS Surge Arrester, main connections GIS bus duct & Air Insulated Bushing (AIB) (for connecting with existing AIS Busbar), female part of 132kV GIS cable termination (pluggable type) for connecting XLPE underground cable (tentative cable size is 300 sqmm. Cable size to be finalized during execution) at GIS bay end, protection and control requirements.
1A2	Double Busbar (3000A), 50kA/3sec, 50Hz, 650kVp BIL with VT and ES including main connections, protection and control requirements in One (1) lot.
1B	**Control, Protection & Metering 132 kV Circuits**
	The equipment to be designed, supplied, installed and commissioned shall be as shown in bid drawings and comprise of: -
1B1	Complete Control, Protection & Metering system for two (2) sets of underground cable circuits.
1B2	Two (2) nos. of ABB, Switzerland make REB500 bay units for extension, connection and modification to existing 132kV busbar protection to accommodate two new lines and synchronization with existing system.
1B3	Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4-wire import and export MWh and MVArh meters (accuracy class 0.2) for Two (2) 132kV line feeder. For each feeder minimum two meters (main & check). The scope of works also includes supply of software(s) & connection cords of the above energy meters for future re-configuration.
1C	**Conductor, Steel Structure, Insulator & Hardware & Fittings**

1C1 One (1) lot of flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection as specified in the technical specifications and bid drawings.

1C2 One (1) lot of steel structures for gantry and equipment supports including nut s& bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard as specified in the technical specifications and bi d drawings.

1D **Multicore Cables**

1D1 One (1) lot complete set of multicore low voltage 0.6/1.1kV, XLPE insulated power and control cables (IEC 60502) shall be supplied, installed, glanded, terminated and have individual cores identified to be used for connection of all equipment supplied under this Contract. The overall cable routing and core schedules shall also be provided.

1E **Earthing and Lightning Protection**

1E1 One(1) lot of design, supply and installation for extension of earthing system and lightning protection screen including connections, connectors and clamps for the additional switchgear and ancillary equipment being installed.

1F **DC Distribution**

1F1 One (1) lot of all necessary switchgears and interconnection cables required for extension of existing 110V DC system to provide service of the plant and equipment to be supplied under this contract.

1F2 One (1) lot of all necessary switchgears and interconnection cables required for extension of existing 48V DC system to provide service of the plant and equipment to be supplied under this contract.

1G **LVAC Distribution**

1G1 One (1) lot of all necessary switchgears and interconnection cables required for extension of existing LVAC switchboard for substation services to be supplied, installed and commissioned, to provide the 415/240V supplies to all equipment being supplied under this turnkey Bid.

1H **Civil Works, Building and Foundation**

1H1 One(1) lot of complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry foundations, AIS & GIS equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of two

new GIS 132kV line bays at new location.

1I **Lighting, Small Power, Air Conditioning and Ventilation**

1I2 One (1) lot of complete design, supply, installation and commissioning of equipment to provide lighting (flood light : LED/Sodium/Mercury type) for security, roadway and switchyard and emergency DC lighting at strategic locations for equipment operation and inspection to suit the substation overall arrangement for the additional switchgear and ancillary equipment to be installed under this turnkey bid.

1J **Fibre Optic Multiplexer Equipment for Communication & Protection and RTU Sub-Rack**

1J1 Dismantling of existing fibre optic multiplexer equipment, METRO 1050 (MSE 5001). One (1) lot complete set of design, supply, installation and commissioning of new fibre optic multiplexer equipment similar or compatible with the existing multiplexer equipment. This also includes necessary works to interface with existing system is to be provided for :

- re-establishment of all the existing teleprotection & telecommunication system
- 87 or 21 relay for each transmission line protection (through fibre cores)
- 21 relay carrier signal (main and back-up)
- SCADA data from switchgear and control system
- hot-line telephone system

The equipment to be supplied, installed and commissioned shall be as shown on bid drawing.

1J2 Underground optical fibre cables (24cores, single mode) from terminal box of each of the 132kV double circuit underground cable termination point to MDF (Main distribution Frame) to be installed in control room. The Contract includes supply and installation of MDF and pigtail cables with adequate length.

1J3 One (1) lot of complete design, supply, installation, testing & commissioning of RTU Subrack for incorporating two new line bays. This RTU Subrack shall be interconnected with the existing RTU (MiCOM C264, Made by ALSTOM [presently GE]) and integrated with the existing NLDC (National Load Despatch Center) system. Existing RTU database shall be upgraded. The following items shall be included with the RTU Subrack :
-one (01) no. of BIU (Base Interface Unit)
-one (01) no. of CPU (Central Processing Unit)
-one (01) no. of SWU (Switch Unit)
-two (02) nos. of DIU (Digital Input Unit)
-one (01) no. of DOU (Digital Output Unit)
Two (02) nos. of IED (RIDH Ducer M01 Programmable Multi-Transducer) shall also be supplied.

1K **SCADA system for Telecontrol and Telemetering**

1K1 One (1) lot of complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetering facilities required at the existing National Load Despatch Center (NLDC) at Rampura and Backup station at Bidyut Bhaban for integration of two new 132kV underground cable bays to Maniknagar substation. All HV breakers, motorized disconnectors etc. shall be controlled form NLDC and Backup station at Bidyut Bhaban through the RTU using IEC 60870-5-101/104 protocol. All necessary modification works in the software of master station and backup station of NLDC and Backup station at Bidyut Bhaban are to be carried out.

1L **Mandatory Spares, Tools & Test Equipment**
Supply of complete spares and spare parts of switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Test equipment are to be supplied from Europe, USA or Japan origin. Printed catalogue, operation and service manual are to be provided. The materials shall have to be handed over to the designated store as per instruction of the Employer's Engineer.

<u>SCOPE-2:</u> EXTENSION OF 132KV AIS LINE BAY AT TONGI (OLD) SUBSTAION:

The equipment to be designed, supplied, installed, tested & commissioned as per detail technical specification and as shown in bid drawings (volume 2 of 3 of this bid document):

Item	Description
2A	**145kV Air Insulated Switchgear (AIS)** The 145kV AIS shall comply with the particular requirements as detailed in the Schedule of Technical Requirements included as Appendix A1 to this section and bid drawings; shall comprise the following: -
2A1	One (1) set of 145kV, 1250A, 50kA/1sec, 50Hz, 650kVp BIL, live tank type, gang operated, SF6 gas circuit breaker with spring-stored energy operating mechanism for line circuit bay.
2A2	One (1) set of 145kV, 1250A, 50kA/1sec, 50Hz, 650kVp BIL, double side break, post type, motor operated disconnectors with manual earthing switch.
2A3	One (1) set of 145kV, 1250A, 50kA/1sec, 50Hz, 650kVp BIL, double side break, post type, motor operated disconnectors without earthing switch.
2A4	Three (3) nos. of single-phase, 4-core, multi ratio, 145kV, 50kA/1sec, 50Hz,

650kVp BIL, post type current transformer for line circuit bay. (1200-800-400/1-1-1-1A).

2A5 Three (3) nos. of single-phase, 2-core, 145kV, 50kA/1sec, 50Hz, 650kVp BIL inductive voltage transformers (IVT).

2A6 Three (3) nos. of 120kV rated voltage, 102kV(rms) continuous operating voltage at 50^0c, 10kA nominal discharge current, 50Hz, Heavy duty station class, gapless metal oxide type, single phase surge arresters.

2A7 One (1) lot of flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection as specified in the technical specifications and bid drawings.

2A8 One (1) lot of steel structures for gantry and equipment supports including nuts, bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard as specified in the technical specifications and bid drawings.

2B Control, Protection, & Metering 132 kV Circuits

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

2B1 Complete Control, Protection & Metering system for one (01) set of under-ground cable feeder circuit.

2B2 Tariff metering panel to accommodate programmable & recordable digital 3-phase, 4 wire import and export MWh and MVArh meters (accuracy class 0.2) for one (1) 132 kV line. For each feeder minimum two meters (main & check). The scope of works also includes supply of software(s) & connection cords of the above energy meters for future re-configuration.

2C Multicore Cables

2C1 One (1) lot complete set of multicore low voltage 0.6/1.1kV, XLPE insulated power and control cables (IEC 60502) shall be supplied, installed, glanded, terminated and have individual cores identified to be used for connection of all equipment supplied under the Contract. The overall cable routing and core schedules shall also be provided.

2D Earthing and Lightning Protection

2D1 One(1) lot of design, supply and installation for extension of earthing system and lightning protection screen including connections, connectors and clamps for the additional switchgear and ancillary equipment being installed.

2D2 One (1) set of 3-phase portable (maintenance) earthing equipment devices with connectors and telescopic glass fibre operating pole suitable for plant supplied.

2E DC Distribution

2E1 One (1) lot of all necessary switchgears and interconnection cables required for extension of existing 220V DC system to provide service of the plant and equipment to be supplied under this contract.

2E2 One (1) lot of all necessary switchgears and interconnection cables required for extension of existing 48V DC system to provide service of the plant and equipment to be supplied under this contract.

2F LVAC Distribution

2F1 One (1) lot of all necessary switchgears and interconnection cables required for extension of existing LVAC switchboard for substation services to be supplied, installed and commissioned, to provide the 415/240V supplies to all equipment being supplied under this turnkey Bid.

2G Civil Works, Building and Foundation

2G1 One(1) lot of complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of one 132kV line bays at new location.

2H Lighting, Small Power, Air Conditioning and Ventilation

2H1 One (1) lot of complete design, supply, installation and commissioning of equipment to provide lighting (flood light : LED/Sodium/Mercury type) for security, roadway and switchyard and emergency DC lighting at strategic locations for equipment operation and inspection to suit the substation overall arrangement for the additional switchgear and ancillary equipment to be installed under this turnkey bid.

2I Fibre Optic Multiplexer Equipment for Communication & Protection and RTU Sub-Rack

1J1 The equipment to be supplied, installed and commissioned shall be as shown on bid drawing. One (1) lot complete set of design, supply, installation and commissioning for extension of existing fibre optic multiplexer equipment to incorporate one new line bay including necessary works to be provided for:
- 87L or 21 relay for each transmission line protection (through fibre cores)
- 21 relay carrier signal (main and back-up)
- SCADA data from switchgear and control system
- Hot-line telephone system

The existing fibre optic multiplexer equipment is AREVA France make OSN 1500 (MSE 5010) with DXC 5000 type.

1J2 Underground optical fibre cables (24cores, single mode) from terminal box of 132kV underground cable termination point to MDF (Main distribution Frame) to be installed in control room. The Contract includes supply and installation of MDF and pigtail cables with adequate length.

2I3 One (1) lot of complete design, supply, installation, testing & commissioning of RTU Sub-Rack for incorporating one new line bay. This RTU Sub-Rack shall be interconnected with the existing RTU (MiCOM C264, Made by ALSTOM [presently GE]) and integrated with the existing NLDC (National Load Despatch Center) system. Existing RTU database shall be upgraded. The following items shall be included with the RTU Sub-Rack :

-one (01) no. of BIU (Base Interface Unit)
-one (01) no. of CPU (Central Processing Unit)
-one (01) no. of SWU (Switch Unit)
-one (01) no. of DIU (Digital Input Unit)
-one (01) no. of DOU (Digital Output Unit)

Two (02) nos. of IED (RIDH Ducer M01 Programmable Multi-Transducer) shall also be supplied.

2J SCADA system for Telecontrol and Telemetering

2J1 One(1) lot of complete design, supply, delivery, installation, testing & commissioning of hardware and software to provide the telecontrol & telemetering facilities required at the existing National Load Despatch Center (NLDC) at Rampura and Backup station at Bidyut Bhaban for integration of one new 132kV underground cable feeder bays to Tongi 230/132kV substation. All HV breakers, motorized disconnectors etc. shall be controlled form NLDC and Backup station at Bidyut Bhaban through the RTU using IEC 60870-5-101/104 protocol. All necessary modification works in the software of master station and backup station of NLDC and Backup station at Bidyut Bhaban are to be carried out.

2K Mandatory Spares, Tools & Test Equipment

Supply of complete spares and spare parts of switchgear, control equipment, protection relays, meters, erection & test equipment as per quantity mentioned in Schedule B. Test equipment are to be supplied from Europe, USA or Japan origin. Printed catalogue, operation and service manual are to be provided. The materials shall have to be handed over to the designated store as per instruction of the Engineer.

APPENDIX A1.1

SCHEDULE OF TECHNICAL REQUIREMENTS OF 132 kV OUTDOOR TYPE GAS INSULATED SWITCHGEAR (GIS)

SL. No.	Description	Unit	230 kV	132 kV
1.	**Site Condition**			
	Max. Altitude above sea level	m	not more than 1000	not more than 1000
	Max. Ambient temperature outdoor	℃	+45	+45
	Min. Ambient temperature outdoor	℃	+4	+4
	Max. Ambient relative humidity	%	100	100
	Max. Seismic acceleration at floor level			
	- horizontal	g	0.1	0.1
	- vertical	g	0.1	0.1
2.	**Type Designation**			
	Enclosure			
	- busbar		three phase	three phase
	- bay		single phase	three phase
	Enclosure Material		Al	Al
	Standards		IEC	IEC
3.	**Electrical Data**			
	Rated Voltage	kV	245	145
	Rated Frequency	Hz	50	50
	Insulation Level			
	- lightning impulse withstand	kV	1050	650
	- 50 Hz withstand 1 minute	kV	460	275
	Rated continuous current at 40℃ ambient temperature			
	- main busbar	A	3000	3000
	- line bay	A	1600	1250
	Rated short time withstand			
	- current	kA	50	50
	- duration	sec	3	3
	Rated peak withstand current	kA	160	125
4.	**Secondary Circuit**			
	Auxiliary voltage			
	- for control and signal	V dc	110	110
	- for remote control	V dc	110	110
	- for heating	V ac	415/230	415/230
	- tolerances	%	-15/+15	-15/+15
5.	**Circuit Breaker**			
	Enclosure		single phase	three phase
	Enclosure material		Al	Al
	Rated short time breaking current	kA	50	50

	Rated peak withstand current	kA	160	125
	Percentage D.C component	%	40	40
	First-pole-to-clear-factor		1.3	1.3
	Rated breaking current			
	- cable charging	A	250	160
	Switching overvoltage	p.u.	2.5	2.5
	Operating mechanism		single/three phase	three phase
	Operating mechanism(for closing/opening)		spring	spring
	Number of making coil per operating mechanism	pcs	1	1
	Number of tripping coil per operating mechanism	pcs	2	2
	Rated motor voltage	V dc	110	110
	Rated operating sequence		O-t-CO-t'-CO	O-t-CO-t'-CO
	- t	sec	0.3	0.3
	- t'	min	3	3
6.	**Disconnector & Earthing Switch**			
	Enclosure		three/single phase	three phase
	Operating mechanism(for closing/opening)		manual & motorised	manual & motorised
	Rated motor voltage	V dc	110	110
7.	**Surge Arrester**			
	Rated voltage	kV	186	120
	Nominal discharge current	kA	10	10
	Discharge class		heavy duty class 3	heavy duty class 3
8.	**CT ratio, class and output**			
	(a) Line bay	A	1600/1,1,1,1 A, 30 VA, 5P20 (2 Cores) for protection, Cl 0.2(1 Core) for measuring 1600/1 A, 30 VA (BBP)	1200-800-400/1,1,1 A , 30 VA, 5P20 (2 Cores) for protection, Cl 0.2 (1 Core) for measuring 1200/1 A, 30 VA (BBP)
9.	**VT ratio, class and output**			
	Ratio	kV	230/√3/0.11/√3/0.11/√3	132/√3/0.11/√3/0.11/√3
	Total burden	VA	10	10
	Accuracy class		3P & 0.2	3P & 0.2

10. Degree of Protection

for indoor GIS IP54

for outdoor GIS IP55W

APPENDIX- A1.2
SCHEDULE OF TECHNICAL REQUIREMENTS OF
145kV AIR INSULATED SWITCHGEAR (AIS)

Sl. No.	Description	Unit	132kV
1.	**Site Condition**		
	Max. Altitude above sea level	meter	not more than 1000
	Max. Ambient temperature outdoor	ºC	+45
	Min. Ambient temperature outdoor	ºC	+4
	Max. Ambient relative humidity	%	100
	Max. Seismic acceleration at floor level		
	- *horizontal*	*g*	*0.1*
	- *vertical*	*g*	*0.1*
2.	**Electrical Data**		
	Nominal system Voltage	kV	132
	Rated Voltage	kV	145
	Rated Frequency	Hz	50
	Insulation Level		
	- lightning impulse withstand	kVp	650
	- switching impulse withstand	kVp	—
	- 50 Hz withstand 1 minute	kV	275
	Rated continuous current at 40º C ambient temperatur e		
	- line bay	A	1250
	Rated short time withstand		
	- current	kA	50
	- duration	Sec	1
	Rated peak withstand current	kA	125
3.	**Secondary Circuit**		
	Auxiliary voltage		
	- for control and signal	V dc	110
	- for remote control	V dc	110
	- for heating	V ac	415/240
	- tolerances	%	-15/+10

4. Circuit Breakers

4.1 145kV Class Circuit Breakers

1	Type	Outdoor, SF_6 insulated, live tank, gang operating type
2	Standard	IEC 62271-100
3	Rated voltage	145 kV
4	Rated short-duration power frequency withstand voltage (1 min.) - Between line terminal and ground - Between terminals with CB open - Between terminals with isolator open	 275 kV rms 275 kV rms 315 kV rms

5	Rated lightning impulse withstand voltage - Between line terminal and ground - Between terminals with CB open - Between terminals with isolator open	 650 kV peak 650 kV peak 750 kV peak
6	First pole to clear factor	1.3
7	Rated current - Line bay	 1250 A
8	Rated short circuit breaking current	50 kA rms
9	Rated short circuit making current	125 kA peak
10	Short time withstand current for 1 sec.	50 kA rms
11	Max. radio interference voltage for frequency between 0.5M Hz and 2MHz in all positions	500 micro V (at 92 kV rms)
12	Total closing time	Not more than 150 ms
13	Total breaking time	60 ms
14	Operating mechanism	Spring
15	Rated duty cycle	O-0.3S-CO-3min-CO
16	Reclosing	Three phase auto-reclosing
17	Creepage distance	25 mm/kV
18	Number of closing coils	1
19	Number of tripping coils	2
20	Number of auxiliary contacts for: - Making - Breaking - Middle position	 Min. 12 Min. 12 0
21	Protection class	IP55

5. Disconnector Switches/Isolators

5.1 145kV Class Disconnector and Earthing Switch

1	Type	Outdoor, i)Double side break ii)Single Center break ii)Single break Series
2	Standard	IEC 62271-102
3	Rated voltage	145 kV
4	Rated short duration power frequency withstand voltage (1 min.) - To earth - Across isolating distance	 275 kV rms 315 kV rms
5	Rated lightning impulse withstand voltage - To earth - Across isolating distance	 650 kV peak 750 kV peak

6	Rated normal current - Line bay	 1250 A
7	Rated short circuit current (I_{th}), 1s	50 kA rms
8	Rated short circuit current (I_{dyn})	125 kA peak
9	Creepage distance of insulator	25 mm/kV
10	Operating mechanism of isolator------ Earthing switch----------	AC motor operated manual operated
11	Number of auxiliary contacts for main switch - Making - Breaking - Middle position	 Min. 6 Min. 6 Min. 1
12	Number of auxiliary contacts for earthing switch - Making - Breaking - Middle position	 Min. 6 Min. 6 Min. 1
13	Radio interference level for 0.5 MHz to 2 MHz	500 micro V (at 92 kV rms)

6. Instrument Transformers

		145 kV
1	Rated lightning impulse withstand voltage	650 kVp
2	Rated switching impulse withstand voltage	-
3	Power frequency withstand voltage (1 min.)	275 kVrms
4	Corona extinction voltage	-
5	Radio interference level for 0.5 MHz to 2 MHz	1000 micro V (at 92 kVrms)
6	Partial discharge level	10 pC
7	Type of insulation	Class A

6.1 145kV Class Current Transformer

1	No. of Cores	Total-4 (Metering-1 plus Protection-3)
2	Ratio	1200-800-400/1/1/1; 2000/1
3	Class of accuracy	- Protection : 5P20 - Metering : Class 0.2
4	Burden (VA)	30
5	Min. knee point voltage at lowest ratio (Volts)	>1kV@ max ratio for protection core <150V@ max ratio for metering core
6	Max. magnetizing current guaranteed at	M.R

	knee point voltage & the lowest ratio (mA)	
7	Max. resistance of secondary winding at 75 ^{0}C and at lowest ratio (ohms)	M.R

6.2 145kV Class Voltage Transformer

1	Rated voltage levels	145 kV	
2	High frequency capacitance for entire carrier frequency range	Within 80% to 150% of rated capacitance	
3	Rated Voltage Factor	1.2 continuous; 1.5 for 30 seconds	
4	Rated total capacitance(pF)	6600, +10% and -5%	
5	Phase angle error (minutes)	20	
6	Acceptable limit of variation of total capacitance over the entire carrier frequency range	+ 50% and -20% of the rated capacitance	
7	Equivalent series resistance over the entire carrier frequency range or temperature range (ohms)	Less than 40	
8	Stray capacitance and stray conductance of low voltage terminal over the entire capacitance.	As per IEC	
9	Core details	Core-I :	Core-II
10	Purpose	Protection	Metering
11	Secondary Voltage	110/√3	110/√3
12	Burden (VA)	50	25
13	Class of accuracy	3P	0.2
14	Rated total thermal burden(VA)	150	150
15	One minute power frequency withstand voltage between LV terminal and earth(kV rms)	4 (10 if the low voltage terminal is exposed)	
16	Withstand voltage for secondary winding (kV rms)	2	

7 Surge Arresters

1	Max. highest system voltage		145kV
2	Type	Outdoor type, ZnO, Gapless	
3	Standard	IEC 60099-4	
4	Rated voltage		120kV
5	Max. continuous operating voltage		102kVrms
6	Nominal discharge current		10kA
7	Discharge class		Heavy duty 3
8	Surge counter		Yes

9	Leakage current detector		Yes

8.1 INSULATOR

1	Rated Voltage	145kV
2	Lightning impulse withstand positive and negative (kVp) (Dry and wet)	650
3	Switching impulse withstand voltage (kVp)	-
4	One min. power freq. withstand voltage (kVrms) (Wet and Dry)	275
5	Total creepage distance (mm) pedestal	3625
6	Total min. cantilever strength (kg)	800
7	Corona extinction voltage (kVrms)	
8	Total min. height of insulator (mm)	2500

8.2 INSULATOR STRING

1	Rated voltage	145kV
2	Type	Anti FOG
3	Size of insulators units (mm)	255 x 145
4	Creepage distance of individual insulator unit (Minimum or as required to obtain total creepage distance, mm)	430
5	Electromechanical strength (kN)	120
6	Power frequency withstand voltage of the complete string (kVrms)	275
7	Lightning impulse withstand voltage of the complete string with C.C. ring (Dry and wet, kVp)	650
8	Switching surge withstand voltage of the comple te string with C.C. rings(Dry & wet, kVp)	-
9	Power frequency puncture withstand voltage for a string insulator unit	1.3 times the actual wet flashover voltage of the unit.
10	Minimum corona extinction voltage level of the complete string with C.C. ring (Dry, kVrms)	
11	R.I.V. Level of the complete string with C.C. ring (micro V)	500
12	Total creepage distance of complete insulator string (mm)	3625

APENDIX A1.5
SCHEDULE OF TECHNICAL REQUIREMENTS OF
FIBRE OPTIC MULTIPLEXER EQUIPMENT

SL.No.	DESCRIPTION	UNIT	REQUIRED
1.0	**GENERAL:**		
1.1	Type of multiplexer		SDH: ADM
1.2	Complying to ITU-T rec.		Yes
1.3	Transmission Capacity	Mbit/s	STM-4: 620
1.4	Access capacity on 64 kbit/s	channels	Minimum 200
1.5	Access capacity on 2 Mbit/s	channels	Minimum 40
1.6	Redundant central processor		Shall be available
1.7	Digital cross connect function		Fully non-blocking
2.0	**Available AGGREGATES:**		
2.1	Optical aggregates (ITU-T G.957)		L-1.1, L-1.2
3.0	**Available TRUNK INTERFACES:**		
3.1	HDB3, 2 Mbit/s interfaces per module	No.	Minimum 8
3.2	Complying to ITU-T rec.		G.703, transparent G.704, selectable
3.3	HDSL, 2Mbit/s interface: no of copper wires Capacity on 2Mbit/s or on 1Mbit/s Capacity selectable	No. ch ch / pair of wire	4 or 2 30 or 15 30 / 2 pairs 30 / 1 pair 15 / 1 pair
4.0	**Available USER INTERFACES**		
4.1	**Voice interfaces for trunk lines:**		
4.1.1	1 + 1 com path protection, available for all		yes
4.1.2	Analogue, 4wire with E&M: Input level Output level	dBr	+7.5 .. –16 +7.0 .. –16.5
4.1.3	Analogue, 2wire with E&M: Input level Output level	dBr	+6.5 .. –12.5 –1.0 .. -20
4.1.4	Digital, 2Mbit/s CAS or PRI		yes
4.2	**Voice interfaces for remote subscriber:**		
4.2.1	2wire, subscriber side	dBr	-5 .. +4 / -7.5 .. -1
4.2.2	2wire, PABX side	dBr	-5 .. +4 / -7.5 .. -3
4.3	**Integrated teleprotection**		
4.3.1	**Interface for Commands:**		
4.3.1.1	Number of independent commands	No.	4
4.3.1.2	Transmission time max.	ms	6
4.3.1.3	Signal voltage	Vpeak	250
4.3.1.4	1 + 1 com path protection		yes
4.3.2	**Interface(s) for Distance Protection:**		
4.3.2.1	Electrical interface: G.703	kbit/s	64
4.3.2.2	Optical Interface	kbit/s	Minimum 64
4.4	**Data: channels per module**		
4.4.1	1 + 1 com path protection, available for all		yes

4.4.2	V.24/V.28 (RS-232): up to 38.4kbit/s	No.	4
4.4.3	V.11/X.24 (RS-422): 64kbit/s	No.	4
4.4.4	V.35: 64kbit/s	No.	4
4.4.5	V.36 (RS-449): 64kbit/s	No.	2
4.4.6	G.703: 64kbit/s	No.	8
4.4.7	Ethernet: 10/100 BaseT WAN capacity Protocols	No. Mbit/s	1 Min: 2x 2Mbit/s Min.: IP
4.5	**Integrated alarm gathering module:**		
4.5.1	Number of external alarms per module	No.	Min. 20
4.5.2	Auxiliary power supply for ext. contacts		Yes
4.6	**Network Management System**		
4.6.1	Type/Name of configuration tool		
4.6.2	For fault / configuration management		Yes / yes
4.6.3	For local / remote operation		Yes / yes
4.6.4	Data communication network (DCN)		Ethernet / IP or Ethernit / OSI
4.7	**Ambient Conditions:**		
4.7.1	Storage: ETS 300 019-1-1, class 1.2	°C / % hum	-25 .. + 55 / class 1.2
4.7.2	Transport: ETS 300 019-1-2, class 2.2	°C / % hum	-25 .. + 70 / class 2.2
4.7.3	Operation: ETS 300 019-1-3, class 3.1E	°C / % hum	-5 .. +45 / class 3.1E
4.8	**Power Supply**		
4.8.1	Operation	VDC	48 / 60 (-15/+20%)
4.8.2	Fully redundant power supply		yes

APPENDIX A1.6

SCHEDULE OF TECHNICAL REQUIREMENTS OF OPERATIONAL TELEPHONE SYSTEM (PABX)

SL.No.	DESCRIPTION	UNIT	REQUIRED
1.0	**GENERAL:**		
1.1	Type		IP PABX
1.2	Complying to ITU-T rec.		Yes
1.3	Analogue Trunk Connectivity		Yes
1.4	Digital Trunk Connectivity(E1/T1)		Yes
1.5	10/100 BaseT Ethernet Connection		Yes
1.6	No of Subscribers	No.	Up to 32
2.0	**Trunk Connectivity**		
2.1	Analogue Trunk		
2.1.1	- Loop Start/Ground Start(Via peripheral)		Yes
2.1.2	- E&M		Yes
2.1.3	- DID(Direct Inward Dial)		Yes
2.2	Digital Trunk		
2.2.1	- T1		Yes
2.2.2	- E1		Yes
2.2.3	- ISDN Connectivity using BRI/PRI		Yes
2.3	IP Trunk		
2.3.1	- 10/100 Mbps Ethernet(IEEE 802.3)		Yes
2.3.2	- TCP/IP, H.323, T.38(Switching)		Yes
2.3.3	- Voice Compressor : G.711, G729		Yes
2.3.4	- QoS(Quality of Signal) : 802.1		Yes
2.3.5	- SIP(Session Initiation Protocol): RFC 3261		Yes
3.0	**Main Features**		
3.1	- Ring Back		Yes
3.2	- Call Forwarding, park, waiting, pick-up		Yes
3.3	- Call/Message waiting lamp		Yes
3.4	- Hands Free operation		Yes
3.5	- Speed Calling, Stored number redial		Yes
3.6	- Account Code		Yes
3.7	- Automatic Attendant, Auto Answer		Yes
3.8	- Automatic Route Selection		Yes
3.9	- Call-by- call Service, Call Duration Display		Yes
3.10	- Call Transfer, Direct Outward Dialing		Yes
3.11	- Hunt Group, Music on Hold		Yes
3.12	- Night Service, Off-hook Alarm, Redial		Yes
4.0	**Network Management System**		
4.1	Type/Name of configuration tool		

4.2	For fault / configuration management		Yes / yes
4.3	For local / remote operation		Yes / yes
4.4	Data communication network (DCN)		Ethernet / IP or Ethernet / OSI
5.0	**Ambient Conditions:**		
5.1	Storage: ETS 300 019-1-1, class 1.2	°C / % hum	-25 .. + 55 / class 1.2
5.2	Transport: ETS 300 019-1-2, class 2.2	°C / % hum	-25 .. + 70 / class 2.2
5.3	Operation: ETS 300 019-1-3, class 3.1E	°C / % hum	-5 .. +45 / class 3.1E

POWER GRID COMPANY OF BANGLADESH LIMITED

BIDDING DOCUMENT
FOR
PROCUREMENT OF
Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

SCHEDULE B (PRICE SCHEDULES)

PREAMBLE

General

1. The Price Schedules are divided into separate Schedules as follows:

Schedule No. 1: Plant (including Mandatory Spare Parts) Supplied from Abroad .

Schedule No. 2: Plant (including Mandatory Spare Parts) Supplied from within the Employer's Country.

Schedule No. 3: Design Services

Schedule No. 4: Installation & other services.

Schedule No. 5: Grand Summery

Schedule No. 6: Recommended Spare Parts.

2. The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.

3. If bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.

Pricing

4. Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc., shall be initialed by the Bidder.

   As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.

5. Bid prices shall be quoted in the manner indicated and in the currencies specified in the instructions to Bidders in the Bidding Document.

   For each item, bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.

   Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.

6. Payments will be made to the Contractor in the currency or currencies indicated under each respective item.

7. When requested by the Employer for the purposes of making payments or partial payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 1 - Plant and Mandatory Spare Parts Supplied from Abroad

					Foreign Currency (in ….)	
Item	Description	Code[1]	Qty	Unit	Unit Price[2] CIP	Total Price[2] CIP
			(1)		(2)	(1) x (2)
Section-1: EXTENSION OF 132KV GIS LINE BAY AT MANIKNAGAR 132/33KV SUBSTATION						
1A	**132kV Outdoor Type Gas Insulated Switchgear (GIS)**					
1A1	132kV underground line circuit bay,1250A					
i)	_GIS for 132kV underground line circuit bay		2	Sets		
ii)	_GIS bus duct		2	Sets		
iii)	_Air Insulated bushing		2	Sets		
1A2	132kV Main busbar (double busbar), 3000A, with VT & ES		1	Lot		
1A3	HV GIS Test Bushing		1	Set		
1B	**Control, Protection & Metering**					
1B1	Complete Control, Protection and Metering system for underground cable circuits.		2	Sets		
1B2	ABB, Switzerland make REB500 bay units for extension, connection and modification to existing 132kV busbar protection to accommodate two new lines and synchronization with existing system		2	nos.		
1B3	Tarrif metering for two line bays		1	Lot		
1C	**Conductor,Steel Structure, Insulator & Hardware & Fittings:**					
1C1	Flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection.		1	Lot		
1C2	Steel structures for gantry and equipment supports including nuts& bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard.		1	Lot		
1D	**Multicore Cables**					
1D1	Multicore, XLPE, LV Power & Control Cables					
i)	_LV Control Cable		1	Lot		
ii)	_LV Power Cable		1	Lot		
1E	**Earthing & Lightning Protection**					
1E 1	Earthing and Lightning Protection System					
i)	_Modification of Earthing system		1	Lot		
ii)	_Modification of Lighting Protection System		1	Lot		
1F	**DC Distribution**					
1F1	Modification of 110V DC Distribution panel					
1F2	Modification of 48V DC Distribution panel		1	Set		

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 1 - Plant and Mandatory Spare Parts Supplied from Abroad

					Foreign Currency (in ….)	
Item	Description	Code[1]	Qty	Unit	Unit Price[2] CIP	Total Price[2] CIP
			(1)		(2)	(1) x (2)
1G	**LVAC Distribution**					
1G1	Modification of LVAC Distribution panel		1	Lot		
1H	**Civil Works, Building and Foundation**					
1H1	Complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry foundations, AIS & GIS equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of two new GIS 132kV line bays at new location		1	Lot		
1I	**Lighting, Small Power, Air Conditioning and Ventilation**					
1I1	**Outdoor switchyard Lighting, Small Power**					
i)	_Outdoor Small power		1	Lot		
ii)	_Outdoor Lighting		1	Lot		
1J	**Fiber Optic Multiplexer Equipment for Teleprotection & Communication and RTU Sub-Rack**					
1J1	Dismantling of existing fibre optic multiplexer equipment. Design, supply, installation and commissioning of new Fiber Optic Multiplexer		1	Lot		
1J2	Underground Fibre Optic cable (24 cores), outdoor termination box, indoor MDF, pigtail cables etc.		1	Lot		
1J3	RTU Subrack for incorporating two new line bays. Upgradation of existing RTU (MiCOM C264, Made by ALSTOM [presently GE])		1	Lot		
1K	**SCADA system for Telecontrol and Telemetering**					
1K1	Integration with existing SCADA/NLDC system.		1	Lot		
1L	**Mandatory Spares, Tools & Test Equipment**					
1L1	**132 kV GIS**					
i)	Arcing contact of CB		2	nos.		
ii)	Moving contact of CB		2	nos.		
iii)	Fixed contact of CB		2	nos.		
iv)	Moving contact of DS & ES		2	nos.		
v)	Fixed contact of DS & ES		2	nos.		
vi)	Blast nozzle		2	nos.		
vii)	CB Closing coil		3	nos.		
viii)	CB Tripping coil		3	nos.		
ix)	Motor for CB operating mechanism		1	nos.		
x)	Dashpot for CB operating mechanism		2	nos.		
xi)	Motor for DS & ES drive		2	nos.		
xii)	Supporting insulator		2	nos.		

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 1 - Plant and Mandatory Spare Parts Supplied from Abroad

					Foreign Currency (in ….)	
Item	Description	Code[1]	Qty	Unit	Unit Price[2] CIP	Total Price[2] CIP
			(1)		(2)	(1) x (2)
xiii)	Supporting insulator with barrier		2	nos.		
xiv)	Indicating lamps		1	nos.		
xv)	Indicating lamp covers		1	nos.		
xvi)	Set of gaskets		1	nos.		
xvii)	Heater		2	nos.		
xviii)	Humidity stat and thermostat		2	nos.		
xix)	Gas pressure monitor		2	nos.		
xx)	Gas pressure switch		2	nos.		
xxi)	Gas pressure gauge		2	nos.		
xxii)	Gas pressure relief device		2	nos.		
1L2	**Protection**					
i)	Line differential relay with complete protection elements		1	set		
ii)	Overcurrent and earth fault relay		1	set		
iii)	Bay unit (REB 500, ABB make)		1	set		
iv)	Tripping relay (electrical reset)		2	nos.		
v)	Trip Circuit Supervision relay, 3phase		1	set		
vi)	Relay Test block & plug		1	set		
vii)	Bulbs for annunciator		10	nos.		
1L3	**Test Equipment**					
i)	SF6 Gas Handling Equipment incld. Storage tank		1	set		
ii)	SF6 Gas leak Detector		1	set		
iii)	Partial Discharge monitoring Device for GIS		1	set		
vi)	Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.)		1	set		
v)	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)		1	set		
vi)	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)		1	set		
vii)	Clip-on mA meter (for spill current)		1	set		
viii)	Portable Earthing lead including glass fiber stick		1	set		
xi)	AVO Meter, digital		1	set		

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 1 - Plant and Mandatory Spare Parts Supplied from Abroad

					Foreign Currency (in ….)	
Item	Description	Code[1]	Qty	Unit	Unit Price[2] CIP	Total Price[2] CIP
			(1)		(2)	(1) x (2)
Section. 2: EXTENSION OF 132KV AIS LINE BAY AT TONGI 230/132kV SUBSTAION						
2A	**145kV Air Insulated Switchgear (AIS) and Connection:**					
2A1	Circuit Breaker, SF6, 1250A, live tank, gang operating for line bays		1	Set		
2A2	Disconnector with earthswitch, 1250A, double side break		1	Set		
2A3	Disconnector without earthswitch, 1250A, double side break		1	Set		
2A4	Single phase current transformer,4-core, for line bays		3	Nos.		
2A5	Single phase Inductive Voltage Transformer (IVT)		3	Nos.		
2A6	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide		3	Nos.		
2A7	Flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and		1	Lot		
2A8	Steel structures for gantry and equipment supports including nuts, bolts, cable tray and all necessary fitting & fixing accessories		1	Lot		
2B	**Control, Protection & Metering**					
2B1	Complete Control, Protection and Metering system for underground cable circuit.		1	Set		
2B2	Tarrif metering for one line bay		1	Lot		
2C	**Multicore Cables**					
2C1	Multicore, XLPE, LV Power & Control Cables					
i)	_LV Control Cable		1	Lot		
ii)	_LV Power Cable		1	Lot		
2D	**Earthing & Lightning Protection**					
2D1	Earthing and Lightning Protection System					
i)	_Modification of Earthing system		1	Lot		
ii)	_Modification of Lighting Protection System		1	Lot		
2D2	Portable Earthing Equipment devices with connectors and telescopic glass fiber operating pole suitable for plant supplied.		1	Set		
2E	**DC Distribution**					
2E1	Modification of 220V DC Distribution panel		1	Lot		
2E2	Modification of 48V DC Distribution panel		1	Lot		

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 1 - Plant and Mandatory Spare Parts Supplied from Abroad

					Foreign Currency (in ….)	
Item	Description	Code[1]	Qty	Unit	Unit Price[2] CIP	Total Price[2] CIP
			(1)		(2)	(1) x (2)
2F	**LVAC Distribution**					
2F1	Modification of LVAC Distribution panel		1	Lot		
2G	**Civil Works, Building and Foundation**					
2G1	Complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate		1	Lot		
2H	**Lighting, Small Power, Air Conditioning and Ventilation**					
2H1	**Outdoor switchyard Lighting, Small Power**					
i)	_Outdoor Small power		1	Lot		
ii)	_Outdoor Lighting		1	Lot		
2I	**Fiber Optic Multiplexer Equipment for Teleprotection & Communication and RTU Sub-Rack**					
2I1	Modification of existing fibre optic multiplexer equipment.		1	Lot		
2I2	Underground Fibre Optic cable (24 cores), outdoor termination box, indoor MDF, pigtail cables etc.		1	Lot		
2I3	RTU Subrack for incorporating two new line bays. Upgradation of existing RTU (MiCOM C264, Made by ALSTOM [presently GE])		1	Lot		
2J	**SCADA system for Telecontrol and Telemetering**					
2J1	Integration with existing SCADA/NLDC system.		1	Lot		
2K	**Mandatory Spares, Tools & Test Equipment**					
2K1	**145 kV Air Insulated Switchgear**					
i)	Complete SF6 gas, livetank type 145kV, 1250A Circuit Breaker (Gang operation type)		1	set		
ii)	Complete 145 kV,1250A disconnector switch		1	set		
iii)	Set of interrupting chamber including insulators, fixed and moving contacts for 145kV offered type circuit breaklers		1	set		
iv)	145 kV post insulators suitable for disconnector		3	nos.		
v)	Set (three phase) contacts for 145 kV disconnector		1	set		
vi)	120 kV surge arrester		3	nos.		
vii)	145 kV inductive voltage transformer		3	nos.		
viii)	Closing coils		3	nos.		

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 1 - Plant and Mandatory Spare Parts Supplied from Abroad

					Foreign Currency (in ….)	
Item	Description	Code[1]	Qty	Unit	Unit Price[2] CIP	Total Price[2] CIP
			(1)		(2)	(1) x (2)
ix)	Tripping coils		3	nos.		
x)	Motor for 145 kV circuit breaking operating mechanism		1	no.		
xi)	Motor for disconnector drive		1	no.		
xii)	Coils for Blocking magnet in disconnector drive		3	nos.		
2K2	**Protection**					
i)	Line differential relay with complete protection elements		1	set		
ii)	Overcurrent and earth fault relay		1	set		
iii)	Tripping relay (electrical reset)		2	nos.		
iv)	Trip Circuit Supervision relay, 3phase		1	set		
v)	Relay Test block & plug		1	set		
vi)	Bulbs for annunciator		10	nos.		
2K3	**Test Equipment**					
i)	Set of gas filling equipment and 1 bottle of SF6 gas		1	set		
ii)	SF6 gas sniffer		1	set		
iii)	Portable vacuum pump suitable for SF6 circuit breaker		1	set		
vi)	Contact resistance measurement test set (suitable for measurement down to 1 μ ohm at 200A d.c.)		1	set		
v)	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)		1	set		
vi)	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)		1	set		
vii)	Clip-on mA meter (for spill current)		1	set		

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 1 - Plant and Mandatory Spare Parts Supplied from Abroad

					Foreign Currency (in ….)	
Item	Description	Code[1]	Qty	Unit	Unit Price[2] CIP	Total Price[2] CIP
			(1)		(2)	(1) x (2)
viii)	Portable Earthing lead including glass fiber stick		1	set		
ix)	AVO Meter, digital		1	set		
Total Price of Schedule 1 (Carried to Schedule 5 Grand Summary)						

Name of Bidder _____

Signature of Bidder _____

[1] Bidders shall enter a code representing the country of origin of all imported plant and equipment.

[2] Specifiy currency. Create and use as many column for Unit Price and total Price as there are currencies.

Country of Origin Declaration Form

Item	Description	Code	Country

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 2 - Plant and Mandatory Spare Parts Supplied from Employer's Country

Item	Description	Qty	Unit	Foreign Currency (in .....)		Local Currency (in BDT)		
				EXW Unit Price[1]	EXW Total Price[1]	EXW Unit Price	EXW Total Price	Vat on EXW
		(1)		*(2)*	*(3)=(1) x (2)*	*(4)*	*(5)=(1) x (4)*	*6*
Section-1: EXTENSION OF 132KV GIS LINE BAY AT MANIKNAGAR 132/33KV SUBSTATION								
1A	**132kV Outdoor Type Gas Insulated Switchgear (GIS)**							
1A1	132kV underground line circuit bay,1250A							
i)	_GIS for 132kV underground line circuit bay	2	Sets					
ii)	_GIS bus duct	2	Sets					
iii)	_Air Insulated bushing	2	Sets					
1A2	132kV Main busbar (double busbar), 3000A, with VT & ES	1	Lot					
1A3	HV GIS Test Bushing	1	Set					
1B	**Control, Protection & Metering**							
1B1	Complete Control, Protection and Metering system for underground cable circuits.	2	Sets					
1B2	ABB, Switzerland make REB500 bay units for extension, connection and modification to existing 132kV busbar protection to accommodate two new lines and synchronization with existing system	2	nos.					
1B3	Tarrif metering for two line bays	1	Lot					
1C	**Conductor,Steel Structure, Insulator & Hardware & Fittings:**							
1C1	Flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection.	1	Lot					
1C2	Steel structures for gantry and equipment supports including nuts& bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard.	1	Lot					
1D	**Multicore Cables**							
1D1	Multicore, XLPE, LV Power & Control Cables							
i)	_LV Control Cable	1	Lot					
ii)	_LV Power Cable	1	Lot					
1E	**Earthing & Lightning Protection**							
1E 1	Earthing and Lightning Protection System							
i)	_Modification of Earthing system	1	Lot					
ii)	_Modification of Lighting Protection System	1	Lot					
1F	**DC Distribution**							
1F1	Modification of 110V DC Distribution panel							
1F2	Modification of 48V DC Distribution panel	1	Set					
1G	**LVAC Distribution**							
1G1	Modification of LVAC Distribution panel	1	Lot					

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 2 - Plant and Mandatory Spare Parts Supplied from Employer's Country

Item	Description	Qty	Unit	Foreign Currency (in .....)		Local Currency (in BDT)		
				EXW Unit Price[1]	EXW Total Price[1]	EXW Unit Price	EXW Total Price	Vat on EXW
		(1)		*(2)*	*(3)=(1) x (2)*	*(4)*	*(5)=(1) x (4)*	*6*
1H	**Civil Works, Building and Foundation**							
1H1	Complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry foundations, AIS & GIS equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of two new GIS 132kV line bays at new location.	1	Lot					
1I	**Lighting, Small Power, Air Conditioning and Ventilation**							
1I1	Outdoor switchyard Lighting, Small Power							
i)	_Outdoor Small power	1	Lot					
ii)	_Outdoor Lighting	1	Lot					
1J	**Fiber Optic Multiplexer Equipment for Teleprotection & Communication and RTU Sub-Rack**							
1J1	Dismantling of existing fibre optic multiplexer equipment. Design, supply, installation and commissioning of new Fiber Optic Multiplexer Equipment for Teleprotection and Communication.	1	Lot					
1J2	Underground Fibre Optic cable (24 cores), outdoor termination box, indoor MDF, pigtail cables etc.	1	Lot					
1J3	RTU Subrack for incorporating two new line bays. Upgradation of existing RTU (MiCOM C264, Made by ALSTOM [presently GE]) database.	1	Lot					
1K	**SCADA system for Telecontrol and Telemetering**							
1K1	Integration with existing SCADA/NLDC system.	1	Lot					
1L	**Mandatory Spares, Tools & Test Equipment**							
1L1	132 kV GIS							
i)	Arcing contact of CB	2	nos.					
ii)	Moving contact of CB	2	nos.					
iii)	Fixed contact of CB	2	nos.					
iv)	Moving contact of DS & ES	2	nos.					
v)	Fixed contact of DS & ES	2	nos.					
vi)	Blast nozzle	2	nos.					
vii)	CB Closing coil	3	nos.					
viii)	CB Tripping coil	3	nos.					
ix)	Motor for CB operating mechanism	1	nos.					
x)	Dashpot for CB operating mechanism	2	nos.					
xi)	Motor for DS & ES drive	2	nos.					
xii)	Supporting insulator	2	nos.					
xiii)	Supporting insulator with barrier	2	nos.					
xiv)	Indicating lamps	1	nos.					
xv)	Indicating lamp covers	1	nos.					
xvi)	Set of gaskets	1	nos.					
xvii)	Heater	2	nos.					
xviii)	Humidity stat and thermostat	2	nos.					

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 2 - Plant and Mandatory Spare Parts Supplied from Employer's Country

Item	Description	Qty	Unit	Foreign Currency (in .....)		Local Currency (in BDT)		
				EXW Unit Price[1]	EXW Total Price[1]	EXW Unit Price	EXW Total Price	Vat on EXW
		(1)		*(2)*	*(3)=(1) x (2)*	*(4)*	*(5)=(1) x (4)*	*6*
xix)	Gas pressure monitor	2	nos.					
xx)	Gas pressure switch	2	nos.					
xxi)	Gas pressure gauge	2	nos.					
xxii)	Gas pressure relief device	2	nos.					
1L2	**Protection**							
i)	Line differential relay with complete protection elements	1	set					
ii)	Overcurrent and earth fault relay	1	set					
iii)	Bay unit (REB 500, ABB make)	1	set					
iv)	Tripping relay (electrical reset)	2	nos.					
v)	Trip Circuit Supervision relay, 3phase	1	set					
vi)	Relay Test block & plug	1	set					
vii)	Bulbs for annunciator	10	nos.					
1L3	**Test Equipment**							
i)	SF6 Gas Handling Equipment incld. Storage tank	1	set					
ii)	SF6 Gas leak Detector	1	set					
iii)	Partial Discharge monitoring Device for GIS	1	set					
vi)	Contact resistance measurement test set (suitable for measurement down to 1 µ ohm at 200A d.c.)	1	set					
v)	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)	1	set					
vi)	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)	1	set					
vii)	Clip-on mA meter (for spill current)	1	set					
viii)	Portable Earthing lead including glass fiber stick	1	set					
xi)	AVO Meter, digital	1	set					
Section. 2: EXTENSION OF 132KV AIS LINE BAY AT TONGI 230/132kV SUBSTAION								
2A	**145kV Air Insulated Switchgear (AIS) and Connection:**							
2A1	Circuit Breaker, SF6, 1250A, live tank, gang operating for line bays	1	Set					
2A2	Disconnector with earthswitch, 1250A, double side break	1	Set					
2A3	Disconnector without earthswitch, 1250A, double side break	1	Set					
2A4	Single phase current transformer,4-core, for line bays	3	Nos.					
2A5	Single phase Inductive Voltage Transformer (IVT)	3	Nos.					
2A6	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide	3	Nos.					

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 2 - Plant and Mandatory Spare Parts Supplied from Employer's Country

Item	Description	Qty	Unit	Foreign Currency (in .....)		Local Currency (in BDT)		
				EXW Unit Price[1]	EXW Total Price[1]	EXW Unit Price	EXW Total Price	Vat on EXW
		(1)		*(2)*	*(3)=(1) x (2)*	*(4)*	*(5)=(1) x (4)*	*6*
2A7	Flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection.	1	Lot					
2A8	Steel structures for gantry and equipment supports including nuts, bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard.	1	Lot					
2B	**Control, Protection & Metering**							
2B1	Complete Control, Protection and Metering system for underground cable circuit.	1	Set					
2B2	Tarrif metering for one line bay	1	Lot					
2C	**Multicore Cables**							
2C1	Multicore, XLPE, LV Power & Control Cables							
i)	_LV Control Cable	1	Lot					
ii)	_LV Power Cable	1	Lot					
2D	**Earthing & Lightning Protection**							
2D1	Earthing and Lightning Protection System							
i)	_Modification of Earthing system	1	Lot					
ii)	_Modification of Lighting Protection System	1	Lot					
2D2	Portable Earthing Equipment devices with connectors and telescopic glass fiber operating pole suitable for plant supplied.	1	Set					
2E	**DC Distribution**							
2E1	Modification of 220V DC Distribution panel	1	Lot					
2E2	Modification of 48V DC Distribution panel	1	Lot					
2F	**LVAC Distribution**							
2F1	Modification of LVAC Distribution panel	1	Lot					
2G	**Civil Works, Building and Foundation**							
2G1	Complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of one 132kV line bays at new location.	1	Lot					
2H	**Lighting, Small Power, Air Conditioning and Ventilation**							
2H1	Outdoor switchyard Lighting, Small Power							
i)	_Outdoor Small power	1	Lot					
ii)	_Outdoor Lighting	1	Lot					
2I	**Fiber Optic Multiplexer Equipment for Teleprotection & Communication and RTU Sub-Rack**							
2I1	Modification of existing fibre optic multiplexer equipment.	1	Lot					
2I2	Underground Fibre Optic cable (24 cores), outdoor termination box, indoor MDF, pigtail cables etc.	1	Lot					
2I3	RTU Subrack for incorporating two new line bays. Upgradation of existing RTU (MiCOM C264, Made by ALSTOM [presently GE]) database.	1	Lot					

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 2 - Plant and Mandatory Spare Parts Supplied from Employer's Country

Item	Description	Qty	Unit	Foreign Currency (in .....)		Local Currency (in BDT)		
				EXW Unit Price[1]	EXW Total Price[1]	EXW Unit Price	EXW Total Price	Vat on EXW
		(1)		*(2)*	*(3)=(1) x (2)*	*(4)*	*(5)=(1) x (4)*	*6*
2J	**SCADA system for Telecontrol and Telemetering**							
2J1	Integration with existing SCADA/NLDC system.	1	Lot					
2K	**Mandatory Spares, Tools & Test Equipment**							
2K1	**145 kV Air Insulated Switchgear**							
i)	Complete SF6 gas, livetank type 145kV, 1250A Circuit Breaker (Gang operation type)	1	set					
ii)	Complete 145 kV,1250A disconnector switch	1	set					
iii)	Set of interrupting chamber including insulators, fixed and moving contacts for 145kV offered type circuit breaklers	1	set					
iv)	145 kV post insulators suitable for disconnector	3	nos.					
v)	Set (three phase) contacts for 145 kV disconnector	1	set					
vi)	120 kV surge arrester	3	nos.					
vii)	145 kV inductive voltage transformer	3	nos.					
viii)	Closing coils	3	nos.					
ix)	Tripping coils	3	nos.					
x)	Motor for 145 kV circuit breaking operating mechanism	1	no.					
xi)	Motor for disconnector drive	1	no.					
xii)	Coils for Blocking magnet in disconnector drive	3	nos.					
2K2	**Protection**							
i)	Line differential relay with complete protection elements	1	set					
ii)	Overcurrent and earth fault relay	1	set					
iii)	Tripping relay (electrical reset)	2	nos.					
iv)	Trip Circuit Supervision relay, 3phase	1	set					
v)	Relay Test block & plug	1	set					
vi)	Bulbs for annunciator	10	nos.					
2K3	**Test Equipment**							
i)	Set of gas filling equipment and 1 bottle of SF6 gas	1	set					
ii)	SF6 gas sniffer	1	set					
iii)	Portable vacuum pump suitable for SF6 circuit breaker	1	set					
vi)	Contact resistance measurement test set (suitable for measurement down to 1 μ ohm at 200A d.c.)	1	set					
v)	5 kV insulation resistance test set (range 0.5 –1.0 - 2.5 - 5 kV)	1	set					
vi)	Earth resistance test set (range 10-100-1000 ohm: min scale division 0.01 ohm)	1	set					
vii)	Clip-on mA meter (for spill current)	1	set					

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 2 - Plant and Mandatory Spare Parts Supplied from Employer's Country

Item	Description	Qty	Unit	Foreign Currency (in .....)		Local Currency (in BDT)		
				EXW Unit Price[1]	EXW Total Price[1]	EXW Unit Price	EXW Total Price	Vat on EXW
		(1)		*(2)*	*(3)=(1) x (2)*	*(4)*	*(5)=(1) x (4)*	*6*
viii)	Portable Earthing lead including glass fiber stick	1	set					
ix)	AVO Meter, digital	1	set					
Total Price of Schedule 2 (carried to Schedule 5 Grand Summary)								

[1] Specifiy currency. Create and use as many column for Unit Price and total Price as there are currencies.

Note: EXW price are required to be quoted excluding VAT, VAT on EXW shall be quoted in separate column in Bangladesh Taka. VAT on EXW is included in the Contract Price and shall be paid by the Contractor which shall be reimbursed by the Employer to the contractor at actual basis but not more than the quoted amount upon submission of relevant document.

Name of Bidder _____

Signature of Bidder _____

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 3 - Design Service

Item	Description	Qty (1)	Unit	Unit Price [1] Foreign Curreny Portion (2)	Unit Price [1] Local Curreny Portion (3)	Total Price [1] Foreign Curreny Portion (1) x(2)	Total Price [1] Local Curreny Portion (1) x (3)
Section-1: EXTENSION OF 132KV GIS LINE BAY AT MANIKNAGAR 132/33KV SUBSTATION							
1A	**132kV Outdoor Type Gas Insulated Switchgear (GIS)**						
1A1	132kV underground line circuit bay,1250A						
i)	_GIS for 132kV underground line circuit bay	2	Sets				
ii)	_GIS bus duct	2	Sets				
iii)	_Air Insulated bushing	2	Sets				
1A2	132kV Main busbar (double busbar), 3000A, with VT & ES	1	Lot				
1A3	HV GIS Test Bushing	1	Set				
1B	**Control, Protection & Metering**						
1B1	Complete Control, Protection and Metering system for underground cable circuits.	2	Sets				
1B2	ABB, Switzerland make REB500 bay units for extension, connection and modification to existing 132kV busbar protection to accommodate two new lines and synchronization with existing systen	2	nos.				
1B3	Tarrif metering for two line bays	1	Lot				
1C	**Conductor,Steel Structure, Insulator & Hardware & Fittings:**						
1C1	Flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection.	1	Lot				
1C2	Steel structures for gantry and equipment supports including nuts& bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard.	1	Lot				
1D	**Multicore Cables**						
1D1	Multicore, XLPE, LV Power & Control Cables						
i)	_LV Control Cable	1	Lot				
ii)	_LV Power Cable	1	Lot				
1E	**Earthing & Lightning Protection**						
1E 1	Earthing and Lightning Protection System						
i)	_Modification of Earthing system	1	Lot				
ii)	_Modification of Lighting Protection System	1	Lot				
1F	**DC Distribution**						
1F1	Modification of 110V DC Distribution panel						

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 3 - Design Service

Item	Description	Qty (1)	Unit	Unit Price [1] Foreign Curreny Portion (2)	Unit Price [1] Local Curreny Portion (3)	Total Price [1] Foreign Curreny Portion (1) x(2)	Total Price [1] Local Curreny Portion (1) x (3)
1F2	Modification of 48V DC Distribution panel	1	Set				
1G	**LVAC Distribution**						
1G1	Modification of LVAC Distribution panel	1	Lot				
1H	**Civil Works, Building and Foundation**	1	Lot				
1H1	Complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry foundations, AIS & GIS equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of two new GIS 132kV line bays at new location	1	Lot				
1I	**Lighting, Small Power, Air Conditioning and Ventilation**						
1I1	**Outdoor switchyard Lighting, Small Power**						
i)	_Outdoor Small power	1	Lot				
ii)	_Outdoor Lighting	1	Lot				
1J	**Fiber Optic Multiplexer Equipment for Teleprotection & Communication and RTU Sub-Rack**						
1J1	Dismantling of existing fibre optic multiplexer equipment. Design, supply, installation and commissioning of new Fiber Optic Multiplexer Equipment for Teleprotection and Communication.	1	Lot				
1J2	Underground Fibre Optic cable (24 cores), outdoor termination box, indoor MDF, pigtail cables etc.	1	Lot				
1J3	RTU Subrack for incorporating two new line bays. Upgradation of existing RTU (MiCOM C264, Made by ALSTOM [presently GE]) database.	1	Lot				
1K	**SCADA system for Telecontrol and Telemetering**						
1K1	Integration with existing SCADA/NLDC system.	1	Lot				
1L	**Mandatory Spares, Tools & Test Equipment**	1	Lot				
Section. 2: EXTENSION OF 132KV AIS LINE BAY AT TONGI 230/132kV SUBSTAION							
2A	**145kV Air Insulated Switchgear (AIS) and Connection:**						
2A1	Circuit Breaker, SF6, 1250A, live tank, gang operating for line bays	1	Set				
2A2	Disconnector with earthswitch, 1250A, double side break	1	Set				
2A3	Disconnector without earthswitch, 1250A, double side break	1	Set				
2A4	Single phase current transformer,4-core, for line bays	3	Nos.				
2A5	Single phase Inductive Voltage Transformer(IVT)	3	Nos.				
2A6	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide	3	Nos.				
2A7	Flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection.	1	Lot				

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 3 - Design Service

Item	Description	Qty (1)	Unit	Unit Price [1] Foreign Curreny Portion (2)	Unit Price [1] Local Curreny Portion (3)	Total Price [1] Foreign Curreny Portion (1) x(2)	Total Price [1] Local Curreny Portion (1) x (3)
2A8	Steel structures for gantry and equipment supports including nuts, bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard.	1	Lot				
2B	**Control, Protection & Metering**						
2B1	Complete Control, Protection and Metering system for underground cable circuit.	1	Set				
2B2	Tarrif metering for one line bay	1	Lot				
2C	**Multicore Cables**						
2C1	Multicore, XLPE, LV Power & Control Cables						
i)	_LV Control Cable	1	Lot				
ii)	_LV Power Cable	1	Lot				
2D	**Earthing & Lightning Protection**						
2D1	Earthing and Lightning Protection System						
i)	_Modification of Earthing system	1	Lot				
ii)	_Modification of Lighting Protection System	1	Lot				
2D2	Portable Earthing Equipment devices with connectors and telescopic glass fiber operating pole suitable for plant supplied.	1	Set				
2E	**DC Distribution**						
2E1	Modification of 220V DC Distribution panel	1	Lot				
2E2	Modification of 48V DC Distribution panel	1	Lot				
2F	**LVAC Distribution**						
2F1	Modification of LVAC Distribution panel	1	Lot				
2G	**Civil Works, Building and Foundation**	1	Lot				
2G1	Complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of one 132kV line bays at new location	1	Lot				

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 3 - Design Service

Item	Description	Qty (1)	Unit	Unit Price [1] Foreign Curreny Portion (2)	Unit Price [1] Local Curreny Portion (3)	Total Price [1] Foreign Curreny Portion (1) x(2)	Total Price [1] Local Curreny Portion (1) x (3)
2H	**Lighting, Small Power, Air Conditioning and Ventilation**						
2H1	**Outdoor switchyard Lighting, Small Power**						
i)	_Outdoor Small power	1	Lot				
ii)	_Outdoor Lighting	1	Lot				
2I	**Fiber Optic Multiplexer Equipment for Teleprotection & Communication and RTU Sub-Rack**						
2I1	Modification of existing fibre optic multiplexer equipment.	1	Lot				
2I2	Underground Fibre Optic cable (24 cores), outdoor termination box, indoor MDF, pigtail cables etc.	1	Lot				
2I3	RTU Subrack for incorporating two new line bays. Upgradation of existing RTU (MiCOM C264, Made by ALSTOM [presently GE]) database.	1	Lot				
2J	**SCADA system for Telecontrol and Telemetering**						
2J1	Integration with existing SCADA/NLDC system.	1	Lot				
2K	**Mandatory Spares, Tools & Test Equipment**	1	Lot				
Total Price of Schedule 3 (carried to Schedule 5 Grand Summary)							

Name of Bidder

Signature of Bidder

[1] Specify currency in accordance with specifications in Bid Data Sheet under ITB 18.1.

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 4 -Installation & Other Services

Item	Description	Qty (1)	Unit	Unit Price [1] Foreign Curreny Portion (2)	Unit Price [1] Local Curreny Portion (3)	Total Price [1] Foreign Curreny Portion (1) x(2)	Total Price [1] Local Curreny Portion (1) x (3)
Section-1: EXTENSION OF 132KV GIS LINE BAY AT MANIKNAGAR 132/33KV SUBSTATION							
1A	**132kV Outdoor Type Gas Insulated Switchgear (GIS)**						
1A1	132kV underground line circuit bay,1250A						
i)	_GIS for 132kV underground line circuit bay	2	Sets				
ii)	_GIS bus duct	2	Sets				
iii)	_Air Insulated bushing	2	Sets				
1A2	132kV Main busbar (double busbar), 3000A, with VT & ES	1	Lot				
1A3	HV GIS Test Bushing	1	Set				
1B	**Control, Protection & Metering**						
1B1	Complete Control, Protection and Metering system for underground cable circuits.	2	Sets				
1B2	ABB, Switzerland make REB500 bay units for extension, connection and modification to existing 132kV busbar protection to accommodate two new lines and synchronization with existing system	2	nos.				
1B3	Tarrif metering for two line bays	1	Lot				
1C	**Conductor,Steel Structure, Insulator & Hardware & Fittings:**						
1C1	Flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection.	1	Lot				
1C2	Steel structures for gantry and equipment supports including nuts& bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard.	1	Lot				
1D	**Multicore Cables**						
1D1	Multicore, XLPE, LV Power & Control Cables						
i)	_LV Control Cable	1	Lot				
ii)	_LV Power Cable	1	Lot				
1E	**Earthing & Lightning Protection**						
1E 1	Earthing and Lightning Protection System						
i)	_Modification of Earthing system	1	Lot				
ii)	_Modification of Lighting Protection System	1	Lot				

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 4 -Installation & Other Services

Item	Description	Qty (1)	Unit	Unit Price [1] Foreign Curreny Portion (2)	Unit Price [1] Local Curreny Portion (3)	Total Price [1] Foreign Curreny Portion (1) x(2)	Total Price [1] Local Curreny Portion (1) x (3)
1F	**DC Distribution**						
1F1	Modification of 110V DC Distribution panel						
1F2	Modification of 48V DC Distribution panel	1	Set				
1G	**LVAC Distribution**						
1G1	Modification of LVAC Distribution panel	1	Lot				
1H	**Civil Works, Building and Foundation**	1	Lot				
1H1	Complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry foundations, AIS & GIS equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of two new GIS 132kV line bays at new location.	1	Lot				
1I	**Lighting, Small Power, Air Conditioning and Ventilation**						
1I1	**Outdoor switchyard Lighting, Small Power**						
i)	_Outdoor Small power	1	Lot				
ii)	_Outdoor Lighting	1	Lot				
1J	**Fiber Optic Multiplexer Equipment for Teleprotection & Communication and RTU Sub-Rack**						
1J1	Dismantling of existing fibre optic multiplexer equipment. Design, supply, installation and commissioning of new Fiber Optic Multiplexer Equipment for Teleprotection and Communication.	1	Lot				
1J2	Underground Fibre Optic cable (24 cores), outdoor termination box, indoor MDF, pigtail cables etc.	1	Lot				
1J3	RTU Subrack for incorporating two new line bays. Upgradation of existing RTU (MiCOM C264, Made by ALSTOM [presently GE]) database.	1	Lot				
1K	**SCADA system for Telecontrol and Telemetering**						
1K1	Integration with existing SCADA/NLDC system.	1	Lot				
Section. 2: EXTENSION OF 132KV AIS LINE BAY AT TONGI 230/132kV SUBSTAION							
2A	**145kV Air Insulated Switchgear (AIS) and Connection:**						
2A1	Circuit Breaker, SF6, 1250A, live tank, gang operating for line bays	1	Set				
2A2	Disconnector with earthswitch, 1250A, double side break	1	Set				
2A3	Disconnector without earthswitch, 1250A, double side break	1	Set				

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 4 -Installation & Other Services

Item	Description	Qty	Unit	Unit Price [1]		Total Price [1]	
				Foreign Curreny Portion	Local Curreny Portion	Foreign Curreny Portion	Local Curreny Portion
		(1)		(2)	(3)	(1) x(2)	(1) x (3)
2A4	Single phase current transformer,4-core, for line bays	3	Nos.				
2A5	Single phase Inductive Voltage Transformer(IVT)	3	Nos.				
2A6	Single phase surge arrestor, 120kV, 10kA Discharge Current, Class III, gapless metaloxide	3	Nos.				
2A7	Flexible bus conductors, insulators, fittings including all necessary clamps and connectors required for extending 132kV busbar and completing switchgear connection.	1	Lot				
2A8	Steel structures for gantry and equipment supports including nuts, bolts, cable tray and all necessary fitting & fixing accessories required for extending 132kV switchyard.	1	Lot				
2B	**Control, Protection & Metering**						
2B1	Complete Control, Protection and Metering system for underground cable circuit.	1	Set				
2B2	Tarrif metering for one line bay	1	Lot				
2C	**Multicore Cables**						
2C1	Multicore, XLPE, LV Power & Control Cables						
i)	_LV Control Cable	1	Lot				
ii)	_LV Power Cable	1	Lot				
2D	**Earthing & Lightning Protection**						
2D1	Earthing and Lightning Protection System						
i)	_Modification of Earthing system	1	Lot				
ii)	_Modification of Lighting Protection System	1	Lot				
2D2	Portable Earthing Equipment devices with connectors and telescopic glass fiber operating pole suitable for plant supplied.	1	Set				
2E	**DC Distribution**						
2E1	Modification of 220V DC Distribution panel	1	Lot				
2E2	Modification of 48V DC Distribution panel	1	Lot				
2F	**LVAC Distribution**						
2F1	Modification of LVAC Distribution panel	1	Lot				

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 4 -Installation & Other Services

Item	Description	Qty (1)	Unit	Unit Price [1]		Total Price [1]	
				Foreign Curreny Portion (2)	Local Curreny Portion (3)	Foreign Curreny Portion (1) x(2)	Local Curreny Portion (1) x (3)
2G	**Civil Works, Building and Foundation**	1	Lot				
2G1	Complete design, supply and construction of carried earth filling and all civil items required for the outdoor works suitable for switchyard gantry & equipment foundations, internal roads, cable trenches, surfacing, drainage, fences, etc. to accommodate extension of one 132kV line bays at new location.	1	Lot				
2H	**Lighting, Small Power, Air Conditioning and Ventilation**						
2H1	**Outdoor switchyard Lighting, Small Power**						
i)	_Outdoor Small power	1	Lot				
ii)	_Outdoor Lighting	1	Lot				
2I	**Fiber Optic Multiplexer Equipment for Teleprotection & Communication and RTU Sub-Rack**						
2I1	Modification of existing fibre optic multiplexer equipment.	1	Lot				
2I2	Underground Fibre Optic cable (24 cores), outdoor termination box, indoor MDF, pigtail cables etc.	1	Lot				
2I3	RTU Subrack for incorporating two new line bays. Upgradation of existing RTU (MiCOM C264, Made by ALSTOM [presently GE]) database.	1	Lot				
2J	**SCADA system for Telecontrol and Telemetering**						
2J1	Integration with existing SCADA/NLDC system.	1	Lot				
Total Schedule 3 (carried to Schedule 5 Grand Summary)							

Name of Bidder

Signature of Bidder

[1] Specify currency in accordance with specifications in Bid Data Sheet under ITB 18.1.

** For schedule No. 1

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 5 - Grand Summary

Item	Description	Total Price [1]	
		Foreign in ….	Local in BDT
1	Total Schedule 1. Plant, and Mandatory Spare Parts Supplied from Abroad		
2	Total Schedule 2. Plant, and Mandatory Spare Parts Supplied from Within the Employer's Country		
3	Total Schedule 3. Design Service		
4	Total Schedule 4. Installation and Other Services		
Grand Total			

Note: VAT on EXW is included in the contract price and shall be paid by the contractor which shall be re-imbursed by the employer to the contractor at actual basis but not more than the quoted amount upon submission of relevent document.

Name of Bidder _____

Signature of Bidder _____

[1] specifiy currency in accordance with specifications in Bid Data Sheet under ITB 18.1. Create and use as many as columns for Foregin Currency requirement as there are foreign currencies.

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

Schedule No. 6 - Recommended Spare Parts

Item	Description	Qty	Unit Price [1]		Total Price
			CIP	EXW	
		(1)	*(2)*	*(optional)*	*(1) x (2) or (3)*

Name of Bidder _____

Signature of Bidder _____

POWER GRID COMPANY OF BANGLADESH LIMITED

BIDDING DOCUMENT

FOR

PROCUREMENT OF

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

SCHEDULE C

TIMES FOR DELIVERY AND COMPLETION

The individual dates are all contractually binding.

The times given under Column D are the commissioning target dates at present planned to be achieved and may be the subject of mutual adjustment.

Column A details the earliest dates by which access to site can be given for storage purposes. The times entered under column B are to be the dates guaranteed for arrival at Site of the first shipment of parts for the circuits in question being also the dates when the contract requires access to the Site for plant erection, to the extent necessary to enable him to proceed with work to meet the dates under column C guaranteed for complete delivery, erection and commissioning of the shipment.

The times include all necessary control, relay, metering, auxiliary power ancillary equipment to enable the respective circuit or item of plant to be completely commissioned and put into commercial operation, together with such other associated equipment, e.g. busbars, etc as will ensure that subsequent shutdown are unnecessary or at least only of a temporary or short time nature.

The dates assume an order is placed by . . . . . .
(to be advised or stated by Bidder)

Site	**A*** **Latest Access Permitted**	**B*** **Guaranteed Arrival of first shipment**	**C*** **Guaranteed Completion**	**D*** **Target Completion**
Existing Maniknagar Grid Substation, Dhaka & Existing Tongi Grid Substation, Tongi, Gazipur	7 days from the date of signing of the Contract		09 (nine) months.	

* Time in days, from contract effective date.

Preliminary SLD, overall layout and control building drawings of the Technical Specifications shall be provided within 2.0 months of the contract commencing date.

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

SCHEDULE C-1

BAR CHART PROGRAMME OF KEY ACTIVITIES

	1	2	3	4	5	6	7	8	9
Equipment Design									
Drawings of single line diagram									
Drawings of 132kV Switchgear Layout									
Drawings of 132kV Switchgear Equipment									
Manufacture of 132kV Switchgear									
Manufacture of Control, Protection, and Metering System									
Factory Acceptance Test									
Delivery of equpment to site									
Building & Foundation Design									
Calculation/Drawings of gantry structures and equipment supports									
Calculaiton /Drawings of control building									
Calculaiton /Drawings of earthing System									
Construction and Installation Works									
Site Survey									
Geo-technical survey									
Switchyard									
- Piling									
- Foundation works incl. earthing									
- Cable trenches									
- Gantry and equpment support installation									
switchgear equipment installation									
Transformer installation									
- Busbars, Jumper condcutors and OH earthwire installation									
Construction of Control Building/GIS Bulding									
Cable laying & Termination									
Installation of LVAC & DC system									
Installation of indoor equipment (Control, protection, metering,DFDR etc.)									
Testing & Commissioning									

Note: Time to complete the plant and services from the effective date is 270 (Two Hundred Seventy) days.

POWER GRID COMPANY OF BANGLADESH LIMITED

BIDDING DOCUMENT

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

SCHEDULE D

MANUFACTURERS, PLACES OF MANUFACTURE AND TESTING

The following Subcontractors and/or manufacturers are proposed for carrying out the item of the facilities indicated.

Bidders are free to propose more than one for each item.

Item	Description	Proposed Subcontractors/ Manufacturers	Place of Manufacture	Place of Testing and Inspection
1	132kV OUTDOOR GIS			
2	132 kV SWITCHGEAR Circuit-breakers CB Operating Mechanism Disconnectors Current transformers Voltage Transformers Lightning Arrester Flexible conductors EarthWire Connectors Insulator -Post -Disc Fittings Steel Structures			
3	**PROTECTION METERING AND CONTROL** Control & Relay Panels			

Item	Description	Proposed Subcontractors/ Manufacturers	Place of Manufacture	Place of Testing and Inspection
	Protective relays Meters Transducers Energy(Tariff) meter Tarrif metering panel			
4	**DC EQUIPMENT** Distribution Boards			
5	**415 V SWITCH BOARD**			
6	**MULTICORE CABLES** XLPE Insulated Cables Cable trays			
7	**EARTHING** Copper flat bar/ Copper conductor Insulated copper Conductor Earthing Rod			
8	**FIBRE OPTIC MULTIPLEXER EQUIPMENT**			
9	**RTU**			
10	**SITE ERECTION AND COMMISSIONING BY** **CIVIL WORKS** Design to be performed by:- Constructed by:-			

POWER GRID COMPANY OF BANGLADESH LIMITED

BIDDING DOCUMENT
FOR
PROCUREMENT OF

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

SCHEDULE E

TECHNICAL PARTICULARS AND GUARANTEES

PART 1 - 132 kV GIS

1.1 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation:

Sl. No.	Description	Unit	Bidder's Data
			132 kV
1	**Site Condition**		
	Max. Altitude above sea level	m	
	Max. Ambient temperature outdoor	^{0}C	
	Min. Ambient temperature outdoor	^{0}C	
	Max. Ambient relative humidity	%	
	Max. Seismic acceleration at floor level:		
	- horizontal	g	
	- vertical	g	
2	**Type Designation**		
	Enclosure:		
	- busbar		
	- bay		
	Enclosure Material		
	Standards		
3	**Electrical Data**		
	Rated Voltage	kV	
	Rated Frequency	Hz	
	Insulation Level:		
	- lightning impulse withstand	kV	
	- 50 Hz withstand 1 minute	kV	
	Rated continuous current at 40^{0}C ambient temperature:		
	- main busbar and bus coupler	A	
	- transformer bay	A	

Sl. No.	Description	Unit	Bidder's Data
			132 kV
	- line bay	A	
	Rated short time withstand:		
	- current	kA	
	- duration	sec	
	Rated peak withstand current	kA	
4	**Secondary Circuit**		
	Auxiliary voltage:		
	- for control and signal	V dc	
	- for remote control	V dc	
	- for heating	V ac	
	- tolerances	%	
5	**Solid Insulators**		
	Type of solid insulators		
	Material of solid insulators		
	Discharge level at 110% of the Rated voltage	pC	
	Gas tight disc type insulator:		
	- bursting pressure	Bar	
	- routine test pressure	Bar	
6	**Insulation Medium**		
	Insulation medium		
	Max. permissible moisture content	ppmv	
	Max. permissible air content	vol%	
7	**Gas Compartments**		
	No. of gas compartment per feeder		
	Max. gas losses per gas compartment and year	%	
	Material of filter employed for Moisture absorption		
	Gas filling pressure at 20^0C ambient temperature	Bar	
	Max. gas-service pressure at 40^0C ambient temperature	Bar	
	Min. gas-service pressure at 25^0C ambient temperature	Bar	
	Type of gas monitoring		
	Signal: "Loss of SF6-Gas" at 20^0C ambient temperature	Bar	

Sl. No.	Description	Unit	Bidder's Data
			132 kV
	Signal: "Min. of SF6-Gas" at 20^0C ambient temperature	Bar	
	Type of pressure relief device		
	Material of pressure relied device		
	Setting of pressure relief device	Bar	
8	**Enclosures**		
	Mechanical strength of enclosures:		
	- design pressure	Bar	
	- min. bursting pressure	Bar	
	Temperature rise of enclosures at Rated current:		
	- which have to be touched during normal operation	K	
	- which need not to be touched during normal operation	K	
	- which are not accessible to the operation	K	
9	**Circuit Breaker**		
	Enclosure		
	Enclosure material		
	Material of contacts		
	No. of breaks per phase		
	Rated continuous current at 40^0C ambient temperature	A	
	Rated short time breaking current	kA	
	Rated peak withstand current	kA	
	Percentage D.C component	%	
	First-pole-to-clear-factor		
	Rated breaking current, small capacitive currents	A	
	Rated breaking current, small inductive currents	A	
	Switching overvoltage	p.u.	
	Operating mechanism:		
	- for closing		
	- for opening		
	Making coil:		
	- no. per operating mechanism	pcs	
	- rated power each	W	

Sl. No.	Description	Unit	Bidder's Data
			132 kV
	Tripping coil:		
	- no. per operating mechanism	pcs	
	- rated power each	W	
	- voltage tolerances	%	
	Rated motor voltage	V dc	
	Rated motor power	W	
	No. of auxiliary contacts (NC/NO/wiping)	pcs	
	Rated operating sequence:		
	- t	sec	
	- t'	min	
	Max. closing time	ms	
	Max. dead time	ms	
	Max. break time	ms	
	Max. arcing time	ms	
10	**Disconnector**		
	Enclosure		
	Enclosure material		
	Rated continuous current at 40^0C ambient temperature	A	
	Rated breaking current	A	
	Operating mechanism:		
	- for closing		
	- for opening		
	Max. operating time:		
	- for closing	s	
	- for opening	s	
	No. of auxiliary contacts (NC/NO/wiping)	pcs	
	Rated motor voltage	V dc	
	Rated motor power	W	
	Hand operating facilities		
11	**Maintenance Earthing Switch**		
	Enclosure		
	Enclosure material		
	Operating mechanism:		
	- for closing		
	- for opening		

Sl. No.	Description	Unit	Bidder's Data
			132 kV
	Max. operating time:		
	- for closing	s	
	- for opening	s	
	No. of auxiliary contacts (NC/NO/wiping)	pcs	
	Rated motor voltage	V dc	
	Rated motor power	W	
	Hand operating facilities		
12	**High Speed Earthing Switch**		
	Enclosure		
	Enclosure material		
	Rated current	A	
	Rated capacitive breaking current	A	
	Rated inductive breaking current	A	
	Operating mechanism:		
	- for closing		
	- for opening		
	Max. operating time:		
	- for closing	s	
	- for opening	s	
	No. of auxiliary contacts (NC/NO/wiping)	pcs	
	Rated motor voltage	V dc	
	Rated motor power	W	
	Hand operating facilities		
13	**Surge Arrester**		
	Rated voltage	kV	
	Nominal discharge current	kA	
	Steep current impulse residual voltage	kV pk	
	Lightning impulse residual voltage	kV pk	
	Duty class		
	Discharge class		
14	**CT ratio, class and output**		
	(a) Line bay	A	
15	**VT ratio, class and out**		
	Ratio	kV	
	Burden	VA	

Sl. No.	Description	Unit	Bidder's Data
			132 kV
	Accuracy class		
16	**Circuit Breaker Control Cubicle**		
	Material		
	Material thickness	mm	
	Dimensions (depth/width/height)	mm	
	Total net weight	mm	
17	**Separate Local Control Cubicle**		
	Material		
	Material thickness	mm	
	Dimensions (depth/width/height)	mm	
	Total net weight	mm	

PART 2 : 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation

2.1 SF6 CIRCUIT BREAKERS :

Sl. No.	Description	Unit	Bidder's Data
			132kV
1	Manufacturer		
2	Type Reference (Manufacturer's designation)		
3	Number of Poles		
4	Rated Voltage	kV	
5	Rated frequency	Hz	
6	Rated normal current-	A rms	
7	Rated breaking currents: Line charging Cable charging Small inductive	kA rms	
8	Rated short-circuit breaking current	kA,rms	
9	First pole to clear factor		
10	Rated transient recovery voltage for terminal faults if other than standard	kV	
11	Rated characteristics for short-line faults		
12	Rated short-circuit making current	kA	

Sl. No.	Description	Unit	Bidder's Data
			132kV
13	Rated operating sequence		
14	Rated duration of short-circuit	s	
15	Rated out of phase breaking current	kA	
16	Rated opening time	ms	
17	Rated break time	ms	
18	Rated closing time	ms	
19	Maximum arcing time of any duty cycle to IEC 56	ms	
20	Is circuit-breaker re-strike free	Yes/No	
21	Test Authority		
22	Test Certificate ref.		
23	Rated short time withstand current	kA	
24	Rated duration of short-circuit	s	
25	Rated peak withstand current	kA	
26	Rated insulation levels:-		
26.1	Lightning impulse withstand to earth	kV pk	
	(waveshape 1.2/50μs)		
26.2	Lightning impulse withstand across open	kV pk	
	contacts (waveshape 1.2/50μs)		
26.3	Power frequency voltage withstand to earth	kV rms	
26.4	Power frequency voltage withstand across open contacts	kV rms	
27	Frequency of operation	yr^{-1}	
28	Operating mechanism Manufacturer		
29	Mechanism Type:		
30	Trip free/or fixed trip		
31	Is lockout facility fitted?		
32	Closing supply Volts max/min Amps	 V A	
33	Rated supply voltage of shunt opening release	V	
34	Current required at rated supply voltage to open circuit-breaker	A	

Sl. No.	Description	Unit	Bidder's Data
			132kV
	Spring charging motor - Current - Voltage AC/DC	 A V	
35	Number of auxiliary switch contacts - normally open - normally closed - adjustable		
36 37	Other auxiliary loads: Voltage: Current:		
38	Degree of Protection for (a) auxiliary circuits (b) moving parts		
39	Minimum clearances in air: (a) between phases (b) phases to earth (c) across interrupters (d) live parts to ground level	 mm mm mm mm	
40	Minimum creepage (a) to earth (b) across interrupter terminals	 mm mm	
41	Radio interference voltage	μV	
42	Number of interrupters per pole		
43	Material of interrupter chamber		
44	Wall thickness of interrupter chamber	mm	
45	Material of contact surfaces primary arcing		
46	Length of each break	mm	
47	Length of stroke	mm	
48	Operating rod for moving contact(s) material		
49	DIMENSIONS, ETC.		
50	Weight of circuit-breaker unit complete	kg	
51	Maximum shock load imposed on floor or foundations when opening under fault conditions (state whether tension or compression)	kg	

Sl. No.	Description	Unit	Bidder's Data
			132kV
52	Period of time equipment has been in commercial operation		
53	Number of the same type of circuit breakers supplied to date		

2.2 DISCONNECTORS AND EARTHING SWITCHES

Sl. No.	Description	Unit	Bidder's Data
			132kV
1	Manufacturer		
2	Type Number		
3	Operating type		
	(a) horizontal/vertical break		
	(b) Series/parallel		
	(c) Number of support insulator for pole		
	(d) Number of breaks per pole (Single Break/Center Break/Double Break)		
	(e) Material of contact surfaces		
	(f) Type of Contacts		
4	Rated normal current	A	
5	Rated short time withstand current	kA, rms	
6	Rated duration of short time current	s	
7	Rated peak withstand current	kA pk	
8	Rated insulation levels:		
8.1	Lightning impulse withstand to earth (waveshape: 1.2/50μs)	kV pk	
8.2	Lightning impulse withstand across open contacts (waveshape: 1.2/50μs)	kV pk	
8.3	Power frequency voltage withstand to earth	kV rms	
8.4	Power frequency voltage withstand across open contacts	kV rms	

Sl. No.	Description	Unit	Bidder's Data
			132kV
9	Method of operation		
10	Type of operating mechanism manual/power		
11	Operating power		
12	Voltage/pressure rated max min	V/MPa(g) V/MPa(g) V/MPa(g)	
13	Consumption electric	A	
14	Operating time: open max min	ms ms	
15	Operating time: close max min	ms ms	
16	Manual operating torque	kNm	
17	Load switching capability	A	
18	Mechanical Terminal Load	N	
19	Insulator Creepage	mm	
20	Radio interference voltage	mV	
21	Number of auxiliary switches - normally open - normally closed - adjustable		
22	Other auxiliary loads - voltage - current		
23	Mechanical endurance:		
	Number of operations carried out for mechanical operation test		
24	Degree of protection for 1) auxiliary circuits 2) moving parts		
25	Total weight of three pole disconnector complete	kg	
26	Type test certificate date/reference		
27	Period of time equipment has been in commercial operation		
28	Number of the same type of disconnectors supplied to date		

2.3 CURRENT TRANSFORMERS

Sl. No.	Description	Unit	Bidder's Data
			132kV
1	Manufacturer/type		
2	Rated primary current	A rms	
3	Rated secondary current	A rms	
4	Rated frequency	Hz	
5	Highest voltage for equipment	kV	
6	Rated insulation level - primary winding	kV	
7	Lightning impulse withstand	kV pk	
8	(a) Power frequency withstand (dry) (b) Power frequency withstand (wet)	kV rms kV rms	
9	Insulator creepage (phase to earth)	mm	
10	Electrical dissipation factor at power frequency test voltage		
11	Radio influence voltage measured at U/√3 1 MHz	µV	
12 13	Rated short term thermal current for 1s Rated short term thermal current for 3s	A rms A rms	
14	Rated dynamic current	kA pk	
15	Insulation class		
16	Number of secondary windings		
	Location of core		
	Core 1 Rated output Accuracy class Accuracy limit factor		
	Core 2 Rated output Accuracy class Accuracy limit factor		
	Core 3 Rated output Accuracy class Accuracy limit factor		
	Core 4 Rated output Accuracy class Accuracy limit factor		
17	Is earth screen fitted between primary and secondary windings		

Sl. No.	Description	Unit	Bidder's Data
			132kV
18	Type test certificate ref/date		

2.4 Inductive Voltage Transformer

Sl. No.	Description	Unit	Bidder's Data
			132kV
1	Manufacturer	-	
2	Type No.	-	
3	Transformer type	-	
4	Rated primary voltage	kV rms	
5	Rated secondary voltage for each secondary winding	kV rms	
6	Accuracy class for each winding Rated output for each winding Rated volt-ampere rating for each winding	VA VA	
7	Rated voltage factor		
8	Type of Insulation		
9	Maximum temperature rise	^{o}C	
10	Short-circuit withstand capability	kA rms	
11	Primary insulation		
11.1	Lightning impulse withstand dry	kV pk	
11.2	(a) Power frequency withstand wet (b) Power frequency withstand dry	kV rms kV rms	
12	Partial discharge magnitude	pC	
13	Total external creepage distance	mm	
14	Radio influence voltage measured at 11 Um/ 3 at 1 MHz	µV	
15	Total installed weight	kg	
17 18	Open circuit intermediate voltage Rated open-circuit intermediate voltage	kV kV	
19 20	Reference range of frequency Reference range of temperature	+/- Hz oC	
21	Protective device to limit overvoltage		

2.5 SURGE ARRESTERS

Sl. No.	Description	Unit	Bidder's Data
			132kV
1	Manufacturer		
2	Model Number		

3	Type:		
4	Continuous operating voltage	kV rms	
5	Rated voltage	kV rms	
6	Standard nominal discharge current	kA	
7	Reference current at ambient temperature	mA	
8	Reference voltage for above	kV rms	
9	Steep current impulse residual voltage	kV pk	
10	Lightning impulse residual voltage at 5kA 10kA 20kA	 kV pk kV pk kV pk	
11	Duty Class		
12	Discharge class		
13	Pressure relief class		
14	Nominal diameter of resistor blocks	mm	
15	Number of resistor blocks connected electrically in parallel		
16	Number of separately housed units per phase		
17	Overall height of arrester (without supporting structure)	m	
18	Overall height of arrester including grading ring if applicable	mm	
19	Clearances: phase to earth (from centre line) phase to phase (centre line to centre line)	 mm mm	
20	Overall Weight of arrester (without supporting structure)	kg	
21	Maximum cantilever strength	Nm	
22	Maximum force due to wind (at maximum specified gust speed)	Nm	
23	Minimum creepage distance over insulator housing	mm	
24	Insulator shed profile - Reference		

	Document		
25	Terminal palm details - Drawing No.		
26	Earthing terminal - Drawing No.		
27	Type & Description of surge monitoring device		
28	Type test certificate ref/date		
29	Number of the same type of surge arresters supplied to date		

2.6 INSULATOR STRINGS

Sl. No.	**Description**	**Unit**	**Bidder's Data**
			132kV
1	Manufacturer		
2	Insulator type (normal) and manufacturer's reference		
3	Insulation material		
4	Number of units per string		
5	Outside diameter	mm	
6	Distance between centres	mm	
7	Length of string overall	mm	
8	Maximum working load	kN	
9	Minimum failing load per unit	kN	
10	Mechanical routine load test	kN	
11	Electro-mechanical failing load	kN	
12	Mechanical failing load	kN	
13	Electrostatic capacity	pF	
14	Weight of complete string	kg	
15	50 Hz 1 minute withstand voltage of unit (dry)	kV	
16	50 Hz 1 minute withstand voltage of unit (wet)	kV	
17	Minimum 50 Hz puncture voltage	kV	
18	Dry lightning impulse withstand voltage		

	of string1.2/50 micro sec. wave	kV	
19	Minimum creepage distance per unit: (a) Specified, subject to acceptable shed profile (b) Guaranteed	 mm mm	
20	Protected creepage distance per unit	mm	
21	Radio influence voltage measured at Um/√3 at 1 MHz	µV	

2.7 BUSBAR/JUMPER CONDUCTORS AND CONNECTIONS

Sl. No.	Description	Unit	Bidder's Data
			132kV
A.	**FLEXIBLE CONDUCTORS**		
1	Manufacturer		
2	Conductor material		
3	Material specification aluminium alloy		
4	Minimum use of grease		
5	Number of sub conductor per		
6	Nominal diameter of conductor		
7	Rated current (site rating)		
8	Temperature rise at rated current		
9	Short time withstand current for		
10	Peak withstand current		
11	Conductor spacer type		
12	Creep period of conductor	years	
B.	**SHIELD WIRES**		
1	Manufacturer		
2	Conductor material		
3	Material specification aluminium alloy		
C.	**CLAMPS AND FITTINGS**		
	Manufacturer		
	Types		
	Maximum working stresses		
D	**STEEL STRUCTURES**		
1	Manufacturer		

2	Proposed standards for steel		

PART 3 – AUXILIARY POWER AND MULTICORE CONTROL CABLES
(Schedule to be completed if manufacture not to BS 6346)

Item		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Number of core		4	4	4	4	4	2	2	2	2	4	7	12	19	27	37
Core section	mm^2															
Core diameter	mm															
Conductor insulation	mm															
Type of filler																
Type of tape																
Sheath thickness	mm															
Sheath outer diameter	mm															
Armour wires	no.															
Armour wires diameter	mm															
Outer covering	type															
Outer covering thickness	mm															
Complete cable:																
Diameter	mm															
Weight per metre	kg															
Maximum drum length	m															
Minimum installed bending radius	mm															
Maximum conductor temperature	^0C															

PART 4 - FOR DCDB & LVAC EQUIPMENT

Sl.No.	Description		Bidder's Data
3.1	**Miniature Circuit Breakers For DCDB**		
1	Manufacturer		
2	Manufacturer’s type designation		
3	Rating	Amps	
4	Fault Rating for 1 sec	KA	
5	Voltage	Volts	
3.2	**Miniature Circuit Breakers for LVAC**		
1	Manufacturer		
2	Type		
3	Rating	Amps	
4	Fault Rating for 1 sec	kA	

PART 5 - FIBRE OPTIC MULTIPLEXER EQUIPMENT

SL. No.	Description	Unit	Bidder's Data
1	**GENERAL:**		
	Manufacturer		
	Model No.		
	Type		
	Type of multiplexer		
	Complying to ITU-T rec.		
	Transmission Capacity	Mbit/s	
	Access capacity on 64 kbit/s	channels	
	Access capacity on 2 Mbit/s	channels	
	Redundant central processor		
	Digital cross connect function		
2	**Available AGGREGATES:**		
	Optical aggregates (ITU-T G.957)		
3	**Available TRUNK INTERFACES:**		
	HDB3, 2 Mbit/s interfaces per module	No.	
	Complying to ITU-T rec.		
	HDSL, 2Mbit/s interface: no of copper wires - Capacity on 2Mbit/s or on 1Mbit/s - Capacity selectable	No. ch ch / pair of wire	
4	**Available USER INTERFACES**		
5	**Voice interfaces for trunk lines:**		
	1 + 1 com path protection, available for all		
	Analogue, 4wire with E&M: Input level Output level	dBr dBr	
	Analogue, 2wire with E&M: Input level Output level	dBr dBr	
	Digital, 2Mbit/s CAS or PRI		
6	**Voice interfaces for remote Subscriber:**		
	2wire, subscriber side	dBr	
	2wire, PABX side	dBr	
7	**Integrated teleprotection**		
8	**Interface for Commands:**		
	Number of independent commands	No.	
	Transmission time max.	ms	
	Signal voltage	Vpeak	
	1 + 1 com path protection		
9	**Interface(s) for Distance Protection:**		
	Electrical interface: G.703	kbit/s	
	Optical Interface	kbit/s	
10	**Data: channels per module**		
	1 + 1 com path protection, available for all		
	V.24/V.28 (RS-232): up to 38.4kbit/s	No.	
	V.11/X.24 (RS-422): 64kbit/s	No.	
	V.35: 64kbit/s	No.	
	V.36 (RS-449): 64kbit/s	No.	

SL. No.	Description	Unit	Bidder's Data
	G.703: 64kbit/s	No.	
	Ethernet: 10/100 BaseT WAN capacity Protocols	No. Mbit/s Mbit/s	
11	**Integrated alarm gathering module:**		
	Number of external alarms per module	No.	
	Auxiliary power supply for ext. contacts		
12	**Network Management System**		
	Type/Name of configuration tool		
	For fault / configuration management		
	For local / remote operation		
	Data communication network (DCN)		
13	**Ambient Conditions:**		
	Storage: ETS 300 019-1-1, class 1.2	°C / % hum	
	Transport: ETS 300 019-1-2, class 2.2	°C / % hum	
	Operation: ETS 300 019-1-3, class 3.1E	°C / % hum	
14	**Power Supply**		
	Operation	VDC	
	Fully redundant power supply		

Bidder shall provide all necessary information which deem to be necessary to complete the project in all respects.

PART 6 – PROTECTION

9.1 132kV Line Differential Protection (87L) (Main) :

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Range of operating coil settings	% of CT rating	
4	Range of bias coil settings	% of CT rating	
5	Recommended operating coil setting	% of CT rating	
6	Recommended bias coil settings	% of CT rating	
7	Number of bias coils		
8	Minimum sensitivity: Earth faults/Phase faults	% of CT rating	
9	Maximum through fault at which the protective equipment is stable with recommended settings: Earth faults/Phase faults	% of CT rating	
10	Inter trip: Operating time/Reset time	ms	
11	Permissive inter trip:		
	Time delay setting	ms	
	Operating time after delay setting	ms	
	Reset time	ms	
12	Maximum time delay between initiation of fault and emerging of breaker trip circuit		
13	Current transformer requirement		

9.3 132 kV Line Distance Protection (21)

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Phase switched		
4	Zone switched		
5	Number of zones		
6	Shape of impedance characteristic: Zone 1/Zone 2/Zone 3		
7	Reverse looking element (blocking signal initiation)		
8	Sensitivity:		
8.1	Minimum operation current: Earth faults/Phase faults	A	
8.2	Minimum necessary voltage for fault at Zone 1 reach point (if applicable): Earth faults/Phase faults	V	
8.3	Minimum Zone 1 ohmic impedance to which relay can be set	ohms	
8.4	Maximum Zone 1 ohmic impedance to which relay can be set and maintain accuracy	ohms	
8.5	Minimum Zone 2 ohmic impedance to which relay can be set	ohms	
8.6	Maximum Zone 2 ohmic impedance to which relay can be set and maintain accuracy	ohms	
8.7	Maximum Xone 3 ohmic reach: Forward reach/Reverse reach	ohms	
9	Arc forward and reverse reach setting independent of each other?	Yes/No	
10	Can resistance and reactance reaches be set independent of each other	Yes/No	
11	Directional sensitivity	V	
12	Current transformer requirements		
13	Voltage transformer requirements		
14	Back up Zone time ranges: Zone 2/ Zone 3	sec.	
15	Method used to clear close-in faults:		
	which occur when line is already energized in service		
	which exist upon line energisation		
16	Has distance protection previously been used in the type of blocking scheme offered for this contract? If yes: number of scheme in service/year first in service	Yes/No	
17	Approximate number of years distance relay in service (A complete reference list should be submitted stating client, system voltage and year of going into service).		
18	Zone 1 operating times on fault position:		
	Earth faults: 0, 50, 90% of relay setting	ms (min./max.)	
	Phase to phase faults: 0, 50, 90% of relay setting	ms (min./max.)	

	Three phase faults: 0, 50, 90% of relay setting	ms (min./max.)	

9.4 Directional over current and Earth Fault Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Current setting range: Forward element/Reverse element	A	
4	Minimum polarizing quantity required for correct directional decision:		
	Voltage: Forward element/Reverse element	V	
	Current: Forward element/Reverse element	V	
5	Characteristic angle	Degree	
6	Time ranges: Blocking scheme/Back up	sec	
7	Has protection previously been used in the blocking scheme offered for this contract?	Yes/No	
8	Current transformer requirements		

9.5 Inversed Time Overcurrent and Earth Fault Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Inversed time element		
	Range of current settings: Overcurrent/Earth Fault	A	
	Range of operating times at highest timing setting at ten times current setting	sec.	
	Range of operating times at highest timing setting at twice current setting	sec.	
4	High set instantaneous element range of settings: Overcurrent/Earth Fault	A	
5	Transient overreach at X/R=10		
6	Operating time with Maximum offset current at five times current setting	ms	
7	Burden of relay on minimum inverse time element current setting at a current ten times setting: Overcurrent/Earth fault	VA	

9.6 132 kV Busbar Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Operating principle, e.g. high impedance		
4	Minimum relay setting	A	
5	Sensitivity of scheme (allowing for CT magnetizing current, etc.)		
6	Maximum through fault current at which protection is stable	A	

7	Current transformer requirements		
8	Estimated magnetizing current at relay setting	A	
9	Operating time at twice relay minimum setting	ms	
10	Operating time at ten times relay minimum setting	ms	

9.8 Breaker Failure Protection

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Setting of current elements: Phase faults/Earth faults	A	
4	Timer setting range	sec.	
5	Burden of relay at minimum current setting at ten times CT secondary rated current during: Phase faults/Earth faults	VA	
6	Operating time/Reset time	ms	

9.9 Tripping Relays

SL. No.	Description	Unit	Bidder's Data
1	Manufacturer		
2	Type designations		
3	Nominal operating voltage	V	
4	Minimum operating voltage	V	
5	Operation indicator		
6	Operating time at nominal voltage	ms	
7	Contact rating:		
	Make and carry continuously	VA	
	Make and carry for 3 sec.	VA	
	Break: resistive inductive	W VA	

9.10 Overall Fault Clearance Times

SL. No.	Description	Unit	Bidder's Data
1	132 kV Busbar Faults:		
	Main protection relay operating time	ms	
	Auxiliary and tripping relay time (where used)	ms	
	Circuit breaker time	ms	
	Total	ms	

9.11 Control/Relay Panel

SL. No.	Description	Unit	Requirement	Bidder's Data
1	Manufacturer			
2.1	Type (simplex/duplex)			
2.2	Applicable standard		IEC	
3	Enclosure protection class		IP43	
4	Thickness of sheet metal used			
4.1	Front and rear portion	mm	>=3	
4.2	Side, top & bottom covers	mm	>=2	
4.3	Doors	mm	>=3	
5	All instruments, meters, relays and control switches flush or semi-flush type?		flush type	
6.1	Ground bus Material & size		copper	
6.2	Ground bus size		25X6mm	
7	Overall dimension of control boards (LxWxH)	mm		

PART-7: Energy Meter (Tariff Meter)

Sl. No.	Description	Unit	Employer's requirement	Bidder's Data
1	Manufacturer			
2	Type			
3	Programmable meter	yes/no	yes	
4	Adjustable different tariff	yes/no	yes	
5	Input voltage setting	V	110-400	
6	Accuracy class		0.2	
7	RS232/485 Port for Medem interface	yes/no	yes	
8	Password protection for programming and for configuaration	yes/no	yes	
9	Configurable display	yes/no	yes	
10	Power quadrant display	yes/no	yes	
11	Optical interface facilities	yes/no	yes	

PART-8: **PORTABLE EARTHING EQUIPMENT**

Sl.	Specification	Employer's requirement	Bidder's Data
	Type/Model No.		
	Manufacturer		
1	Rated voltage	245kV	
2	Material type for Hot Stick	Glass fibre, weather resistant Non conductive,	
3	Material type for grounding lead	Heavy duty with wide range current capacity; Hi-copper conductor lead with Transparent insulated cover.	
4	Min. Short circuit current capacity	(50 kA for 3 sec),	
5	No.s grounding lead,	3Nos.(1 for each phase)	
6	length of Grounding lead	Minimum 4.28 meter	
7	Height of Hot stick	Minimum 4.28 meter (2 section)	
8.	Country of origin	USA/UK/Japan/Europe	

Bidder shall provide all necessary information which deems to be necessary to complete the project in all respects. Bidders shall provide all necessary information with supporting documents against proposed manufacturer in schedule D.

POWER GRID COMPANY OF BANGLADESH LIMITED

BIDDING DOCUMENT
FOR
PROCUREMENT OF

Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

SCHEDULE F

PROPOSED SUBCONTRACTORS

The bidder shall propose a list of the Sub-contractors in the following table as per sub-clause 2.6, Item 5, Subcontractors, Section-3, Evaluation and Qualification Criteria, Volume 1 of 3 of the Bidding Document.

Sl. No.	Name and Address of the Subcontractor

Signature ----------
Date ----------

POWER GRID COMPANY OF BANGLADESH LIMITED

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Design, Supply, Erection, Testing and Commissioning of 132 kV Gas Insulated Switchgear (GIS) Bay Extension at Existing Maniknagar Grid Substation (GSS) and 132 kV Air Insulated Switchgear (AIS) Bay Extension at Existing Tongi Grid Substation (GSS) on Turnkey Basis.

SCHEDULE G

COEFFICIENT AND INDICES FOR PRICE ADJUSTMENT

Coefficient Scope of Index	Country of Origin; Currency of Index	Source of Index; Title/Definition	Value on Stated Dates	
			Value	Date
For Transformer: a=0.15 b=0.22 c=0.25 d=0.15 e=0.03 f=0.2				