TECHNICAL QUALIFYING CRITERIA FOR 400kV GIS

Qualifying Requirements for 400kV GIS Package (Package-II) at KPS 3 (HVDC), South Olpad (HVDC) and Extn. of existing KPS3 (GIS) station including civil works associated with ±500kV, 2500 MW KPS-3 (HVDC) and South Olpad (HVDC) Scheme associated with Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-V (8GW): Part C through Tariff based Competitive (TBCB) route; Spec No: CC/T/W-GIS/DOM/A06/24/14461

Funding: Domestic
Mode of Procurement: DCB

QUALIFICATION OF THE BIDDER

Qualification of Bidder will be based on meeting the minimum pass/fail criteria specified below regarding the Bidder's Technical Experience and Financial Position as demonstrated by the Bidder's responses in the corresponding Bid Schedules. Technical experience and financial resources of any proposed subcontractor shall not be taken into account in determining the Bidder's compliance with the qualifying criteria. ~~The bid can be submitted by an individual firm or a Joint Venture of two or more firms (specific requirements for Joint Ventures are given under Para 3.0 below).~~

POWERGRID/BHEL may assess the capacity and capability of the bidder, to successfully execute the scope of work covered under the package within stipulated completion period. This assessment shall interalia include (i) document verification; (ii) bidders work/manufacturing facilities visit; (iii) manufacturing capacity, details of works executed , works in hand, anticipated in future & the balance capacity available for present scope of works; (iv) details of plant and machinery, manufacturing and testing facilities, manpower and financial resources; (v) details of quality systems in place; (vi) past experience and performance; (vii) customer feedback; (viii) banker's feedback etc.

1.0 TECHNICAL QUALIFICATION CRITERIA

1) **The GIS must be offered from Indian manufacturer, who meets the requirement mentioned at Route-1 or Route-2 or Route-3 mentioned below.**

&

2) **A legally enforceable undertaking (By GIS Manufacturer jointly with BHEL) (as per enclosed format in bidding document) to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s) is submitted along with the bid stating that GIS Manufacturer shall furnish performance guarantee for an amount of two (2) % of the GIS Portion**. This performance guarantee shall be in addition to the Contract Performance security to be submitted by the Bidder.**

&

3) **Bidder must meet the any of the following qualification Route-1, 2 or 3.**

Route-1:

1.1 The Bidder must have designed, manufactured, type tested (as per IEC or equivalent standard), supplied and supervised erection & commissioning of at least two (2) nos. Gas Insulated Switchgear (GIS) circuit breaker bays@ of 345kVor above voltage class in one (1) Substation or Switchyard during the last seven (7) years and these bays must be in satisfactory operation# for at least two (2) years as on the on the Originally scheduled last date of bid submission (soft copy) i.e. 04.11.2024.

Route-2:

1.2 The Bidder, who has established manufacturing & testing facility in India for 345kV or above voltage level

TECHNICAL QUALIFYING CRITERIA FOR 400kV GIS

GIS but not meeting the requirement stipulated in para 1.1 above, shall also be considered provided that:

a) The Bidder must have manufactured, at least one (1) no. 345kV or above voltage class GIS circuit breaker bays@ based on technological support of the collaborator(s), provided that the collaborator(s) meets the requirement stipulated in para 1.1 above. Further bidder must have either supplied or type tested above CB bay (as per IEC or equivalent standard) as on the originally scheduled last date of bid submission mentioned above, i.e., 04.11.2024.

b) Further, the bidder shall also submit the following along with the bid:

i. A legally enforceable undertaking (jointly with the Collaborator(s) to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s).

ii. A confirmation letter from the Collaborator(s) stating that the Collaborator(s) shall furnish performance guarantee for an amount of 10 % of the ex-works cost of such equipment(s). This performance guarantee shall be in addition to Contract Performance Guarantee to be submitted by the bidder.

iii. A valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 345kV or above voltage level GIS equipment in India.

Route-3:

1.3 The Bidder, who has established manufacturing & testing facility in India for 345kV or above voltage level GIS as Subsidiary/JVC/Group company by its parent/principal but not meeting the requirement stipulated in para 1.1 above, shall also be considered provided that:

a) The Bidder must have manufactured, at least one (1) no. 345kV or above voltage class GIS circuit breaker bays@ based on technological support of the parent/principal, provided that the parent/principal meets the requirement stipulated in para 1.1 above. Further bidder must have either supplied or type tested above CB bay (as per IEC or equivalent standard) as on the originally scheduled last date of bid submission mentioned above, i.e., 04.11.2024.

b) Further, the bidder shall also submit the following along with the bid:

i. A legally enforceable undertaking (jointly with the parent/principal company) to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s).

ii. A confirmation letter from the parent/principal company stating that the parent/principal company shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s). This performance guarantee shall be in addition to Contract Performance Guarantee to be submitted by the bidder.

iii. A valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 345kV or above voltage level GIS equipment in India.

Route-4

-deleted-

Note :-

TECHNICAL QUALIFYING CRITERIA FOR 400kV GIS

1. *(#) Satisfactory operation means certificate issued by the Employer certifying the operation without any adverse remark.*

2. (@) For the purpose of qualifying requirement, one no. of circuit breaker bay shall be considered as a bay used for controlling a line or a transformer or a reactor or a bus section or a bus coupler and comprising of at least one circuit breaker, one disconnector and three nos. of single phase CTs / Bushing CTs.

3. In case bidder is a holding company, the technical experience referred to in Route-1, 2, 3 & 4 above as the case may be shall be of that holding company only (i.e. excluding its subsidiary/ group companies). In case bidder is a subsidiary of a holding company, the technical experience referred to in Route-1, 2, 3 & 4 above as the case may be shall be of that subsidiary company only (i.e. excluding its holding company).

4. In case bidder is qualifying through Route-1, type test reports of Collaborator/ Parent Company/ Subsidiary Company/ Group Company shall also be acceptable, for which a confirmation shall be furnished along with the bid as per format attached in the bidding documents.

5. ** Total price of items in supply, F&I and installation schedules mentioned under Activity titled "GIS portion" in BPS shall be considered for calculation of amount of CPG to be furnished by GIS manufacturer

4.0 The bidder shall furnish documentary evidence in support of the qualifying requirement stipulated as above.

Prepared by: **Checked by:** **Approved by:**

Attachment-3 (QR)

400kV GIS Package (Package-II) at KPS 3 (HVDC), South Olpad (HVDC) and Extn. of existing KPS3 (GIS) station including civil works associated with ±500kV, 2500 MW KPS-3 (HVDC) and South Olpad (HVDC) Scheme associated with Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-V (8GW): Part C through Tariff based Competitive (TBCB) route.
Spec. No. CC/T/W-GIS/DOM/A06/24/14461

(Qualifying Requirement Data)

To:

Contract Services

Power Grid Corporation of India Ltd.,
"Saudamini", Plot No. 2, Sector 29
Gurugram (Haryana) - 122001

Bidders's Name & Address:

Name:	
Address:	

Dear Sir,

In support of the Qualification Requirements (QR) for bidders, stipulated in Annexure-A (BDS) of the Section - III (BDS), Volume-I & Additional Information required as per ITB clause 9.3(c) of the Bidding Documents, we furnish herewith our QR data/details along with other information, as follows herewith our stipulations have been reproduced in italics for ready reference, however, in case of any discrepancy the QR as given in BDS shall prevail).

*	We have submitted bid as individual firm.
*	We have submitted bid as joint venture of following firms :

(* ***delete whichever is not applicable***)

[For details regarding Qualification Requirements of a Joint Venture, please refer para 4.0 below.]

We are furnishing the following details/document in support of Qualifying requirement for the subject package.

A Attached copies of original documents defining :

a) The constitution or legal status;

b) The principal place of business;

c) The place of incorporation (for bidders who are corporations); or the place of registration and the nationality of the Owners (for applicants who are partnerships or individually-owned firms).

B Attached original & copies of the following documents :

a) Written power of attorney of the signatory of the Bid to commit the bidder.

~~b)~~ ~~Joint Venture Agreement.~~

GENERAL INFORMATION

Bidder is required to provide general information as per the following format.

[Where the Bidder proposes to use named subcontractor(s) for critical components of the works or for work contents in excess of ten (10) percent of the bid price, the following information should also be supplied for the subcontractor(s)].

S No.	Particulars	Bidder/Lead Partner	In case of Joint Venture	
			For Other Partner(s)	For Other Partner(s)
1	Name of the Firm			
2	Head Office/ Registered Office Address			
3	Telephone			
4	Fax			
5	Contact Person			
6	Place of Incorporation/ Registration			
7	Year of Incorporation/ Registration			
8	Nationality of			
	Owner (i)			
	Owner (ii)			
	Owner (iii)			

1.0 TECHNICAL REQUIREMENTS ***{Reference para 1.0 of Annexure-A (BDS)}***

TECHNICAL EXPERIENCE

1.1	*Route-1:* *The Bidder must have designed, manufactured, type tested (as per IEC or equivalent standard), supplied and supervised erection & commissioning of at least two (2) nos. Gas Insulated Switchgear (GIS) circuit breaker bays@ of 345kVor above voltage class in one (1) Substation or Switchyard during the last seven (7) years and these bays must be in satisfactory operation# for at least two (2) years as on the on the Originally scheduled last date of bid submission (soft copy) i.e.* ***04.11.2024.***	
1.2	*Route-2:* *The Bidder, who has established manufacturing & testing facility in India for 345kV or above voltage level GIS but not meeting the requirement stipulated in para 1.1 above, shall also be considered provided that:* *a)The Bidder must have manufactured, at least one (1) no. 345kV or above voltage class GIS circuit breaker bays@ based on technological support of the collaborator(s), provided that the collaborator(s) meets the requirement stipulated in para 1.1 above. Further bidder must have either supplied or type tested above CB bay (as per IEC or equivalent standard) as on the originally scheduled last date of bid submission mentioned above.* *b)Further, the bidder shall also submit the following along with the bid:* *i. A legally enforceable undertaking (jointly with the Collaborator(s) to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s).* *ii. A confirmation letter from the Collaborator(s) stating that the Collaborator(s) shall furnish performance guarantee for an amount of 10 % of the ex-works cost of such equipment(s). This performance guarantee shall be in addition to Contract Performance Guarantee to be submitted by the bidder.* *iii. A valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 345kV or above voltage level GIS equipment in India.*	

1.3	*Route-3:* *The Bidder, who has established manufacturing & testing facility in India for 345kV or above voltage level GIS as Subsidiary/JVC/Group company by its parent/principal but not meeting the requirement stipulated in para 1.1 above, shall also be considered provided that:* *a)The Bidder must have manufactured, at least one (1) no. 345kV or above voltage class GIS circuit breaker bays@ based on technological support of the parent/principal, provided that the parent/principal meets the requirement stipulated in para 1.1 above. Further bidder must have either supplied or type tested above CB bay (as per IEC or equivalent standard) as on the originally scheduled last date of bid submission mentioned above.* *b)Further, the bidder shall also submit the following along with the bid:* *i.A legally enforceable undertaking (jointly with the parent/principal company) to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s).* *ii.A confirmation letter from the parent/principal company stating that the parent/principal company shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s). This performance guarantee shall be in addition to Contract Performance Guarantee to be submitted by the bidder.* *iii.A valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 345kV or above voltage level GIS equipment in India.*
1.4	*Route-4* *In case, the bidder is not a GIS manufacturer, he shall also be considered provided:* *i. The bidder must have erected and commissioned at least two (02) nos. GIS circuit breaker bays of 345kV or above voltage class in one (01) new GIS substation or switchyard during last seven (07) years and these bays must be in satisfactory operation# for at least two (02) years as on the originally scheduled last date of bid submission mentioned above.* *ii. The GIS must be offered from Indian manufacturer, who meets the requirement mentioned at Route-1 or Route-2 or Route-3 above.* *iii. A legally enforceable undertaking (jointly with the GIS Manufacturer) (as per enclosed format in Section VI, Volume-I of bidding document) to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s) is submitted along with the bid stating that GIS Manufacturer shall furnish performance guarantee for an amount of two (2) % of the GIS Portion**. This performance guarantee shall be in addition to the Contract Performance security to be submitted by the Bidder.*

	Note :- *1.(#) Satisfactory operation means certificate issued by the Employer certifying the operation without any adverse remark.* *2.(@) For the purpose of qualifying requirement, one no. of circuit breaker bay shall be considered as a bay used for controlling a line or a transformer or a reactor or a bus section or a bus coupler and comprising of at least one circuit breaker, one disconnector and three nos. of single phase CTs / Bushing CTs.* *3.In case bidder is a holding company, the technical experience referred to in Route-1, 2, 3 & 4 above as the case may be shall be of that holding company only (i.e. excluding its subsidiary/group companies). In case bidder is a subsidiary of a holding company, the technical experience referred to in Route-1, 2, 3 & 4 above as the case may be shall be of that subsidiary company only (i.e. excluding its holding company).* *4.In case bidder is qualifying through Route-1, type test reports of Collaborator/ Parent Company/ Subsidiary Company/ Group Company shall also be acceptable, for which a confirmation shall be furnished along with the bid as per format attached in the bidding documents.* *5.** Total price of items in supply, F&I and installation schedules mentioned under Activity titled "GIS portion" in BPS shall be considered for calculation of amount of CPG to be furnished by GIS manufacturer*

Using the following format, each Bidder (individual firms or partners of a joint venture) is requested to list the experience as detailed above, on the basis of which the Bidder wishes to qualify. The information is to be summarised using following format for each experience of the Bidder or of each Partner of a Joint Venture.

(The bidder shall attach documentary evidence, such as copies of utility certificates for completed contracts and copies of award letters etc. for ongoing contracts in support of his experience as listed in the following proforma for each Contract with the help of "Attach" Buttons provided in table given below).

Format-A:

Format for the Bidder/ Lead Partner/ Partners of JV in case of Joint Venture/Indian GIS Manufacturer in support of meeting the requirement of para 1.1, Annexure-A to BDS, Section-III, Volume-I of the Bidding Documents)

	Bidder's Name :		
	Single Firm/Lead Partner/Other Partners of a JV/Indian GIS Manufacturer		
1	Name of Contract Undertaken		
2	Contract Reference No. & Date of Award		
3	Name and Address of the Employer/Utility for whom the Contract was executed by the firm/Partner of a JV		
	E-mail ID		
	Telephone No.		
	Fax No.		

4(a)(i)	Voltage Level of GIS Substation commissioned under the Contract ***(Indicate 345kV or above class only)***		
	No. of GIS Circuit Breaker equipped bays under the above contract		
	(Indicate nos. of GIS Circuit Breaker equipped bays of 345kV or above voltage level where one no. of circuit breaker bay shall be considered as a bay used for controlling a line or a transformer or a reactor or a bus section or a bus coupler and comprising of at least one circuit breaker, one disconnector and three nos. of single phase CTs/Bushing CTs)		
	Name of the substation or switchyard		
(a)(ii)	No. of years, the above Substation have been in operation as on the Originally scheduled last date of bid submission (soft copy)		
	Scope of work involved under the Contract (Tick whichever is/are applicable) NOTE: type test reports of Collaborator/ Parent Company/ Subsidiary Company/ Group Company shall also be acceptable, for which a confirmation shall be furnished along with the bid as per format attached in the bidding documents (Attachment-30 in Volume-III)	☐Design ☐Manufacture ☐Type Testing ☐Supply ☐Supervision of Erection & Commissioning	☐Design ☐Manufacture ☐Type Testing ☐Supply ☐Supervision of Erection & Commissioning
	Whether Undertaking (as per enclosed format in Section-VI, Sample Forms and Procedures of bidding document) for above is enclosed with the bid		
	Details of documents uploaded in support of the above stated experience		

Format-B:

Format in support of meeting the requirement of para 1.2 (Route-2) of Annexure-A to BDS, Section-III, Volume-I of the Bidding Documents)

	Name of the Indian Bidder not meeting the requirement stipultaed in Clause 1.1 of Annexure-A (BDS), but has established manufacturing and testing facilities in India for 345kV or above Gas Insulated Switchgear (GIS):	
1	Whether 345kV or above voltage level GIS Circuit Breaker bay manufactured by bidder have been supplied or Type tested	
A	if Type tested, details of Type test Report	
B	Details of GIS supplied by them	
i	Name of Contract Undertaken for manufacturing 345kV or above voltage level GIS bays	
ii	Contract Reference No. & Date of Award	
iii	Name and Address of the Employer/Utility for whom 345kV or above voltage level GIS bays were supplied by the Bidder	
	E-mail ID	
	Telephone No.	
	Fax No.	

iv	No. of 345kV or above GIS Circuit Breaker bays under the contract		
	Name of the substation or switchyard		
	Whether 345kV or above voltage level GIS Circuit breaker bays, as mentioned above, has been manufactured based on technological support of the Collaborator under the Contract.		
	If Yes, indicate the Name of Collaborator(s)		
	No. of years, the above GIS Subatation(s) are in operation as on the Originally scheduled last date of bid submission (soft copy).		
	Scope of work involved under the Contract for the above 345kV or above GIS bay as per IEC as on the Originally scheduled last date of bid submission (soft copy). ***(Tick whichever is/are applicable)***	☐Manufactured ☐Supply ☐Type Testing	
	Details of documents uploaded in support of the above stated experience		

Format-C:

Format in support of meeting the requirement of para 1.2(Route-2) (as applicable) Annexure-A to BDS, Section-III, Volume-I of the Bidding Documents)

	Name of the Collaborator (refer para 1.2), if applicable :		
	Name of the 345kV or above GIS Equipment Manufacturer (refer para 1.2), if applicable :		
1	Name of Contract Undertaken		
2	Contract Reference No. & Date of Award		
3	Name and Address of the Employer/Utility for whom the Contract was executed by the firm/Partner of a JV		
	E-mail ID		
	Telephone No.		
	Fax No.		

4(a)(i)	No. of 345kV or above GIS Circuit Breaker bays under the above contract *(Indicate nos. of GIS Circuit Breaker bays of 345kV or above where one no. of circuit breaker bay shall be considered as a bay used for controlling a line or a transformer or a reactor or a bus section or a bus coupler and comprising of at least one circuit breaker, one disconnector and three nos. of single phase CTs / Bushing CTs)*		
	Name of the substation or switchyard		
(a)(ii)	No. of years, the above GIS CB bays are in operation as on the Originally scheduled last date of bid submission (soft copy).		
	Scope of work involved under the Contract as per IEC (Tick whichever is/are applicable)	☐ Design ☐ Manufacture ☐ Type Testing ☐ Supply ☐ Supervision of Erection & Comm.	☐ Design ☐ Manufacture ☐ Type Testing ☐ Supply ☐ Supervision of Erection & Comm.
	Whether Joint Deed of Undertaking executed between The Bidder and 345kV or above GIS Equipment Manufaturer has been enclosed with bid ? (in line with para 1.2 of Annexure-A (BDS)		
	Whether confirmation letter from the Collaborator(s) stating that the Collaborator(s) shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s) has been enclosed with bid? ***(in line with para 1.2 of Annexure-A (BDS)***		
	Whether valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 345kV or above GIS equipment in India has been enclosed with bid (in line with para 1.2 of Annexure-A (BDS)		
	Details of documents uploaded in support of the above stated experience		

Format-D:

Format in support of meeting the requirement of para 1.3 (Route-3) of Annexure-A to BDS, Section-III, Volume-I of the Bidding Documents)

	Name of the Indian established as Subsidiary/JVC/Group company by its parent/principal	☐ Subsidiary ☐ JVC ☐ Group Company
	Whether bidder have established manufacturing and testing facilities in India for 345kV or above voltage level GIS	
1	Whether 345kV or above voltage level GIS Circuit Breaker bay manufactured by bidder have been supplied or Type tested based on Technological support of their Parent/ Principal Company	
A	if Type tested, details of Type test Report	
B	Details of GIS supplied by them	
i	Name of Contract Undertaken for manufacturing 345kV or above voltage level GIS bays	
ii	Contract Reference No. & Date of Award	
iii	Name and Address of the Employer/Utility for whom 345kV or above voltage level GIS bays were supplied by the Bidder	
	E-mail ID	
	Telephone No.	
	Fax No.	
iv	No. of 345kV or above GIS Circuit Breaker bays under the above contract	
	Name of the substation or switchyard	
	Whether 345kV or above voltage level GIS Circuit breaker bays, as mentioned above, has been manufactured based on technological support of the Parent/ Principal Company under the Contract.	
	If Yes, indicate the Name of Parent/ Principal Company(s)	

	No. of years, the above AIS/GIS Subatation(s) are in operation as on the Originally scheduled last date of bid submission (soft copy).		
	Scope of work involved under the Contract for the above 345kV GIS bay as per IEC as on the Originally scheduled last date of bid submission (soft copy). ***(Tick whichever is/are applicable)***	☐Manufactured ☐Supply ☐Type Testing	
	Details of documents uploaded in support of the above stated experience		

Format-E:

Format in support of meeting the requirement of para 1.3(Route-3) (as applicable) Annexure-A to BDS, Section-III, Volume-I of the Bidding Documents)

	Name of the Parent Company/ Principal (refer para 1.3), if applicable:	0	
	Name of the 345kV or above voltage level GIS Equipment Manufacturer (refer para 1.3), if applicable :		
1	Name of Contract Undertaken		
2	Contract Reference No. & Date of Award		
3	Name and Address of the Employer/Utility for whom the Contract was executed by the firm/Partner of a JV		
	E-mail ID		
	Telephone No.		
	Fax No.		

4(a)(i)	No. of 345kV or above GIS Circuit Breaker bays under the above contract *(Indicate nos. of GIS Circuit Breaker bays of 345kV or above where one no. of circuit breaker bay shall be considered as a bay used for controlling a line or a transformer or a reactor or a bus section or a bus coupler and comprising of at least one circuit breaker, one disconnector and three nos. of single phase CTs / Bushing CTs)*		
	Name of the substation or switchyard		
(a)(ii)	No. of years, the above GIS CB bays are in operation as on the Originally scheduled last date of bid submission (soft copy).		
	Scope of work involved under the Contract as per IEC (Tick whichever is/are applicable)	☐ Design ☐ Manufacture ☐ Type Testing ☐ Supply ☐ Supervision of Erection & Comm.	☐ Design ☐ Manufacture ☐ Type Testing ☐ Supply ☐ Supervision of Erection & Comm.
	Whether Joint Deed of Undertaking executed between The Bidder and 345kV GIS Equipment Manufaturer has been enclosed with bid ? (in line with para 1.3 of Annexure-A (BDS)		
	Whether confirmation letter from the parent/principal company stating that the parent/principal company shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s) has been enclosed with bid? (in line with para 1.3 of Annexure-A (BDS)		
	Whether valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 345kV GIS equipment in India has been enclosed with bid ? (in line with para 1.3 of Annexure-A (BDS)		
	Details of documents uploaded in support of the above stated experience		

Format-F:

Format in support of meeting the requirement of para 1.4(Route-4) (as applicable) Annexure-A to BDS, Section-III, Volume-I of the Bidding Documents)

	Bidder's Name :	
1	Name of Contract Undertaken	
2	Contract Reference No. & Date of Award	
3	Name and Address of the Employer/Utility for whom the Contract was executed by the firm	
	E-mail ID	
	Telephone No.	
	Fax No.	

4(a)(i)	Voltage Level of GIS Substation commissioned under the Contract ***(Indicate 345kV or above class only)***		
	No. of GIS Circuit Breaker equipped bays under the above contract		
	(Indicate nos. of GIS Circuit Breaker equipped bays of 345kV or above voltage level where one no. of circuit breaker bay shall be considered as a bay used for controlling a line or a transformer or a reactor or a bus section or a bus coupler and comprising of at least one circuit breaker, one disconnector and three nos. of single phase CTs / Bushing CTs)		
	Name of the substation or switchyard		
(a)(ii)	No. of years, the above Substation have been in operation as on the Originally scheduled last date of bid submission (soft copy).		
	Scope of work involved under the Contract	☐ Erection ☐ Commissioning	☐ Erection ☐ Commissioning
	(Tick whichever is/are applicable)		
	Whether Undertaking (Jointly with the GIS Manufacturer) (as per enclosed format in Section-VI, Sample Forms and Procedures of bidding document) for above is enclosed with the bid		
	Details of documents uploaded in support of the above stated experience		

BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESS ENGINEERING MANAGEMENT
NOIDA

DOCUMENT NO.	TB-PBTU-POWERGRID-400KV GIS-KPS3-S.OLPAD	Rev 00	Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION	NAME	MSP	SKS	SKS
TITLE 400kV Gas Insulated Switchgear with its accessories		SIGN			
		DATE	22.11.2024	22.11.2024	22.11.2024
		GROUP	TBEM		
		WO No.			

CUSTOMER	M/s POWERGRID
CONSULTANT	--
PROJECT	Pre-Bid Tie up for, 400kV GIS Package (Package-II) at KPS 3 (HVDC), South Olpad (HVDC) and Extn. of existing KPS3 (GIS) station including civil works associated with ±500kV, 2500 MW KPS-3 (HVDC) and South Olpad (HVDC) Scheme associated with Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-V (8GW): Part C through Tariff based Competitive (TBCB) route; Spec No: CC/T/W-GIS/DOM/A06/24/14461.

Contents

Remarks: Bidder to note that data and details of Guaranteed Technical Particulars shall not be reviewed during Technical Evaluation/ Review, hence compliance of Guaranteed Technical Particulars in line with Technical Specification has to be ensured by the bidder.

Rev. No.	Date	Altered	Checked	Approved	
Distribution				To	
				Copies	

SECTION 1: CHECKLIST FOR TECHNICAL EVALUATION

Along with the technical offer/ bids, the bidder should submit this checklist confirming the inclusion of the enclosures as listed below,

Sl. No.	Documents to be enclosed	Bidder to confirm (Please tick "Confirmed")
1.	Supporting documents for compliance of Technical Qualifying Requirement.	Confirmed
2.	Unpriced BOQ duly mentioning "Quoted" for all the items, signed and sealed.	Confirmed
3.	Annexure- A duly signed and sealed & Annexure- B duly filled, signed and sealed.	Confirmed

Note: Any bidder not meeting the above requirement shall be liable for non-evaluation.

The above checklist is reviewed and verified for,

NIT Reference No.:

Name of Bidder:

Name of Project:

Date: Bidder's Stamp & Signature

Contents

This document covers broader guideline for bidder's scope of supply & services. The same shall be prevailing on all other section of technical specification.

1. SCOPE

This technical specification covers the requirements of (1.) design, type testing, engineering, fabrication, manufacturing, shop assembly, inspection and testing at manufacturer's works, proper packing, supply and delivery to project site, (2.) supervision of material reconciliation, installation / erection, (3.) execution of site testing & commissioning along with necessary kits, tools & equipment , putting GIS with LCC & its Accessories into successful operation complete with all materials, support structures, anchoring bolts, chemical anchor, accessories, commissioning spares & maintenance spares, special spanners, special tools & tackles, any specific required ancillary services, SF6 gas for first filling & spare etc. including design studies, training of BHEL / Customer personnel for offered GIS & its Accessories complete in all respects for efficient & trouble-free operation mentioned under this specification.

The complete technical specification comprises of following sections:

Section-1	:	Scope, Project Specific Technical Specification & Bill of Quantities
Section-2	:	Equipment Specification under scope of Supplies
Section-3	:	Project Details & General Technical Requirements (For All Equipment under the Project)
Section-4	:	Annexures Annexure A- Compliance Certificate Annexure B- Schedule of Technical Deviations

The following order of priority shall be followed. In case of conflict between requirements specified in various documents, the more stringent one shall be followed. BHEL/Customer concurrence shall, however, be obtained before taking a final decision in such matters.

1. Statutory Regulations
2. Section-1(PART-A) Standard Scope Matrix
3. Section-1(PART-B)
4. Section-2
5. Section-3

Bidder shall furnish list of conflicts/ ambiguities/ deviations, if any, along with their technical offer and also furnish the basis that is considered for submitting technical offer. BHEL will address the bidder's listed conflicts prior to award. In case of ambiguity, bidder shall inform BHEL of their interpretation. In case bidder fails to convey the same prior to award, BHEL decision on interpretation shall be considered final if need arises during the execution. No additional cost or extra time on account of conflicts/ ambiguities/ deviations shall be admissible.

In general, no deviation from the requirements specified in various clauses of this specification shall be allowed and hence, a certificate to this effect shall have to be furnished along with the offer (Annexure-A), however bidder shall furnish list of conflicts/ ambiguities/ deviations (Annexure-B), if any.

Please note, any deviation not specifically brought out in Annexure-B (Schedule of Technical Deviations) shall not be admissible for any time and commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer. Any conflicts/ ambiguities/ deviations mentioned elsewhere in technical offer shall not be reviewed.

The scope of supplies shall be as per commercial terms and conditions enclosed separately with the notice inviting tender/ enquiry.

2. SPECIFIC TECHNICAL REQUIREMENTS

Project specific technical requirements shall be as per Section-1 (Part-B) of technical specification.

3. GENERAL TECHNICAL REQUIREMENTS (Part-1 of 2)

1. SF6 gas for initial installation of complete GIS System, including wastage during installation, testing and successful commissioning shall be deemed included in the bidder's scope. Manufacturer to supply additional qty so as to cater the losses during installation, testing & commissioning.
2. The offered GIS with LCC & its Accessories shall be complete in all respect in compliance to technical specification and relevant IS / IEC / IEEE standards as applicable. Any other equipment/material required to complete the specified GIS scope of work are inclusive of bidder's scope of supply & services.
3. All essential and desirable accessories are deemed inclusive of offer i.e. and not limited to Gas Monitoring Devices, Pressure Switches, PD sensors, Pressure relief device, insulator, expansion joint/ flexible, bellows/ compensators like lateral mounting units, Axial compensators, Parallel compensators, tolerance compensators and vibration compensators etc. complete in all respect.
4. Total contract value may vary up to ±20% at contract stage.
5. Any Item not quoted mentioned "**Not Applicable**" in bid price schedule and found applicable as per technical specification and system requirement shall be supplied free of cost by bidder without any time / cost implication to BHEL / Customer.
6. Length & route of GIB is purely indicative and same shall be finalized during detailed engineering stage.
7. BHEL reserve rights to amend Bay sequence during contract stage, no separate claim shall be admissible in this regard.
8. Supply scope of Testing & Maintenance Equipment – Scope of supply of following Equipments shall be applicable exclusively if covered in BOQ / BPS. However same shall not be used for erection/ installation, testing and commissioning of GIS, hence bidder to bring Special Tools &, tackles, Testing & Maintenance Equipment/ Instruments at site for during erection/ installation, testing & commissioning on returnable basis.
    a. SF6 Gas leakage detector
    b. Gas filling and evacuating plant: (Gas Processing unit)
    c. SF6 gas analyser
    d. Portable Partial Discharge(PD) monitoring system
    e. Online Partial Discharge Monitoring System
9. Main Bus 1 / 2 / Transfer Bus etc. Gas Insulated Bus Bars running across the length of the switchgear to interconnect each of the bay modules (as per layout) and necessary interfaces (as applicable under the technical requirement) is

deemed inclusive in the scope. The same may or may not be indicated with break-up in BOQ / BPS.

4. GENERAL TECHNICAL REQUIREMENTS (Part-2 of 2)

Other general requirements GIS with LCC & its Accessories shall be as follows,

1. Guaranteed Technical Particulars: Bidder to submit detailed GTP in line with technical specification during contract stage for review and approval. GTP & drawings submitted with technical bid shall only be reviewed during contract stage only. Bidder to please note, deviations / conflict if any please be mentioned in schedule of technical deviations only.
2. The positioning of the circuit breaker in the GIS shall be such that it shall be possible to access the circuit breaker of any feeder from the front side for routine inspection, maintenance and repair without interfering with the operation of the adjacent feeders.
3. The physical layout shall ensure free movement of the SF6 Gas Cart and easy access to all components of the GIS for operation and maintenance purposes.
4. Bidder shall submit list of consumables with shelf life of less than six months and same shall be dispatched before commencement of erection or after clearance from BHEL/Customer whichever is earlier. No separate dispatch clearance shall be required for consumables. The service activities shall include consumables/ commissioning spares required during commencement of GIS installation, testing and commissioning in all respect. Cost of the same deemed inclusive.
5. Bidder shall offer their latest type tested model to accommodate the specified & allocated space as per attached layout drawing of GIS.
6. Bidder shall conduct insulation co-ordination studies in line with IEC for establishing surge arrester rating, quantity and any other requirement for successful operation of GIS. however, additional supply of surge arrester in line with above required shall be paid as per Bill of Quantity, as applicable.
7. Bidder to submit Study report of VFTO generated for 400kV GIS installation.
8. Bidder shall check and ensure adequacy of system protection for successful operation of GIS. After checking of system by bidder, GIS shall be installed and if any failure, malfunction of any part occurs after/ during commissioning, same shall be replaced immediately without any extra cost.
9. Final documentation shall be submitted in hard copy (Four prints) and soft (Three

CDs/DVDs)

10. In the case if CSD is specifically called in BPS / BOQ / Section-1(PART-B) of technical specifications, the same should have display facility at the front for the display of settings and measured values. In case where CSD does not have complete display facility for settings and measured values, bidder to supply one number laptop PC with pre-installed, licensed software for each site. Special cable required for integration is deemed inclusive in bidder's scope.
11. Bidder to submit all supporting documents in English. If document submitted by bidder is other than English language, self-attested English translated document should also be submitted.

5. MODE OF MEASUREMENT FOR GIB DUCT

1. The price of Bus-duct inside the GIS hall (up to **outer** wall face of GIS Hall) shall be integral part of the respective bay module and it will not be paid separately. However, the payment of bus-duct for outside the GIS hall along with support structure shall be paid as per running meters in line with provision of Technical Specification & Bid Price schedule.
2. In the case of outdoor type GIS, Gas Insulated Bus Duct (GIB) length of bus duct outside the GIS BAY MODULE shall be considered for mode of measurement from the end of Bay equipment (VT, LA etc.) to end equipment (SF6 to air bushing / SF6 to oil bushing/ Cable connection module etc.).
3. Any change in bay pitch (distance between bays): In a case where shifting of GIS bays shall be called by BHEL (during contract stage) due to layout requirement / cost optimization / revision / change in civil architectural requirement or due to expansion joint requirement in the GIS building, Bidder to incorporate the same with full compliance of technical requirement. Payment equivalent of BPS / BOQ item under head "Gas Insulated Bus Duct" shall be operated for additional length of Main Bus, subject to such shifting is not attributed to bidder.

6. STRUCTURE & HARDWARE (INCLUDING STRUCTURE STEEL)

Structural Steel, Support Structure, Walkway, Inserts & Hardware (required for installation & operation of complete GIS system with LCC & its Accessories etc.) are deemed inclusive of bidder's scope of supply. The same may or may not be indicated

with break-up in BOQ / BPS.

All steel structure members shall be hot-dip galvanized after fabrication (excluding floor embedded items for which standard practice is to be followed). All field assembly joints shall be bolted. Field welding shall generally not be acceptable. Noncorrosive metal or plated steel shall be used for bolts and nuts throughout the work.

The minimum weight of the zinc coating shall be 610 gm/sq.m and minimum average thickness of coating shall be 86 microns for all items having thickness 6mm and above and 900 gm/sq.m for coastal area (if defined in Section-1B / Section-2 of technical specification) For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq.m minimum and **900 gm/sq.m for coastal area** (if defined in Section-1B / Section-2 of technical specification).

1. Lattice / Pipe structure Materials for support of GIS, Bus Ducts, SF6 to oil bushing/ SF6 to cable connection and SF6 to air bushing/ connection including Anchor Fastener Bolts, Foundation Bolts, Base Plate / Channel / Metallic / Structural Member for seating of GIS system, all floor and wall Embedded Items, wall crossing arrangements, Rails and/ or other items structural items as required. Manufacturer shall provide suitable foundation channels and anchor bolts to support the switchgear assemblies. All mounting bolts, Anchor Fasteners, foundation bolts, nuts and washers, equipment fixing hardware shall be provided to fasten the switchgear base frames to the foundation channels as applicable
2. Chemical / Mechanical Anchors Bolts are to be provided by bidder for GIS, GIB & SAB.
3. The GIS Equipment shall be complete with all necessary supports, ladders, galleries, staircases, catwalks, movable platforms or walkways (for accessing the equipment above two meters for maintenance and operation), mechanism cabinets, internal cable raceways etc. for each bay and it shall be of modular construction and extendable design.
4. Structural steel for complete GIS system with LCC & its Accessories is deemed inclusive in bidder's scope of supply.

7. EARTHING MATERIALS OF GIS

1. Earthing material of GIS are deemed inclusive of bidder's scope of supply. The same may or may not be indicated with break-up in BOQ / BPS.
2. Bidder to submit detailed calculations and layout drawings for earthing system during detailed engineering stage based on technical specification, bidder's design philosophy, IS/IEC/IEEE requirement as applicable. Bidder to provide the bill of quantity of entire GIS system with LCC & its Accessories
3. Supply of 40 mm MS ROD, 75X12 mm GI Flat, 50X06 mm GI Flat is not in bidder's scope of supply.

4. **COPPER GROUNDING MESH FOR GIS**: Bidder to consider scope of Copper Flat & hardware supply as follows

A. If Requirement is called in Technical Specification	
a. Bidder's Scope of Supply	If covered in BOQ / BPS.
b. Not in Bidder's Scope of Supply	If not covered in BOQ / BPS.
c. In case COPPER GROUNDING MESH concluded as Not in Bidder's Scope of Supply (i.e. BHEL scope of supply) : Copper Riser Connection for GIS equipment Shall be brought approximately **200** mm above the FINISHED FLOOR LEVEL shall be supplied by BHEL. Onward earthing connections for GIS equipment shall be in the scope of the bidder.	

B. If Requirement is not exclusively called in Technical Specification but required as per manufacturer's design	
a. Bidder's Scope of Supply	Required, even if a separate BOQ / BPS item is not indicated.

1. **All** other materials, including onward risers, earthing materials, hardware (nuts, bolts, washers, lugs, etc.) required as per the earthing design, shall be included in the GIS Manufacturer's scope of supply. However, the installation/erection of earthing will be carried out by the BHEL team under the supervision of the bidder/manufacturer, in accordance with the manufacturer's design.
2. Installation/ erection/ laying of earthing system for GIS shall be done by BHEL/ its contractor, however, supervision shall be provided by bidder as per approved design philosophy.
3. Special requirement for earthing (as mentioned in Section-2) shall be duly taken

care while designing the earthing system for GIS and its associated system.

Remark:- BPS: Bid Price Schedule & BOQ: Bill of Quantity with TS

8. INTERNAL CABLES

1. Power, control & instrumentation cables for **Cabling** (1.) within GIS, (2.) GIS to LCC, (3.) LCC to LCC (excluding incoming power cable) shall be deemed inclusive in bidder's scope of supply. The same may or may not be indicated with break-up in BOQ / BPS.
2. Scope includes for completeness for GIS system with LCC & its Accessories
3. Cabling between LCC to LCC shall be applicable if required in bidder's design philosophy.
4. Cables required for bidder supplied GIS sub-system i.e. condition monitoring system (Gas monitoring system, PD monitoring system etc) are to be supplied by bidder as complete system.
5. Necessary Cable Lug, Glands & shroud etc. required for installation of bidder's supplied cable are deemed inclusive in bidder's scope.
6. Bidder to provide detailed "Bill of Quantity" during detailed engineering stage. Cabling & termination schedule for the same shall be provided by successful bidder along with AS BUILT drawing during contract stage.
7. Power Cable TB's (for both AC & DC incoming feeder cables) shall be suitable for termination of requisite cable.

9. DRAWINGS / DOCUMENTS FOR MANUFACTURING CLEARANCE

The drawings/ documents, as follows shall be used for providing technical clearance for manufacturing of GIS and furthermore, it shall be used for delay analysis, if any, from bidder. The first drawing submission will be counted from the date of submitting reasonably correct drawings.

Sl. No.	Overall Drawings approval required in Cat I /Cat II
LOT-1	
1	GIS- Gas Schematics with Single Line Diagram (Including CT VT

	Parameters)
2	GIS- Guaranteed Technical Particulars (Including all GIS equipment)
3	GIS- Layout Plan & Section
4	GIS- Interfacing Drawings for Cable Connection Module / SF6 to Air Bushing / SF6 to Oil Module (as applicable under scope) with Guaranteed Technical Particulars
5	GIS- Type Test Reports (Including all GIS equipment)
6	GIS- Quality Assurance Plan & Inspection Test Schedule
LOT-2	
7	GIS- Secondary Engineering Base Design & Control Schematics for GIS and Local Control Cabinet
8	GIS- Maintenance Equipment Catalogue with Guaranteed Technical Particulars, test reports
9	GIS- Civil Design Specification with Foundation Loading Diagram (Including interfacing details)
10	GIS – Support Structure, Platform, Wall & Floor Inserts & Hardware drawing & BOM
11	GIS- Earthing Layout with Design
12	GIS- Quantification for main Items, Spares, Consumables
13	Design Calculations (Having interface on GIS Manufacturing)
OTHER	
14	GIS- 3D OGA Drawing (3D-Model with complete editable data base) compatible with Autocad & Primtech for complete GIS & its accessories.
15	Manuals on unloading, safe storage, transportation, installation, testing, commissioning, routine check, preventive maintenance

10. TYPE TEST

Please refer Section-1(PART-B) and Section-2 of technical specification for the details of type test requirement. All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine & acceptance tests in accordance with requirements stipulated under respective sections of technical specification.

11. QUALITY PLAN

Bidder to follow valid customer approved (1.) Manufacturing Quality Pan, (2.) factory acceptance test (FAT) procedure & (3.) Site acceptance test (SAT) procedures, as per Customer procedure. In case the bidder doesn't have Customer approved Quality Plan, it will be the bidder's responsibility to get its Quality Plan approved from the ultimate Customer within 30 days from the date of issue of after award of LOI / PO whichever is earlier.

All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan. The supplier shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and comply with the requirements of the specification.

GIS and its associated materials shall be subject to inspection by BHEL/ Customer / authorized representative at bidder / manufacturing works. Hence, Bidder shall furnish all necessary information concerning the supply to BHEL. During fabrication, the equipment shall be subject to inspection by BHEL/ Customer or by an agency authorized by BHEL/ Customer to assess the progress of work as well as to ascertain that only quality raw material is used.

12. SITE SERVICES

Site service activities shall be carried out at in stages as per requirement or front availability at site, and hence multiple visits for completion of work are envisaged as per site requirements hence any claim in this regards shall not be admissible on account of multiple mobilization or idling during project execution stage.

12.1. SUPERVISION AT SITE

1. Supervision of complete installation / erection of GIS with LCC & its Accessories are in the scope of bidder.
2. Scope also includes verification of materials for proper storage with due

instructions/ training to site persons for long storage.

3. Standard storage instruction manual specifically specifying the item detailed with details of type of storage.
4. Supervision for reconciliation and spares / accessories and handing over to customer.
5. Final documentation including AS BUILT documents

12.2. TESTING & COMMISSIONING

1. The complete GIS System shall be subjected to the site tests as per technical specifications, IEC-62271-203. Bidder to submit site acceptance testing (SAT) procedures and get the same approved from BHEL / Customer before carrying out the site testing at site.
2. Carrying out successful HV/ Power Frequency Testing of GIS as per IEC shall be in scope of bidder, which includes HV test kit with operator, accessories & tools required for completion of HV testing. Bays may be commissioned separately.
3. BHEL shall provide extend support and assistance at site for smooth conduction of HV Testing including unloading, assembling of HV test kit, dismantling, packing & loading back for transportation.
4. Complete Field testing and commissioning of GIS system with LCC & its Accessories are under the scope of Bidder.
5. Bidder supplied special equipment, T&P if required OEM supervision, the same is to be arranged by bidder, cost of the same shall be deemed inclusive of respective item.
6. Bidder/ OEM shall coordinate with manufacturers of other equipment wherever required and shall freely and readily supply all technical information for this purpose as and when called for.
7. ETC work schedule for all the GIS may vary according to readiness of site. Respective dates for the commencement of erection, testing and commissioning activities of GIS shall be communicated to manufacturers from time to time as per the readiness of site.

13. TESTING KITS, TOOLS & TACKLES

1. All the Instruments/ Testing kits including HV Test Kit, SF6 Gas handling Equipments required for successful installation, testing, commissioning, maintenance of offered GIS are to be arranged by bidder on **returnable** basis. Cost of the same shall be deemed inclusive in the offer.
2. Special tools & tackles for installation, maintenance, testing & commissioning of GIS shall be in bidder's scope, it shall be brought at site on **returnable** basis only.
3. The general Tools and Tackles shall be provided by BHEL, list of the requirement i.e. general tools-tackle, spanners, gauges, slings and other lifting devices, crane, welding machines, drills, general instruments and appliances necessary for the installation of GIS is to be submit by bidder along the technical bid. In case bidder fails to convey the same along with technical bid, BHEL decision on interpretation of general tools tackle shall be considered final and any tools & tackles required shall be brought at site by bidder without any claim.
4. Bidder to furnish detailed BOQ for non-returnable special Tools and Tackles, if applicable along with unit prices to be handed over to ultimate customer. The prices for the same shall be considered during evaluation.

14. SPARES

1. Any equipment which is not supplied as main equipment or part of main equipment, mandatory spare for that is not applicable.
2. In case contractor offers circuit breaker, dis-connector, current transformer, SF6/Air Bushing etc. under main equipment of higher rating than equipment rating specified in the specifications, the mandatory spare of same higher rating offered by contractor identical to main equipment offered in the package shall be required to be supplied against spares without any cost implication.
3. The Mandatory Spares shall be included in the bid proposal by the bidder. The prices of these spares shall be given by the Bidder in the relevant schedule of Bid Price Schedule and shall be considered for evaluation of bid. It shall not be binding on the Employer to procure all of these mandatory spares.
4. The bidder is clarified that no mandatory spares shall generally be used during the commissioning of the equipment.
5. Start-up & Commissioning spares are included in bidder’s scope of supply and

shall be included in the base price. Adequate stock of start-up & commissioning spares shall be made available at the site such that the start-up and commissioning of the equipment /systems, performance testing and handing over the equipment/ systems to the Purchaser can be carried out without any hindrance or delays. The unutilized Start-up & Commissioning spares brought for commissioning purpose by bidder shall be taken back by the bidder.

6. Wherever spares in BPS / BOQ/Technical Specification have been specified as "each type/each rating/each type & rating": If the offered spare/spares is sufficient to replace the respective main equipment of all types/ratings, then such offered spare/spares shall be acceptable. It implies that common spare/spare set fulfilling the spare requirement of all types/ratings shall also be acceptable, provided it is configurable at site itself without special assistance of OEM.
7. Mandatory Spares, wherever mentioned, are envisaged for the equipment/items being supplied under the main equipment heads under present scope meeting the requirements of Technical Specifications. The component/sub-component of an equipment/item specified in BPS / BOQ under Mandatory Spare, which is not applicable as per the offered design of respective main equipment, shall not be referred to.
8. Bidder to submit price break-up of spares during tender stage. It shall not be binding on the BHEL to procure all of these mandatory spares.
9. Bidder/ vendor shall ensure the availability of spare parts and maintenance support services for the offered equipment at least for 15 years from the date of supply. Bidder shall give a notice of at least one year to the Customer & BHEL (both) before phasing out the products/spares to enable the owner for placement of order for spares and services.

15. PACKING AND DISPATCH

1. The equipment shall be carefully packed for transport by sea, rail and road in such a manner that it is protected against the climatic conditions and for any damage during transportation, transit and storage. Packing of the equipment shall be suitable for long storage (minimum 1 year).
2. The GIS transport units shall be shipped in the largest factory assembled units within transport and loading limitations and considering handling facilities on site to reduce the erection and installation work on site to a minimum. Where possible all items of equipment or factory assembled units shall be boxed in substantial

crates or containers to facilitate handling in a safe and secure manner.

3. Each individual piece to be shipped, whether crate, container or large unit, shall be marked special notations such as 'Fragile', 'This side up', 'Centre of gravity', 'Weight', 'Owner's particulars', 'PO no.' etc., and other details as per purchase order & technical specification.
4. The equipment may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains and high ambient temperature.
5. Special precautions shall be taken to protect any parts containing electrical insulation against the ingress of moisture. This applies particularly to the equipment of which each gas section shall be sealed and pressurized prior to shipping. Dry nitrogen/air or dry SF6 gas (in full compliance to technical requirement) shall be used and the pressure shall be such as to ensure that, allowing for reasonable leakage, it will always be greater than the atmospheric pressure for all variations in ambient temperature and the atmospheric pressure encountered during shipment to site and calculating the pressure to which the sections shall be filled to ensure positive pressure at all times during shipment.
6. All blanking plates, caps, seals, etc., necessary for sealing the gas sections during shipment to site shall be provided. Any seals, gaskets, `0' rings, etc. that will be used as part of the arrangement for sealing off gas sections for shipment of site, shall not be used in the final installation of the equipment at site. Vendor to provide quantity of components accordingly considering permanent installation and commissioning.

16. SPECIFIC- EXCLUSIONS (NOT IN BIDDER'S SCOPE)

The following items are specifically excluded from the bidder's scope of supply & services, irrespective of the same if covered under any section of technical specification other than Section-1 (PART-B). If specific requirement mentioned in the Section-1(PART-B) of technical specification shall overrule this specific exclusion.

1. Any scope of supply / services mentioned in Section-2 or Section-3 of technical specification but not having any relationship with GIS, LCC & its Accessories and not covered in Section-1(PART-B) or BPS / BOQ shall be deemed excluded from bidder's scope.

2. Installation / Erection of GIS with LCC & its Accessories except supervision work.
3. Cable laying & terminations, however supervision work & termination of special cables shall be in bidder's scope.
4. Open & Closed stores at site. (Bidder to provide space requirement in tech bid)
5. Local transportation/ conveyance for bidder's engineers shall be arranged by BHEL between local stay and site.
6. Office assistance shall be provided BHEL including sitting facility etc.
7. Receipt & unloading of material at site except supervision work
8. Terminal connector for SF6 to Air Bushing to conductor or any other interfacing equipment.
9. Watch & Ward of GIS material at BHEL Store
10. Civil Works i.e. GIS Hall, civil works requirement for GIS System. (Please refer clause "Structure-Steel" for bidder's scope of supply)
11. EOT crane, Air Conditioning & Ventilation System, Illumination System & Fire detection & alarm system, however complete input shall be provided for EOT and other system
12. Control Relay & Protection Panels, Numerical Relays, Bus Bar Protection Panel, SAS & ECS system, ACDB, DCDB, Battery & Charger
13. Earthing material i.e. 40 mm MS Rod, 50X6 GI Flat & 75X12 GI Flat for earthing
14. Outdoor AIS Equipments
15. Power & Control cable beyond LCC towards ACDB, DCDB, CRP, SAS etc
16. BHEL / Customer / BHEL appointed 3rd party inspector travel, lodging & boarding charges during testing / inspection.

Rev Number	Date	Initiated by	Reviewed by	Approved by	Updates
Rev.0	19 Feb 2022	JAIK	SKS	AG	
Rev.1	04 March 22	JAIK			Clause 4.1 revised Clause 3.9 added Clause 5 900 gm/sq.m for coastal area
Rev.2	09 March 22	JAIK			Clause 5 updated (yellow highlight)
Rev.3 & 4	22 March 24	JAIK / DKS			Clarification on Copper Grounding Mesh. Ref clause 2.10 & other clauses
Rev.5	07/10/2024	JAIK/DKS			

This technical specification is required for Pre-bid tie-up before participation in the following tender,

Name of the Customer	Power Grid Corporation of India Ltd.
Name of Main Contractor	Bharat Heavy Electricals Limited
Name of the Project/ Tender	Pre-Bid Tie up for, 400kV GIS Package (Package-II) at KPS 3 (HVDC), South Olpad (HVDC) and Extn. of existing KPS3 (GIS) station including civil works associated with ±500kV, 2500 MW KPS-3 (HVDC) and South Olpad (HVDC) Scheme associated with Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-V (8GW): Part C through Tariff based Competitive (TBCB) route.
Location	KPS3, KPS3 EXTN, SOUTH OLPAD- Gujarat

[1] SPECIFIC TECHNICAL PARAMETERS - Please refer SECTION-PROJECT

[2] BILL OF QUANTITIES: Please refer following

1. GIS substation
    a) Annexure- BOQ_400kV GIS_SUPPLY_KPS3-S.OLPAD
    b) Annexure- BOQ_400kV GIS_SSERVICES_KPS3-S.OLPAD

During tender stage No of bays of GIS may vary. No of bays of GIS shall be finalized after receipt of Notification of award (NOA) from POWERGRID.

Overall contract value may vary +/- 20%.

[3] SPECIFIC TECHNICAL REQUIREMENTS

1. Please refer ***SECTION.1 ANNEXURE SPECIFIC REQUIREMENT FOR GIS (Rev.08)*** for specific technical requirement & description of GIS modules/Equipment as per document.
2. Detailed technical requirement of GIS is as per SECTION-2.
3. Any other items not specifically mentioned in the specification but which are required for erection, testing and commissioning and satisfactory operation of the substation are deemed to be included in the scope of the specification unless specifically excluded.
4. Actions required in case of defects observed during warrantee period
    a. a) SF6 gas leakage: Repair/ replacement
    b. b) High Dew point of SF6 gas (> -36 deg C at atm press): Re-Processing of gas and

replacement of Gas in case of no improvement

c. Replaced/Repaired/Refurbished Equipment (or part of equipment) shall have 2 years warranty without prejudice to contractual warranty period.

5. Any clarification(s) for GIS published by M/s Powergrid with reference to subject project will also valid for this specification.

[4] OTHER TECHNICAL REQUIREMENTS for GIS & OTHER ASSOCIATED EQUIPMENT:

1. SF6 GAS REQUIRED FOR PLACING GIS INTO SUCCESSFUL OPERATION - Complete in all respect in compliance to technical specification and requirements.
2. STRUCTURE MATERIAL INCLUDING FOUNDATION BOLTS, EMBEDDED ITEMS, RAILS AND/ OR OTHER MATERIALS ETC - Complete in all respect in compliance to technical specification and requirements. In the event of changes in present scope, payment shall be made on pro-rata basis of number of circuit breaker bays only.

3. EARTHING MATERIAL – Please review the "Reference Guidelines for GIS Grounding" in addition to Section-1 (Part-A) for a comprehensive requirement of the earthing material. Please note (1.) 40 mm MS ROD, (2.) 75X12 GI Flat & (3.) 50X6 Cu Flat for GIS Floor earthing & Riser up to max 200 mm above FFL are NOT in Bidder's scope of supply.

[5] SPECIFIC TECHNICAL REQUIREMENTS FOR CSD

1. CSD shall be deployed for optimization of switching behavior of bidder supplied GIS Breaker.
2. The limit for inrush current for switching of Transformer by CSD shall be 1.0 p.u. of rated current of transformer after fine tuning of CSD settings during pre-commissioning checks. For site acceptance of CSD, during online CSD test after fine tuning inrush current should be less than 1.0 P.U. of rated current in five consecutive operations.
3. All 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD by using a suitable selector switch irrespective of whether circuit breakers to be supplied are envisaged along with CSD or not as per bid price schedules.
4. Complete interfacing with GIS and CSD shall be in bidder's scope. Any additional item like transducer, contact multiplication relay, switches, special/screened cables, modification hardwired, modification in schematics (if any) required for interfacing and for complying to the technical specification requirement shall be in bidder's scope and shall be included in quoted price. No price implication for the same shall be entertained during detailed engineering.
5. All wiring necessary for interface of GIS/ CRP with bidder supplied CSD is also deemed to be included in the scope of bidder. Cables, lugs, ties etc required for connection of CSD in existing relay panel is deemed to be included in bidder's scope.
6. Supervision of Erection only and testing & Commissioning of CSD shall be in bidder's scope.
7. The CSD should have display facility at the front for the display of settings and measured values. In case where CSD does not have complete display facility for settings and measured values, bidder to supply one number laptop PC with pre-installed, licensed software for each site. Cost of the same shall be deemed included in offer.
8. Special cables (i.e., screened/ FO cable) other than 1100V LT Power & Control Cables required for CB / CSD / Relay Panel interfacing shall be in bidder's scope. Mode of measurement for special cable shall be cable-trench running length from GIS to CSD/ Relay panel. Total requirement of special cable qty. is to be estimated & supplied by bidder based on no. of runs etc.

[6] **TECHNICAL QUALIFYING REQUIREMENTS:** Please refer following attached document for qualification criteria, Bidder to submit complete supporting documents required for technical qualifying requirement along with the bid

Technical Qualifying Requirement for **Annexure-A (BDS)**

[7] **TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE**

Please refer Section-2 and Section-3 of technical specification for the details of type test requirement.

All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

The reports for all type tests as per technical specification shall be furnished by the bidder along with equipment / material drawings. However, type test reports of similar equipment / material already accepted in POWERGRID (in the projects similar to present project) shall be applicable for all projects with similar requirement. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by POWERGRID/representative authorized by POWERGRID/representative of Utility /representative of accredited test lab/ representative of The National Accreditation Board for Certification Bodies (NABCB) certified agency shall also be acceptable.

Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within last 15 (Fifteen) years from the originally scheduled date of bid opening of tender of POWERGRID i.e. **04/11/2024**. In case the test reports are of the test conducted earlier than 15 (Fifteen) years from the original date of technical bid opening of tender (Tender of Powergrid), the contractor shall repeat these test(s) at no extra cost to BHEL / Powergrid.

Further, in the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to non-compliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost and delivery implication to BHEL/Powergrid.

The Bidder shall intimate BHEL with the detailed program about the type tests at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

Note – Type test report shall be reviewed for approval in detailed engineering stage only. However, for evaluation purpose, the test reports are to be submitted along with the technical bid.

[8] ENCLOSED DOCUMENTS WITH SECTION-1

1. SECTION PROJECT
2. DESCRIPTION OF GIS BAY MODULE & EQUIPMENT
3. ANNEXURE MANDATORY SPARES
4. BILL OF QUANTITIES
5. OVERALL GA DRAWING OF KPS3 EXTENSION, SOUTH OLPAD & AREA OUTLINE FOR KPS3 NEW HVDC.
6. TECHNICAL QUALIFYING REQUIREMENT FOR ANNEXURE-A (BDS)

----------xxxxx----------

Description of 420kV GIS modules/Equipment – Rev 01

A. 420kV GIS modules/Equipment: 420kV GIS modules/equipment shall be provided as per Technical Specification Requirement/ BPS and as per description given below:

a) Isolated phase, 420kV SF_6 gas-insulated metal enclosed bus bar module comprising of following:

i. Three (3) numbers of 4000A individual bus bars enclosures running across the length of the switchgear to interconnect each of the circuit breaker bay modules in one and a half breaker bus system.

ii. One (1) number 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

iii. Three (3) numbers 1-phase Potential Transformers complete with manual operated isolating Switch/device.

iv. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structure etc. as required.

v. End Piece (Interface) module with the test link for future extension of Bus bar module. The end piece module shall be designed in such a way so that future GIS module may be tested without extending voltage to existing bus by removing the test link. End piece interface module for both the buses shall be in one alignment.

vi. Local Control Cubicle (if required separately).

b) GIS Bus Section Module:

420kV SF6 gas-insulated metal enclosed Bus Sectionalizer bay module, each set comprising of the following:-

i. One (1) number 3-phase, 4000A, SF6 insulated circuit breaker without PIR complete with operating mechanism.

ii. Three (3) numbers 1-phase, 4000A, 3-core (multi ratio), current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 4000A, 2-core (multi ratio), current transformers (CTB) on other side of circuit breaker.

iv. Two (2) numbers 3-phase, 4000A, single pole, group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phase, single pole, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Three (3) numbers single phase, SF6 ducts for interconnection of above mentioned elements.

vii. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, Support structures etc., as required.

viii. Local Control Cubicle

c) 420kV SF6 gas-insulated metal enclosed Converter feeder bay module comprising of following:

i. One (1) number 3-phase, 3150A, SF_6 insulated circuit breaker **with Controlled Switching and without PIR** complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 3000A, 2-core (multi ratio), current transformers (CTB) on other side of circuit breaker.

iv. Three (3) numbers 3-phase, 3150A, single pole group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. One (1) number 3-phase, single pole high speed grounding switch, complete with group operated manual and motor driven operating mechanisms.

vii. Three (3) numbers 1-phase, 3150A, SF6 ducts inside GIS hall (up to the outer edge of the wall of GIS Hall)

viii. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structure etc. as required.

ix. Local Control Cubicle.

d) 420kV SF6 gas-insulated metal enclosed Converter feeder Tie Bay module comprising of following:

i. One (1) number 3-phase, 3150A, SF_6 insulated circuit breaker **with Controlled Switching and with/without PIR (as per requirement)** complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTB) on other side of circuit breaker.

iv. Two (2) numbers 3-phase, 3150A, single pole group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Three (3) numbers 1-phase, 3150A, SF6 ducts inside GIS hall (up to the outer edge of the wall of GIS Hall)

vii. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structure etc. as required.

viii. Local Control Cubicle.

e) 420kV SF6 gas-insulated metal enclosed AC Filter bay module comprising of following:

i. One (1) number 3-phase, 3150A, SF6 insulated circuit breaker **with Controlled Switching and with/without PIR (as per requirement)** complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 3000A, 2-core (multi ratio), current transformers (CTB) on other side of circuit breaker.

iv. Two (2) numbers 3-phase, 3150A, single pole, group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phase, single pole, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Three (3) numbers 1-phase, 3150A, single pole, individual pole operated isolator switches, complete with manual and motor driven operating mechanisms.

vii. Three (3) numbers 1-phase, single pole, individual pole operated safety grounding switches, complete with manual and motor driven operating mechanisms.

viii. Three (3) numbers 1-phase, 3150A, SF6 ducts inside GIS hall (upto the outer edge of the wall of GIS Hall)

ix. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structure etc. as required.

x. Local Control Cubicle.

f) 420kV SF6 gas-insulated metal enclosed AC Filter Tie Bay module comprising of following:

i. One (1) number 3-phase, 3150A, SF_6 insulated circuit breaker **with Controlled Switching and with/without PIR (as per requirement)** complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on other side of circuit breaker.

iv. Two (2) numbers 3-phase, 3150A single pole, group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structure etc. as required.

vii. Local Control Cubicle.

g) 420kV SF6 gas-insulated metal enclosed Line feeder bay module comprising of following:

i. One (1) number 3-phase, 3150A, SF_6 insulated circuit breaker **without PIR** complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 3000A, 2-core (multi ratio), current transformers (CTB) on other side of circuit breaker.

iv. Three (3) numbers 3-phase, 3150A, single pole group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. One (1) number 3-phase, single pole high speed grounding switch, complete with group operated manual and motor driven operating mechanisms.

vii. Three (3) numbers 1-phase, 3150A, SF6 ducts inside GIS hall (up to the outer edge of the wall of GIS Hall)

viii. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structure etc. as required.

ix. Local Control Cubicle.

h) 420kV SF6 gas-insulated metal enclosed Tie Bay module comprising of following:

i. One (1) number 3-phase, 3150A, SF_6 insulated circuit breaker **without PIR** complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on other side of circuit breaker.

iv. Two (2) numbers 3-phase, 3150A single pole, group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Two (2) numbers 3-phase, single pole group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structure etc. as required.

vii. Local Control Cubicle.

i) 420kV SF6 gas-insulated metal enclosed Bus bar Module Extension comprising of following:

i. Three (3) no's of 4000A individual bus bars enclosures running across the length of the switchgear to interconnect each of the bay modules in one and a half breaker bus system.

ii. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, Support structures etc., as required.

iii. Extension piece (Interface) module, as required to extend existing bus to maintain minimum possible inter connection space between GIS supplied under present scope and the GIS being extended.

iv. End Piece (Interface) modules with the isolating test link for Future extension of Bus bar module on one side. The end piece module shall be designed in such a way so that future GIS module may be tested without extending voltage to existing bus by removing the test link. End piece interface module for both the buses shall be in one alignment.

v. Three (3) numbers single phase, SF6 ducts (as required) inside GIS hall.

j) 420kV SF6 gas-insulated metal enclosed Transformer bay module (For 400kV HV side of 400/33kV Transformer) comprising of following:

i. One (1) number 3-phase, 3150A, SF6 insulated circuit breaker without PIR, complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3000A, 3-core (multi ratio), current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 3000A, 2-core (multi ratio), current transformers (CTB) on other side of circuit breaker.

iv. Three (3) numbers 3-phase, 3150A single pole, group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Three (3) numbers 3-phase, single pole, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Three (3) numbers 1-phase, 3150A, SF6 ducts inside GIS hall (upto the outer edge of the wall of GIS Hall).

vii. Gas monitoring devices, barriers, pressure switches, UHF PD Sensors, support structures etc. as required.

viii. Local Control Cubicle.

k) 420kV SF6 gas-insulated metal enclosed Bus reactor bay module comprising of following:

SF6 gas insulated metal enclosed Bus reactor bay module, each set comprising of the following:

i. One (1) number 3-phase, 3150A, SF6 gas insulated circuit breaker without PIR, complete with operating mechanism.

ii. Three (3) numbers 1-phase, 3000A, 3-core, multi ratio, current transformers (CTA) on one side of circuit breaker.

iii. Three (3) numbers 1-phase, 3000A, 2-core, multi ratio, current transformers (CTB) on other side of circuit breaker.

iv. Three (3) numbers 3-phase, 3150A single pole, group operated isolator switches, complete with manual and motor driven operating mechanisms.

v. Three (3) numbers 3-phases, single pole, group operated safety grounding switches, complete with manual and motor driven operating mechanisms.

vi. Three (3) numbers 1-phase, 3150A, SF6 ducts inside the GIS hall (up to the outer edge of the wall of GIS Hall).

vii. Gas monitoring devices, barriers, pressure switches, UHF PD sensors, support structures etc., as required.

viii. Local Control cubicle.

'#' As per BPS (Bis Price Schedule)

B. 420kV Gas Insulated Bus Ducts (GIB):

For making outdoor overhead connections, 420kV Single Phase enclosed Sf6 Gas Insulated Bus Duct (including support structure, gas monitoring device, gas barrier, UHF PD Sensor etc.) shall be provided and the same shall be paid as lumpsum quoted in Bid Price Schedule. This outdoor bus duct shall be provided to interconnect feeder connections to Converter Bays, feeder connections to ICT & Bus reactor bays, connection to existing Bus Bar module etc. Bidder has to fit the layout in the available area embarked for HVDC System. SF6 gas duct inside GIS building are part of respective GIS Module.

The GIB duct length shall be optimized by contractor further meeting present & future bay requirements without affecting the switchyard arrangement, bay orientation and any of the specified functional requirements.

C. 420kV Gas Insulated SF6 to Air Termination:

i. 420kV, 3150A, 1-phase SF6 to air bushings along with terminal connectors & support structure, foundation bolts, fasteners etc. for outdoor connections in air.

Note:-

i) 3000A, 3-core (multi ratio), current transformers (CTA) shall be with 2 nos. of Protection cores and 1 no. of Metering core with parameters as per Section-GIS Rev-5A.

ii) 3000A, 2-core (multi ratio), current transformers (CTB) shall be with 2 nos. of Protection cores with parameters as per Section-GIS Rev-5A.

iii) CT ratios pertaining to 3000A CT shall also be applicable for 4000A, 420kV GIS CT for bus Sectionalizer.

पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड

(भारत सरकार का उद्यम)

POWER GRID CORPORATION OF INDIA LIMITED

(A Government of India Enterprise)

TECHNICAL SPECIFICATION

FOR

AC Substation and Civil Works Package at KPS3 (HVDC) and South Olpad and Extn. of existing KPS3 (GIS) station associated with Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-V (8GW): Part C - Package – II (GIS)

DIFFERENT SECTIONS OF TECHNICAL SPECIFICATION

For the purpose of present scope of work, technical specification shall consist of following sections and they should be read in conjunction with each other.

Sl.	DESCRIPTION	REVISION
I	**SECTION PROJECT**	Rev 00
II	**SECTION-AC SWITCHYARD**	
i.	Section- Gas Insulated Switchgear	Rev-05A
ii.	Section - Switchgear-CB	Rev. 11
iii.	Section - Switchgear-Isolator	Rev. 13
iv.	Section - Switchgear Instrument Transformer	Rev 12
v.	Section - Switchgear SA	Rev 13
vi.	Section - Lighting System	Rev 07
vii.	Section - Fire Protection System	Rev 06
viii.	Section - Power & Control Cable	Rev 06
ix.	Section - Air Conditioning System	Rev 04
x.	Section - Switchyard Erection	Rev 10
xi.	Section – Structure	Rev 07
xii.	Section - Control & Relay Panel	Rev 09
xiii.	Section - Substation Automation System	Rev 04
xiv.	Section-Sub-station Automation standard factory simulation test plan	
xv.	Section – PMU	Rev. 01
xvi.	Section-400kV Autotransformer	Rev. 13
xvii.	Section-400kV Reactor	Rev-11
xviii.	Section-Specific Requirement to Section AC Switchyard	Rev-08
xix.	Section - General Technical Requirement	Rev 15A
III	**SECTION-CIVIL WORKS**	**Rev 00**
i.	Section- Civil	Rev-00
ii.	Section- Civil for GIS Building	Rev-00
IV	**SECTION-RFP**	
i	Amendment – I to RFP	
ii	Clarification – I to RFP	
Iii	Amendment – II to RFP	
iv	Clarification – II to RFP	
V	Clarification – III to RFP	

- In case of any discrepancy between ‘Section-PROJECT’ and ‘Section-GTR’ and other Technical Specifications on scope of works, ‘Section-PROJECT’ shall prevail over all other sections.
- All requirements of ‘Section RFP’ pertaining to the present scope are to be complied with.
- In case of any discrepancy between ‘Section-GTR’ and individual sections for various equipment, requirement of individual equipment section shall prevail.
- In the event of conflict between requirements of any two clauses of this Specification / Annexures of this specification documents, the requirement specified under ‘Section-PROJECT’ shall prevail unless confirmed otherwise by the Employer in writing based on a written request from the Contractor.

I. Section -PROJECT

Rev-00

TABLE OF CONTENTS

I. Section PROJECT

Annexures to Section- Project:

vi. Annexure- Description of 420kV GIS Modules/ Equipment
vii. Section – Telecom
viii. Section - 400/33kV Transformer at KPS3 (HVDC)
ix. Annexure – Major Interface Requirement with Employer scope (PKG-II)

1.1 GENERAL

Power Grid Corporation of India Ltd. (POWERGRID), A Govt. of India Enterprise is responsible for bulk Power transmission of electrical energy from various Central Govt. Power Projects to various utilities/beneficiaries and interconnecting regional grids, operating and maintaining the National electrical grid of India. It is established with mandate of "We will become a Global Transmission Company with Dominant Leadership in Emerging Power Markets with World Class Capabilities by:

a) World Class: Setting superior standards in capital project management and operations for the industry and ourselves.

b) Global: Leveraging capabilities to consistently generate maximum value for all stakeholders in India and in emerging and growing economies.

c) Inspiring, nurturing and empowering the next generation of professionals.

d) Achieving continuous improvements through innovation and state of the art technology.

e) Committing to the highest standards in health, safety, security and environment as its mission.

Govt. of India (MoP) has identified the execution of "**Transmission system for evacuation of power from potential renewable energy zone in Khavda area of Gujarat under Phase-V (8GW): Part C"** through Tariff Based Competitive Bidding (TBCB)route. The major scope of above transmission system is as follows :

a) Establishment of 2500 MW, ± 500 kV KPS3 (HVDC) [VSC] terminal station (2x1250 MW) at a suitable location near KPS3 substation with associated interconnections with 400 kV HVAC Switchyard
b) Establishment of 2500 MW, ± 500 kV South Olpad (HVDC) [VSC] terminal station (2x1250 MW) along with associated interconnections with 400 kV HVAC Switchyard of South Olpad S/s
c) Establishment of KPS3 (HVDC) S/s along with 2x125 MVAR, 420 kV bus reactors along with associated interconnections. The 400 kV bus shall be established in 2 sections through 1 set of 400 kV bus sectionaliser to be kept normally OPEN. 400/33 kV, 2x50 MVA transformers for exclusively supplying auxiliary power to HVDC terminal.
d) KPS3 – KPS3 (HVDC) 400 kV 2xD/C (Quad ACSR/AAAC/AL59 moose equivalent) line along with the line bays at both substations
e) ±500 kV HVDC Bipole line between KPS3 (HVDC) and South Olpad (HVDC) (with Dedicated Metallic Return) (capable to evacuate 2500 MW)

The above is the exhaustive list of scope of works under the present transmission scheme as notified by Bid Process coordinator (BPC). The portion of this scope envisaged under present package is detailed in this section-project. It is the intent of this specification to describe primary features, equipment and materials, and design & performance requirements and to establish minimum standards for the work. The specification is not intended to specify the complete details of various practices of manufactures/ bidders, but to specify the requirements with regard to performance, durability and satisfactory operation under the specified site conditions.

The work to be done under this specification shall include all labor, plant, equipment, material and performance of all work necessary for the complete installation and commissioning of the switchyard. All apparatus, appliances, material and labor etc. not specifically mentioned or included, but are necessary to complete the entire work or any portion of the work in compliance with the requirements implied in this specification is deemed to be included in the scope of contractor.

Before proceeding with the construction work, the Contractor shall fully familiarize himself with the site conditions and General arrangements & scheme etc. Though the Employer shall endeavor to provide the information, it shall not be binding for the Employer to provide the same. The bidders are advised to visit the substation sites and acquaint themselves with the topography, infrastructure, and the design philosophy. The bidder shall be fully responsible for providing all equipment, materials, system, and services specified or otherwise which are required to complete the construction and successful commissioning, operation & maintenance of the substation in all respects. All materials required for the Construction and Installation work under the present scope shall be supplied by the Contractor.

Complete design (unless specified otherwise in specification elsewhere) and detailed engineering shall be done by the Contractor. The system shall generally conform to the requirements of CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022.

1.2 SCOPE

The scope of this technical specification is pertaining to 400kV AC GIS ~~bays~~ at KPS3(HVDC) (Gujarat), Extension of 400 KV AC GIS ~~bays~~ at 765/400kV GIS South Olpad (Gujarat) and Extension of GIS at existing 765/400kV GIS Substation at KPS3.

The scope also includes execution of Civil Works of all Buildings which inter alia includes Service Building, Ventilation and cooling building, Valve Halls, GIS building, AC & DC Switchyard areas including filters (if applicable), GIS building(including Structures, wall panels, screening, piping, ceiling, roof, doors and gates, floorings, painting, Interface with LCC room, ventilation room etc as applicable) Auxiliary buildings including fire fighting pump house, firewalls, rail cum roads, roads, drain, cable trenches, site levelling, water supply

system, fire water tanks, fencing, soil investigation etc. at KPS3 (HVDC) and South Olpad (HVDC).

The work also includes installation and laying of earthing material and laying of PVC pipes/ cable trays/ buried trenches within switchyard and buildings. The civil design comprising of design calculation and issuance of construction drawings of civil works related to HVDC portion shall be provided by the Employer as detailed in Clause 1.3 below.

For Valve Halls, the civil works pertaining to foundation of Valve Hall Building, construction of RCC Fire rated wall of Valve Hall (if applicable), Other PCC & RCC works of the side walls and Roof (PCC/RCC works) of the Valve Hall building, flooring, painting etc. are in bidder's scope. Tentative height of Valve Hall buildings shall be in the range of 25-30 meters.

At KPS-3 HVDC & South Olpad HVDC, the DC yard shall be indoor yard. At KPS-3 HVDC & South Olpad HVDC, Indoor DC Yard building (DC Hall) shall be constructed. For these DC Halls, the civil works pertaining to the foundation, PCC & RCC works, flooring, painting, brickwall etc. are in bidder's scope. Tentative height of the DC hall building shall be around 22-25 meters.

Further, for GIS Hall, complete works for GIS Building (which includes foundation, Structures, wall panels, screening, piping, ceiling, roof, doors and gates, floorings, painting, Interface with LCC room, ventilation room, including DSLP spikes/wires etc), PCC & RCC works of the side walls and Roof (panel) of the GIS Hall building, etc. are in bidder's scope.

KPS3(HVDC) Station shall be about 2km away from existing KPS3 GIS AC Station. South Olpad (HVDC) station shall be within same premises as exiting 765/400kV South olpad (GIS) station. Interconnection of 400kV GIS bus of South Olpad (HVDC) with that of existing 400kV South Olpad GIS station is envisaged through construction of new bays, bus bar extension and bus ducts.

Any work related to AC/DC transmission lines construction is not included in scope of this specification.

The conceptual schematic of the HVDC link is given below in *Figure-1.*

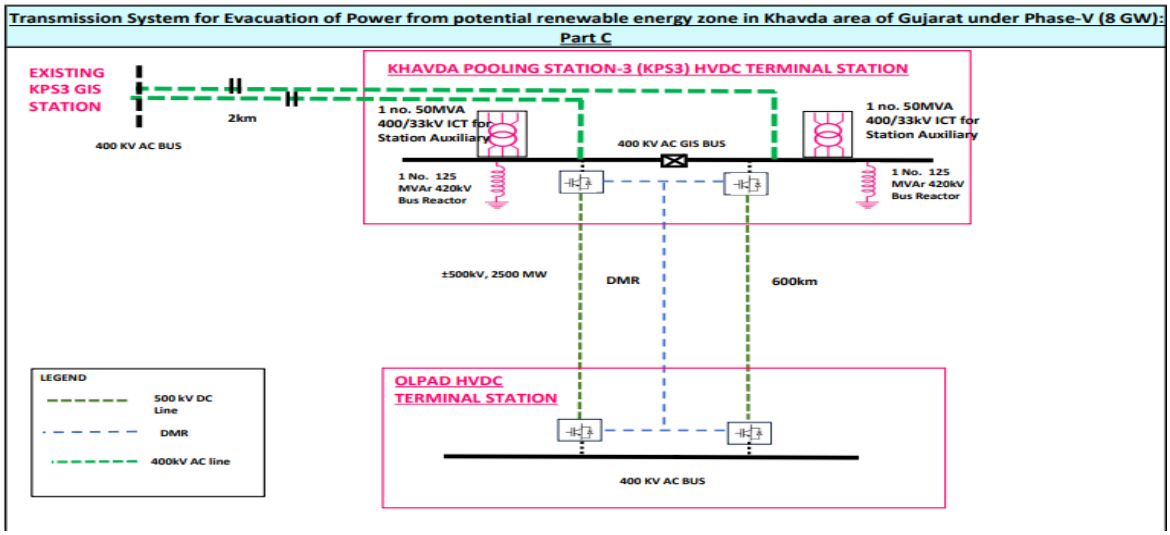

Figure-1: Conceptual Schematic of HVDC link

Civil & Installation works for Temporary storage of equipment required by Contractor during construction stage shall be in contractor's scope without any additional cost implication to POWERGRID..

The brief station wise scope of work is given as follows:

1.2.1 KPS3 (HVDC) STATION

1.2.1.1 HVAC Part:

Switching scheme: One and Half Breaker Scheme
Fault level: 63kA for 1 sec

a) 2 (Two) Nos. of 400 kV VSC Converter bays-GIS
b) 2 (Two) Nos. of 400kV bus Sectionalizer bays -GIS
c) 4 (Four) Nos. of 400 kV line bays along with GIB- GIS
d) 2 (Two) Nos. of 400kV transformer bays for 400/33kV transformer-GIS
e) 2 (Two) Nos. of 400kV reactor bays for 420kV,125MVar bus reactors-GIS
f) 400kV AC Filter bays (if applicable)-GIS
g) 2 (two) nos. of 400/33kV transformers for auxiliary supply
h) 2 (two) nos. of 420kV, 125MVar bus reactors
i) SAS with SCADA and Relay and Protection system.
j) Tele-communication equipment
k) Future space to be kept in layout and to be shown in SLD, overall general arrangement:
    i. 400kV line bays-06 nos. (3 on each section)
    ii. 400kV reactor bays-02 nos. (1 on each section)

Execution of Civil Works for the following:

a) Foundation for HVDC Converter Transformers of suitable capacity and spare units, 400/33 kV ICTs and 125 MVAR, 420 kV bus Reactors
b) Firewalls for Converter Transformers, 400/33kV ICT and 125 MVAR 420kV Bus Reactors
c) Foundation for DC switchyard including DC Switchyard equipment i.e. DC Smoothing Reactor, DC Blocking filter (if required), DC Switches, DC measuring devices, DC Disconnectors, Surge Arresters, DC Filters (if required), Neutral Surge Capacitors, DC Bus works, towers, gantries, lightning masts etc.
d) Foundation of AC Switchyard Equipment (CB, Isolator, CT, CVT, SA, WT, BPI etc.), AC Filter banks/ sub-banks (if required), Towers, Gantries, lightning masts, Valve cooling fans etc.
e) Complete Buildings including Service Building, FFPH Building, Valve Cooling buildings, Valve Hall ventilation Buildings, MV Building, LV Building, Switchyard Panel Rooms, Transit camp, Security hut, open store, indoor store, car parking shed, oil tanks/pits, GIS hall building & extensions as applicable etc.
f) Supply and installation of conduit, elbow, MS boxes, bends, flush mounted plates inside buildings based upon drawing/ design by Employer and this is included in the sqm rate of the building.
   For Transit camp building and Security hut, complete supply and installation of Illumination system including conduit, elbow, MS boxes, bends, flush mounted plates, wires, switches, sockets, MCBs, switch boxes, sockets, fixtures, JB, Lighting DB, Power DB etc is under present scope of Contractor.
g) Foundations, PCC and RCC work of Valve Halls**,** DC Halls & GIS Hall
h) GIS Hall (PEB) Structures, wall panels, screening, piping, ceiling, roof, doors and gates, floorings, painting, Interface with LCC room, ventilation room etc as applicable)
i) Site levelling, Soil investigation, water supply, sewerage system.
j) Rail cum road, Roads, approach road, cable trenches along with covers, buried trenches, road crossings, Hume pipes, pipes in converter transformer/ transformer/ reactor areas for switchyard area and buildings, drains, rainwater harvesting system etc.
k) Installation and laying of earthing material (MS rod, Risers, Earth Flat etc.) and laying of pipes/ cable trays/ buried trenches within switchyard and buildings
l) Borewells and construction water supplies
m) Foundation of Equipment inside Valve Halls
n) Foundations of indoor & outdoor GIS Equipment, Gas insulated Bus (GIB) duct
o) Ground Improvements below Foundation of all structure and buildings.

For detailed scope, refer section 1.3.

1.2.2 : South Olpad (HVDC) STATION

1.2.2.1 HVAC Part (GIS):

Switching scheme: One and Half Breaker Scheme
Fault level: 63kA for 1 sec for 400kV

a) 2 (Two) nos. of 400kV VSC Converter bays-GIS
b) 400kV AC Filter bays (if required) - GIS
c) 400kV GIS Bus bar extension of existing GIS bus
d) Augmentation of existing SAS with SCADA and Relay and Protection system.
e) Tele-communication equipment.

Execution of Civil Works for the following:

a) Foundation for HVDC Converter Transformers of suitable capacity and spare units
b) Firewalls for Converter Transformers
c) Foundation for DC switchyard including DC Switchyard equipment i.e. DC Smoothing Reactor (if required), DC Blocking filter (if required), DC Switches, DC measuring devices, DC Disconnectors, Surge Arresters, DC Filters (if required), Neutral Surge Capacitors, DC Bus works, towers, gantries, lightning masts etc.
d) Foundation of AC Switchyard Equipment (CB, Isolator, CT, CVT, SA, WT, BPI etc.), AC Filter banks/ sub-banks (if required), Towers, Gantries, lightning masts, Valve cooling fans etc.
e) Complete Buildings including Service Building, FFPH Building, Valve Cooling buildings, Valve Hall ventilation Buildings, MV Building, LV Building, Switchyard Panel Rooms, Transit camp, Security hut, open store, closed store, car parking shed, oil tanks etc
f) Supply and installation of conduit, elbow, MS boxes, bends, flush mounted plates inside buildings based upon drawing/ design by Employer and this is included in the sqm rate of the building.
   For Transit camp building and Security hut, complete supply and installation of Illumination system including conduit, elbow, MS boxes, bends, flush mounted plates, wires, switches, sockets, MCBs, switch boxes, sockets, fixtures, JB, Lighting DB, Power DB etc is under present scope of Contractor.
g) Foundations, PCC and RCC work of Valve Halls & DC Halls
h) Foundation for extension of existing 400kV GIS Hall (GIS hall, AHU room, LCC room (includes Foundation, Structures, wall panels, screening, piping, ceiling, roof, doors and gates, floorings, painting, Interface with LCC room, ventilation room etc.) as applicable
i) Site levelling, Soil investigation, water supply, sewerage system.
j) Rail cum road, Roads, approach road, cable trenches along with covers, buried trenches, road crossings, Hume pipes, pipes in converter transformer/ transformer/

reactor areas for switchyard area and buildings, drains, rainwater harvesting system etc.

k) Installation and laying of earthing material (MS rod, Risers, Earth Flat etc.) and laying of pipes/ cable trays/ buried trenches within switchyard and buildings
l) Borewells and construction water supplies
m) Foundation of Equipment inside Valve Halls
n) Foundations of indoor & outdoor GIS Equipment, Gas insulated Bus (GIB) duct

For detailed scope, refer section 1.3.

1.2.3 KPS3 GIS (EXTENSION):

a) 400kV GIS Bus bar extension of existing GIS bus.
b) 4 (Four) nos. of 400kV line bays in existing 400kV GIS Building
c) Augmentation of existing SAS with SCADA and Relay & Protection system.

Design and Execution of Civil Works for the following:

d) Extension of existing 400kV GIS Hall, AHU room, LCC room etc. including foundation, structures, wall panels, screening, piping, ceiling, roof, doors and gates, floorings, painting, Interface with LCC room, ventilation room etc.) as applicable
e) Foundations of indoor & outdoor GIS Equipment, Gas insulated Bus (GIB) duct.
f) Installation and laying of earthing material (MS rod, Risers, Earth Flat etc.) and laying of pipes/ cable trays/ buried trenches within switchyard and buildings.
g) Roads, approach road, cable trenches along with covers, buried trenches, road crossings, Hume pipes etc. for switchyard area and buildings, drains, rainwater harvesting system etc.
h) Ground Improvements below Foundation of all structure and buildings.

For detailed scope, refer section 1.3.

1.3 DETAILED SCOPE OF PROJECT

The scope shall broadly include the overall project management, studies, design, engineering, manufacturing, factory testing, supply of all items including transportation to site & insurance, unloading, storing, handling, and moving into final position, installation, testing, commissioning, training of Employer's personnel, documentation and drawings and placing the supplied AC system and the associated sub-systems into successful operation.

The Detailed scope of work is brought out below:

1.3.1 KPS3 (HVDC) STATION

1.3.1.1 HVAC Part:

a) Two nos. (2 nos.) of 400/33kV 50 MVA transformers along with cable termination arrangement/ box on the secondary side of the transformer for feeding auxiliary power of HVDC station (Refer 'Section - 400/33kV Transformer at KPS3 (HVDC)')

b) Two nos. (2 nos.) of 420kV 125 MVAr Bus reactors

c) Gas insulated switchyard equipment:

The SF6 gas insulated switch gear (50 Hz) shall be of the indoor metal-enclosed type.

420kV SF6 gas insulated switch gear shall have one and a half breaker bus bar arrangement. The Switchgear shall be complete with all necessary terminal boxes, SF_6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring equipment & piping and support structures along with necessary base plate & foundation bolts. In addition, all necessary platforms, supports, ladders and catwalks etc. as required for operation & maintenance work shall also be provided.

420kV GIS modules/ Equipment for HVDC VSC Converter Bays, AC Filter Bank bays (if applicable) with suitable TRV rating, Bus Sectionalizer bays, line bays, transformer bays, Reactor bays shall be provided.

i. 420kV GIS modules/Equipment as per present scope and specified in BPS. Description of GIS module is given in **Annexure-Description of 420kV GIS Modules/Equipment.**

ii. 420kV Gas Insulated Single phase enclosure Bus Duct (Including support structure, gas monitoring device, gas barrier, UHF PD Sensor etc.) from GIS building to Centre line of SF6/Air Bushing shall be in scope of contractor. SF6 gas duct inside GIS building are part of respective GIS Module.

iii. Testing and Maintenance equipment.

iv. EOT crane for GIS hall under present scope

v. Air conditioning system, Ventilation system and Fire detection & alarm system for GIS hall and relay panel room.

vi. Any other equipment/material required to complete the specified GIS scope of work

d) Air insulated switchyard equipment:

i. 400kV 4400pF CVT, 336kV LA, 400KV class Bus Post Insulators

ii. 400kV Equipment for AC Filter Sub-banks (if applicable): Circuit breakers, Isolators, Earth switches, Current transformers, Capacitive voltage transformers, Bus post insulators & Surge arresters.

e) Substation Automation System (SAS):

Complete Substation Automation System based on IEC-61850 for bays under present scope including 400kV AC VSC Converter bays, 400/33kV transformer bays, 420kV reactors bays,400kV line bays, 400kV AC filter main bays (if applicable) and Tie bays as per Section Substation Automation (including hardware and software) along with associated equipment.

Bidder shall include all necessary hardware and software to integrate with the Substation Automation System, BCUs, development of system database, displays, architecture and reports as per requirement. Necessary Licenses for the SAS shall also be considered. The SAS system shall be complete in all respect comprising of all necessary equipment, panels, servers, ethernet switches, HMIs etc. These shall be placed in the Service Building (in HVDC control room) and the necessary cables including optical fibre required for completion of SAS in HVDC control room is under present scope.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

f) Relay and protection system:

Control, Relay and Protection system to be provided for bays & equipment under present scope and bus-bar as per 'Section–Control and Relay Panels'.
The Bus-bar protection scheme shall have complete bus bar protection (separate for each section) for present as well as future bays envisaged i.e. input / output modules for future bays shall also be provided.

Main-I and Main-II relay for protection of 400kV transmission lines from existing KPS3 GIS shall be provided as differential relay (with back up distance protection feature) at KPS3 (HVDC) GIS end of which both channel shall be through DTPC. Protection channel through DTPC shall be realized through Optical fiber cable over 400kV lines.

g) Two set of Digital Protection Coupler (suitable for interfacing with E1 port of SDH equipment) per line for 400kV transmission lines shall be provided under present scope at both KPS3 (HVDC) & KPS-3(existing). Scope also includes cable required for connecting DPC with the communication (SDH) equipment in the Main Service Buildings, FODP on gantry, signal converters (if required), communication cables, associated power cables etc. for both ends of transmission lines. Also refer 'Section-

RFP' for further details. The supply of DTPC shall be such that both protection channel shall be realized through DTPC separately including speech between stations.

h) Tele-Communication equipment:

The broad Scope of FO based Communication Equipment shall include:

- SDH Equipment along with suitable interfaces and line cards.
- All cabling, wiring, Digital Distribution frame patch facilities and interconnection to the supplied equipment at the defined interfaces,
- System integration of all supplied subsystem
- Integration with the existing communication system based on SDH and PDH of employer
- Integration of supplied subsystem with SCADA system, PABX of RLDC/SLDC, VOIP (SIP compliant) for voice.
- Fibre Optic Approach Cable (FOAC) along with duct and Fibre Optic Distribution Panel (FODP)
- Integration of new Communication equipment in the existing regional NMS. All required support to existing NMS vendor for integration of new Communication equipment.

Refer 'Section-Telecom' and 'Section- RFP' for scope of Telecommunication Equipment

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

Controlled Switching device for Main & Tie Bay Circuit Breakers of VSC converter bay, 400kV side of the Transformers, Bus reactors and AC filter bays (if required) for minimizing switching transients and inrush currents.

1.3.1.2 Other Auxiliary facilities:

a) Fire Protection system for substation:

i. Comprehensive fire detection, alarm and protection system including Smoke detectors, hooters, Fire Extinguishers for LCC Room, AHU room, GIS hall, etc. shall be under present scope.

ii. Fire alarm & Annunciation System (FAP) (microprocessor based fully Analogue Addressable Analogue Control Unit) shall be provided by Employer in HVDC control room.

iii. Pumping arrangement inside the Pump House including Main pump, jockey pump, HP tank etc. for entire HVDC station shall be provided by employer. However, complete piping, fittings, accessories etc. for HVWS & Hydrant system for 400/33kV transformers, 125 MVAR 420kV bus reactors and GIS buildings and connection to main header including valves of fire fighting system etc. is under present scope of

work. Further, Installation, Testing and Commissioning of Fire Fighting system including piping work for Hydrant and HVWS system, Deluge Valve system is also in the present scope.

iv. Necessary laying and termination of cables from smoke detectors, HVWS system, heat detectors etc. from GIS Hall/ AC GIS areas to Fire alarm and annunciation panel (FAP) (supplied by Employer in HVDC Control room) is under present scope. Integration of these detectors, HVWS system etc. of AC GIS area, ICTs, reactors in Fire alarm panel shall be done by the employer.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

b) Air conditioning system and ventilation system:

Air conditioning system for LCC Room, each 100% capacity: one operating and one standby.

Suitable ventilation system for GIS halls in one operating and one standy (each 100% capacity) to be provided to maintain dust and dirt-free environment and positive pressure inside GIS hall.

c) Cables:

1.1 kV grade Power & Control cables (and special cables, if any), cable sealing system along with complete accessories including cables for oil filtration units and cabling from common marshaling box of 400kV Transformer & reactors to bay kiosks /Relay panel room /control room/Auxiliary building, Power receptacle for oil filtration unit shall also be provided under present scope of work. Methodology for supply, installation & sizing of cables shall be as per Specific requirement.

d) Illumination system:

Complete illumination design/ drawing/BOM of GIS hall, LCC room building, Transit camp scope shall be under present scope of Contractor.

LED based indoor illumination System for Buildings i.e. GIS Hall, AHU room, LCC room, Transit camp is under present scope. Necessary AC & DC emergency lighting to be provided in all areas. Indoor Illumination (with all fittings, wirings, fixtures, power receptacles switches, MCBs, switch boxes, sockets, JB, Lighting DB, Power DB etc) shall be provided using fixture types as specified in Section: Lighting System.

The bidder shall provide the illumination load requirement during detailed engineering. The required number of feeders in MLDB, ELDB etc. shall be provided by Employer. The bidder shall provide and lay the necessary cable from MLDB & ELDB to the interface DB (under present scope) to complete its scope of work. The illumination system of AC Outdoor switchyard area shall be provided by Employer.

Further, for other buildings, Supply & installation of GI Conduits, bends, flush mounted plates, MS boxes etc. (concealed type) inside buildings i.e service building, Ventilation and cooling building, MV & LV Switchgear building, FFPH building etc. is under present scope. These conduits shall be laid during construction of buildings. All other works of illumination system for these buildings i.e. fittings, fixtures, fixtures on false ceiling, switchboards, connection with distribution boards, wiring, power receptacles switches, MCBs, switch boxes, sockets, fixtures, JB, Lighting DB, Power DB etc. shall be under scope of Employer.

For GIS building, the LAN cable shall be provided by the bidder including necessary cable and its laying from service building to GIS building is under present scope. For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

Solar PV Power Plant/ Roof top Solar Grid as mentioned in Section lighting section and Illumination system of Transit camp/ Township is not part of present scope.

e) Erection Hardware:

Conductors(s), Al tube, bus-bar materials, cable trays & covers, Bay MB (as applicable), spacers, clamps & connectors, Junction box, earth-wire, earthing material risers above ground, pipes for equipment & lighting cables, cable supporting angles/channels, Insulating mats, cable sealing arrangement, all accessories etc. as required for GIS & its associated AC equipment are under present scope.

400kV Busbar current rating shall be 4000 Amp.

f) Insulator strings and associated Hardware

Insulator strings and associated hardware fittings under present scope shall be provided by the contractor.

g) Earthing (Grounding) system:

Design of complete earthing system shall be carried out by Employer. Supply and installation of Main Earth mat (40 mm MS rod), Aux. Earth mat, pipe & rod electrodes, risers (below ground level), construction of Earthing pits etc. for all the entire AC & DC switchyards including AC and DC equipment, converter valve hall, GIS hall & their associated equipment, MV & LV switchgears, FFPH, DG set, service building area, panels, auxiliary mats for isolators, buildings etc. shall be under the present scope of Contractor. Further, installation of Earthing connection (above ground level) from riser to equipment/ panels (as per scope specified in Section Project for GIS package) shall be carried under the present scope of Contractor.

All the structures, equipment's support, structures, cable trenches, auxiliary Earthmat, Panels, fences, etc. shall be earthed by connecting them to the main Earthmat by the contractor under present scope. All material/supplies/services

required for rod electrode, pipe electrode, risers, GS Flats, and other accessories required for connection of the equipment to main earth mat are in the present scope.

The earthing design requirement inside the converter Halls shall be provided by the Employer during detailed engineering and same shall be connected to main earth mat.

If there is any necessity for supply and installation of special earthing arrangement for achieving the required earth resistance, the same is in the scope of contractor.

For the equipment, panels supplied by Employer, Contractor shall bring the 40mm MS rod risers from main earth mat to the nearest location of equipment/ panel/ building as per design layout provided by Employer. Earthing connection from riser to GS flat shall be carried out by the Employer.

Any input related to GIS equipment (if required) by the Employer while designing the earthing system, same shall be provided by the contractor.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

h) Lightning Protection (DSLP)

The lightning protection (DSLP) for complete AC switchyard & GIS buildings (as per scope specified in Section Project) is to be provided by the contractor. The lighting protection shall be designed as per the Rolling sphere method or Razevig method. The contractor shall design the lightning protection by utilizing the structures being provided under present scope. In case, additional structures (Lightning Masts) are required to meet the lightning protection, the contractor shall provide the same without any additional cost to Employer.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

i) Phasor Measuring Unit (PMU)

i. Synchro phasor measurement using Phasor Measurement Units along with fibre optic connectivity, Global Positioning System Receiver and communication equipment shall be provided for 400kV Converter bays, transformer/ reactor bays, main busbars and line bays.
ii. Phasor Measurement Units shall comply with IEC/IEEE 60255-118-1-2018 and shall support IEEE C 37.118 protocols.
iii. These PMUs shall be integrated with Phasor data Concentrator (PDC) at RLDC/SLDC for the subject project.
iv. The Bidder shall extend technical support at local end for seamless integration of PMU with PDC at RLDC end. The integration work at RLDC/SLDC end will not be under the scope of the Bidder. The Existing PDC Software/application at RLDC/SLDC shall be informed during detailed engineering.

v. Each of the PMUs supplied in this project shall support measurement of voltage and current of at least 2 feeders/bays.

vi. All cabling and interconnections for extension of CT/CVT, Digital inputs from the Line Bays, ICTs/Reactors/STATCOM bays up to PMU panel for measurement by PMU, shall be in the scope of the Bidder. Accordingly, the associated 1.1KV Control cables as required for Non-Adjacent Inter- Control and Relay panel (CRP) CT /PT connections & Digital input connections to PMU panel shall also be under the Bidder's scope.

j) Lattice and pipe structures (galvanized):

Design, engineering, fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of Gantry structures, Towers, Beams, Lightning masts and all Equipment support structures complete in all respect (as per scope specified in Section Project for GIS package) are under present scope.

Design and drawings of tower, beams and equipment support structures shall be prepared by the Contractor and put up for approval of Employer during detailed engineering. These shall be developed by the contractor based on the approved design. The proto corrected drawings along with BOM are to be approved by the contractor and final copies of approved proto corrected drawings shall be submitted to POWERGRID for information only. Contractor shall provide editable soft copies of design & drawings during detailed engineering. The Support structure for Circuit Breaker shall be as per manufacturer's design. In the bid price schedule, the structures including foundation nuts and bolts and fasteners are indicated in the form of sets/ lot.

For diameter/bays where transformer is to be terminated, the structure must also consider the load and deviation which is arising due to the interconnection with other side. Further, for the last diameter/bay, the end towers must be extendable type for connecting future beams. Bus work(s) may be optimized by the contractor by suitably considering the number of diameters/bays in a bus work section.

Line take-off gantry structures are required to be considered with ±30-degree deviation and maximum 200m slack span. For design of Gantry structures, the conductor tension shall be considered based on actual requirement for present & future scope of work.

k) Remote operation:

The employer intends to operate the complete AC station from remote location. All Facilities required for data transfer, monitoring & remote operation from NTAMC for complete AC station along with auxiliary systems shall be provided by Contractor. Necessary interfacing equipment including software and hardware, Router, Firewall, Ethernet Switches, HMI etc. (if required) for remote operation are under present scope.

All necessary interfacing equipment including software, hardware, Router, Firewall, Ethernet Switches, HMI etc. for extending the HVDC control and monitoring function from NTAMC at both ends (i.e. KPS3 HVDC and South Olpad HVDC) shall be provided by employer. Communication channel shall be provided by Employer**.**

l) LT switchgear (ACDB & DCDB)

Bidder shall calculate their load requirement as per standard practice and same shall be informed to Employer for finalising the size of LT transformer & switchgear. Suitable feeders in ACDB & DCDB panels shall be provided by Employer. Bidder shall lay & terminate the cable at ACDB, DCDB & in other panels for it's requirement.

The bidder shall supply, lay and terminate the necessary cables from the LT switchgear to Transit camp to meet the auxiliary power requirements of transit camp. Suitable sub distribution board, connectors etc. required at the transit camp for termination of cable including further connection to MCB boxes shall be under present scope of work.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

m) BMS System

A complete BMS system shall be provided by Employer.

Suitable provision for interface/ input/ signal required in the equipment/Illumination system/Air conditioning system etc. for integration in BMS system shall be provided by the contractor.

Supply, laying and termination of necessary cable to respective equipment to be integrated in BMS system for entire station including AC GIS/AIS system is in the scope of the Employer. Necessary support shall be provided by the bidder for integration of equipment in BMS system.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

n) Emergency load requirement, Auxiliary load requirements, DC load requirement including number of feeders for its scope of work to be calculated by the bidder and same shall be informed to Employer for finalizing the rating, sizing of DG set, LT transformer, MV & LV switchgears, 220V & 48V battery and battery chargers.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

o) Mandatory spares as per **BPS and Annexure-Mandatory spares**.

p) Testing and maintenance equipment as per BPS & TS. Technical details shall be as per **Annexure-Testing & Maintenance equipment.**

q) Online drying out system for 400/33kV transformer and Bus reactors are under present scope.

The contractor shall provide all the necessary interface requirements/ inputs as required by Employer for its scope of equipment/ system.

1.3.1.3 Scope of Civil work:

The Scope of Civil Design includes preparation of design and drawings for 400kV GIS Building (GIS Hall, AHU room, LCC room etc.), GIS equipment inside and outside building, GIB duct, 400/33kV ICT, 125 MVAR, 420kV bus reactors, other AC equipment of present scope, soil investigation, ground improvement etc. The Details of Civil design scope is as per below-

A Civil Design Scope

A.1 General points

A.1.1 The environmental exposure condition of the site falls under severe category as per IS:456. All RCC shall be of Design mix with minimum M-30 grade. Further, for pile foundation works RCC shall be of minimum M-30 grade with minimum cement content of 400 kg/Cum.

A.1.2 The type of cement to be used for this project shall be as per the recommendation of soil consultant/ soil investigation report.

A.1.3 All foundations surfaces including boundary walls, Cable Trenches, underground RCC works, RCC drains etc. touching with soil shall be painted with bituminous or silica-fluoride coatings as per IS:456. The cost of painting/coating shall deemed to be included in the corresponding item of BPS.

A.1.4 The corrosion resistant steel (CRS) shall be used

A.1.5 The minimum grade of reinforcement steel shall be Fe500D.

A.1.6 The steel sheets of walls & roofing panels, Trims, Downspouts, Flashings, Gutter etc. shall be provided with 200 GSM zinc aluminium coating. After zinc aluminium coating, the external face of the steel sheet shall be provided with PVDF (Polyvinyl di fluoride) paint coating in place of SMP (Silicon Modified Polyester) paint.

A.1.7 Protective coating shall be applied to the surface of all the structural steel members after grit/shot blasting of structural members. The final DFT (dry firm thickness) shall not be less than 200 microns. The complete Work shall be as below: Shot blasting to SA 2 ½ + Zinc silicate primer of thickness 40-60 microns DFT + MIO (Micaceous Iron Oxide) Epoxy Intermediate coat of thickness 100-120 microns DFT + PU (Polyurethane) finish coat of thickness 40-60 microns DFT.

A.1.8 All other details shall be as per technical specification

A.1.9 The Contractor shall submit design reports with calculations where applicable, drawings for architectural works, structural works and foundations, detailed layout & section drawings etc. in accordance with the Specification, for works mentioned below during detailed

engineering for Employer's approval. Editable copies of relevant design calculations shall be submitted by the contractor for employer's approval during detailed engineering

A.1.10 The design of the foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification. The foundations may be open foundation or pile foundation as per the site requirement / soil report. Soil Investigation and preparation of soil report shall be in bidder's scope

A.1.11 Wind and seismic data shall be considered as per the latest NBC 2016

A.1.12 The Execution of Civil Works based on design submitted by Contractor for the equipment/building mentioned at 'Clause A.2' below is in bidder's scope.

A.2 Detailed scope of design work is as follows:

A.2.1 Site levelling: The item site levelling works includes Contouring of whole plot area within the boundary as per technical specification Section-Civil. The HFL data of the plot shall also be furnished by the bidder. The final area of levelling may be less than the whole plot area, which will be decided during detailed engineering. The layout of site levelling works showing terraces / FGLs shall be proposed by bidder for approval of employer based on the approved contour level drawing and site HFL data.

Mode of measurement of this item is in Cubic meter of earthwork as per BOQ and technical specification. The contouring of the plot area is in the scope as per technical specification is also deemed to be included in quoted rates of this item.

Soil investigation needs to be conducted as per the technical specification Section-Civil. Soil Investigation shall be carried out up to 30m depth for each bore hole location.

Mode of measurement of this item is Lumpsum as per BPS

A.2.2 Design of Foundations and ground improvement for:

A.2.2.1 400/33kV Transformers including firewalls and 125 MVAR 420kV Bus reactors including firewall

A.2.2.2 GIS equipment/ module/ GIB foundation and Outdoor AC Switchyard Equipment i.e. Circuit Breakers, disconnectors, CTs, CVTs, surge arresters including outdoor switchgears of AC Filter Sub-banks (if applicable)

A.2.2.3 Tower and Gantries

A.2.2.4 Bay Marshalling Boxes, Panels and Control Cubicles wherever required

A.2.2.5 Other AC switchyard equipment (as per scope specified)

A.2.2.6 GIS building (GIS Hall, AHU room, LCC room)

A.2.3 Buildings including ground improvement (Complete design, including architectural, structural, electrical, foundation design etc.):

A.2.3.1 Pre-Engineered building (PEB) GIS Hall - Structure, wall & roof panels, cage ladder, door gates, shutter etc

A.2.3.2 Structure and foundations of Equipment inside and outside GIS hall

A.2.3.3 LCC room and AHU room

The dimensions of the above buildings shall be finalized during detailed engineering.

Complete design of buildings including architectural, structural and foundation designs shall be carried out in accordance with the technical specifications and the electrical requirements.

A.2.4 Roads: Detailed layout drawings of bitumen road showing slopes etc. shall be developed by the Contractor (for scope as defined in section project) based on standard road sections of Employer.

A.2.5 Layout of Barbed Wire Switchyard fencing (for scope as defined in section project) based on drawings provided by Employer

A.2.6 Cable Trenches: Layout of cable trenches shall be developed by the Contractor based on standard cable trench sections of Employer (for scope as defined in section project)

A.2.7 Layout for Antiweed Treatment, Geo-synthetic fabric/PCC (as applicable) and Stone Spreading (for scope as defined in section project)

A.2.8 Rail cum roads (for scope as defined in section project)

A.2.9 Oil storage tanks/ Oil treatment and handling system, Common oil pits

A.2.10 Ground improvement for above area/ equipment

The scope of civil design work also includes Preparation of Construction drawings, Overall civil layouts, Rail cum road layout, Oil collection pit layout, Cable trench layout including invert levels, Conduit layout of Building, fencing layout, Stone spreading and anti-weed treatment including PCC/Geosynthetic (as applicable) layout, Water supply system layout, Contour layout and other engineering design/ drawing activities.

The supply and erection of Foundation nuts and bolts/anchor bolts required for civil foundations for structures/ equipment of present scope are under scope of Contractor.

The contractor shall submit the above design reports, drawings for the above works during detailed engineering for Employer's approval.

A3 List of Specific Exclusion to this scope:

i. Design of Boundary Wall, Security Post and Main Gate.
ii. Design of Transit Camp/ Residential Quarters.
iii. Design of Converter Halls, Service Building, MV & LV Switchgear building, FFPH Building, Ventilation & cooling building, DG set, Converter Transformer foundation and firewall, approach road to service building, drain of switchyard, DC Switchyard Equipment and Converter Bay equipment etc.

B. Other Civil works Scope (Based upon Employer's design)

The detailed Scope of Civil works to be carried out by the bidder based on the designs, architectural, structural, foundation drawings furnished by the Employer during detailed engineering for the HVDC Station including AC & DC Yard Equipment, Mechanical & Electrical Auxiliaries, road, drain, trenches and buildings is as per following details:

I. Reinforced Cement Concrete

i. The environmental exposure condition of the site falls under severe category as per IS:456. All RCC shall be of Design mix with **minimum M-30 grade**.
ii. The type of cement to be used for this project shall be as per the recommendation of soil consultant / soil investigation report.
iii. All foundations surfaces including boundary walls, Cable Trenches, underground RCC works, RCC drains etc. touching with soil shall be painted with bituminous or silica-fluoride coatings as per IS:456. The cost of painting/coating shall be deemed to be included in the corresponding item of BPS.
iv. Water used for mixing of any type of concrete and curing shall be conforming to IS456.

II. Reinforced Steel

i. The corrosion resistant steel (CRS) shall be used.
ii. The minimum grade of reinforcement steel shall be 500D.

B.1 Site Levelling:

The item site levelling works includes Contouring of whole plot area within the boundary as per technical specification Section-Civil. The HFL data of the plot shall also be furnished

by the bidder. The final area of levelling may be less than the whole plot area, which will be decided during detailed engineering.

The layout of site levelling works showing terraces / FGLs shall be proposed by bidder for approval of employer based on the approved contour level drawing and site HFL data.

Mode of measurement of this item is in Cubic meter of earthwork as per BOQ and technical specification. The contouring of the entire plot area is in scope as per technical specification is also deemed to be included in quoted rates of this item.

B.2 Soil Investigation.

Soil investigation needs to be conducted as per the technical specification Section-Civil. Soil investigation layout shall be provided by the employer. Soil investigation report shall be submitted by the bidder for approval of POWERGRID. Soil Investigation shall be carried out up to 30m depth for each bore hole location.

Mode of measurement of this item is Lumpsum as per BOQ.

B.3 Execution of Foundations works (including all material, T&P, labour etc.):

i. ±500kV DC switchyard and DC Neutral switchyard comprising of DC valve/phase Reactors, DC Blocking filter (if required), DC high speed & commutating Switches, DC measuring devices, DC Disconnectors, discharge devices (if required), Surge Arresters, DC & RI Filters (if required), Neutral Surge Capacitors (if required), common neutral area equipment, Online fault locator (standalone or built in with HVDC Controls), Converter current control and voltage transducers, Circuit Breaker, Pre-insertion resistor with bypass device, support structures, erection hardware, insulators, pipe bus, flexible conductors , DC Bus, Post insulators, Tower, Gantries, Lightning masts etc..
   At KPS-3 HVDC, the DC yard shall be indoor yard. At KPS-3 HVDC, Indoor DC Yard building (DC Hall) shall be constructed. For these DC Halls, the civil works pertaining to the foundation, PCC & RCC works, flooring, painting, brickwall etc. are in bidder's scope. Tentative height of the DC hall building shall be around 22-25 meters.

ii. 500kV DC Class Converter Transformers and spare transformers.
iii. 400kV AC Filter Equipment (if required) and PLC Filter Equipment (Capacitor, Reactors, Resisters), Surge Arresters, Circuit breakers, Disconnectors and Earth Switches, Measuring devices etc.
iv. 400KV Equipment: BPI, SF6/Air Bushing and Bus Duct
v. LT Transformers (including firewall.) and DG set
vi. Towers, Gantries and Lightning masts for HVDC & AC Yard under present scope
vii. Lighting Poles, Bay Marshalling Boxes, Panels and Control Cubicles.
viii. Valve cooling Fans
ix. Equipment inside Valve Hall & DC Halls (Disconnectors, Grounding switches, BPIs, Measuring Equipment, any other equipment as applicable)

x. Fire walls for Converter Transformers
xi. Oil storage tanks/ Oil treatment and handling system, Common oil pits.

The erection of foundation bolts and nuts by fixing them on template and grouting the same in concrete is in the bidder's scope. No separate payment shall be applicable for erection of foundation bolts and the entire work shall be deemed to be included in the RCC work of the corresponding foundation.

Supply of foundation bolts and nuts is under the scope of Employer.

Foundation of any other equipment/ item required during detailed engineering shall be in the scope of bidder.

B.4 Buildings (Including Complete Foundation/ Erection/Finishing works, Foundation of equipment/panels inside buildings, cable trenches/trays/ pipes/ MS chequered plates/MS Channels inside buildings based on the drawings furnished by the Employer):

a.) RCC works for Pre-Engineered building (PEB) for Converter (Valve) Halls: -

Valve Hall Building foundation, construction of RCC Fire rated wall of Valve Hall towards Converter Transformers, Other PCC and RCC work of the side walls and Roof of the Valve Hall building. Tentative height of Valve Hall buildings shall be in the range of 25-30 meters. Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope

b.) RCC works for Pre-Engineered building (PEB) for Indoor DC halls:-

The indoor DC Hall building shall be constructed adjacent to the valve hall. DC Hall Building foundation, PCC and RCC work including side walls are also in present scope. Further, flooring, painting, Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope. The floor of the indoor DC yard shall have a heavy-duty floor slab suitable for the movement of heavy equipment as designed by Employer. Tentative height of the DC hall building shall be around 22-25 meters.

Specific Exclusion pertaining to Valve Hall and DC Hall Building:

Following works of Valve Hall building (above ground) & DC Hall Building (above ground) are excluded from the bidder's present scope

I. Super-Structure including paneled walls, Screening, Faraday Cage, piping, drainpipe, Doors/Gates etc. of Valve hall and DC halls building.
II. Interface with Conv. Transformer, Valve Bushings, DC Yard Wall Bushings
III. Interface with Valve Cooling and Ventilation building including the Ventilation Ducting/Piping

IV. Interface with Service Building including Fibre optic cables

V. All Control and Power Cable, Fire detection system related cabling / piping works supply, conduiting, laying and sealing.

However, any minor earthworks, miscellaneous supply/works associated with Interface to Valve Hall & DC Hall Building Works, Earthing system, Fire-fighting system, HVAC system, Construction power etc. shall be in Bidder's scope. Foundation of equipment inside the building is also in bidder's scope.

b.) Valve Cooling Buildings: The construction of Valve Cooling Building as per the drawing provided by the employer is in the bidder's scope.

The Installation and Commissioning of Valve Cooling System is in Employer's scope. However, necessary coordination & interface work including minor Earthwork/ miscellaneous supply related to above in order to have a operational system pertaining to above is in bidder's scope.

c.) Valve Hall Ventilation Buildings: The construction of Valve Hall Ventilation Building as per the drawing provided by the employer is in the bidder's scope.

Valve Hall Ventilation system is in Employer's scope. However, necessary coordination& interface work including minor Earthwork/ miscellaneous supply related to above in order to have a functional system pertaining to above is in bidder's scope.

d.) Foundations of Equipment inside Valve Halls & DC Hall comprising of Measuring devices, Earth switches, Arresters, Bus bar, BPIs etc

e.) Main Service Building for Bipole is under present scope. Superstructure, internal & external finishing works, Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope.

f.) MV and LV switchgear room, DG set foundation. Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope

g.) Firefighting pump house: Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope.

h) 1 no. of Store building of size 1500sqm. The building shall be of RCC Structure with trussed roof. One outdoor store area platform (of size 1200 sqm). Spare foundations near outdoor storage area for spare CTs, CVTs & DC VD is also under bidder's scope.

i) Transit Camp Building

j) Boundary wall, main gate and Car Parking Shed

B.5 Fire Water tanks and Diesel storage tank.

B.6 Barbed Wire Switchyard fencing and AC and DC filter fencing with gates and Switchyard Gate

B.7 Rail cum roads for converter transformers, transformers (if applicable), reactors (if applicable), aux. transformers

B.8 Fire walls for HVDC Converter Transformer

B.9 Antiweed Treatment Stone Spreading for complete switchyard areas

B.10 Providing & laying Geo-synthetic fabric in switchyard area and slope pitching

B.11 Sewerage treatment and water supply system for Service Buildings, Transit Camp and Security Hut including internal and external plumbing complete.

B.12 Oil storage tanks & Common Oil Pits.

B.13 Filter Switchyard panel room (if applicable).

B.14 Storm Water Drainage.

B.15 Roads all types

B.16 Cable Trenches in switchyard areas and Buildings, Buried trenches/ pipes for cable laying in switchyard area, buildings, cable trenches inside valve hall and buildings.

B.17 All cable trenches shall be covered with RCC covers. Cable trenches inside buildings shall have chequered plates

B.18 Foundations of Repeater shelter system

B.19 Security Post & Watch Towers

B.20 Dry Stone Pitching for slope protection

B.21 Sump Pits with covers

B.22 Rainwater Harvesting, Borewell and construction water supply

B.23 Fire Protection system for substation:

Installation, Testing and Commissioning of Fire Fighting system including piping work for Hydrant and HVWS system, Deluge Valve system is in the employer's scope. Civil work of Deluge valve buildings (housing) is under bidder's scope of work. Further, necessary coordination/interface work including minor Earthwork/ miscellaneous supply related to above in order to have a functional system pertaining to above is in bidder's scope.

B.24 Air conditioning system:

Foundation of AC Chillers shall be in bidder's scope. Supply, Installation and Commissioning of Air conditioning system for Service building, switchyard panel

room (if provided) shall be in employer's scope. However, necessary coordination/interface work including minor Earthwork/ miscellaneous supply related to above in order to have a functional system pertaining to above is in bidder's scope.

B.25 Illumination system:

Necessary coordination/interface work including minor Earthwork/ miscellaneous supply related to Employer's supplied illumination system, in order to have a functional system pertaining to above is in bidder's scope.

B 26 Earthing system:

Necessary coordination/interface work including minor Earthwork/ miscellaneous supply related to scope of earthing system as specified above in order to have a functional system pertaining to above is in bidder's scope.

B.27 Lightning Protection (DSLP)

Foundation work for Lightning masts, Necessary coordination/interface work related to scope of DSLP system (including Employer's supplied) above in order to have a functional system pertaining to above is in bidder's scope.

B.28 Water supply system:

Design of water supply system, supply and installation of pipes including underground pipes, fittings, valves, pumps with control panel from borewell to Fire Water tanks, Service buildings, other buildings, security hut, transit camp, switchyard areas is under bidder's scope.

Two nos. of borewells shall be constructed inside station boundary by bidder under bidder's scope for construction water supply and station water supply system.

B.29 Ground Improvements below Foundation of all structure and buildings.

1.3.1.4 The contractor shall provide all the necessary interface requirement/ inputs as required by Employer for civil works buildings, equipment, road, cable trenches, drain etc.

1.3.1.5 Any other equipment/system/interface not specifically mentioned in the specification but are required for successful completion of work in line with scope/TS requirement for entire AC and HVDC are deemed to be included in the scope of the specification unless specifically excluded.

1.3.2 SOUTH OLPAD (HVDC) STATION

The existing South Olpad is a 765/400kV GIS Substation. South Olpad HVDC shall be interconnected by 400kV GIS of existing South Olpad substation. Works required to be

carried out in existing GIS Hall (which inter alia includes extension of existing GIS Halls, EOT Cranes, LCC rooms for feeders/ Bus modules etc.) is under present scope of contractor. Make and other Details of existing GIS shall be provided during detailed engineering. Other modifications required in auxiliary systems (ventilation system, illumination system, earthing system, cable trench etc.) of existing GIS due to extension is under present scope of works. Civil foundation works including detail design and drawing for extension of existing GIS Halls & Civil works of extension of LCC Rooms (if required), Cable trenches, earthing etc. shall be under present scope

1.3.2.1 HVAC Part:

a) Gas insulated switchyard equipment:

The SF6 gas insulated switch gear (50 Hz) shall be of the indoor metal-enclosed type.

420kV SF6 gas insulated switch gear shall have one and a half breaker bus bar arrangement. The Switchgear shall be complete with all necessary terminal boxes, SF_6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring equipment & piping and support structures along with necessary base plate & foundation bolts. In addition, all necessary platforms, supports, ladders and catwalks etc. as required for operation & maintenance work shall also be provided.

420kV GIS modules/ Equipment for HVDC VSC Converter Bays, AC Reactor (future use), AC Filter Bank bays (if applicable) with suitable TRV rating, Extension of existing 400kV GIS Bus shall be provided.

i. 420kV GIS modules/Equipment as per present scope and specified in BPS. Description of GIS module is given in **Annexure-Description of 420kV GIS Modules/Equipment.**

ii. 420kV Gas Insulated Single phase enclosure Bus Duct (Including support structure, gas monitoring device, gas barrier, UHF PD Sensor etc.) from GIS building to Centre line of SF6/Air Bushing shall be in scope of contractor. SF6 gas duct inside GIS building are part of respective GIS Module.

iii. Testing and Maintenance equipment.

iv. Extension of EOT crane for GIS hall under present scope.

v. Augmentation of Air conditioning system, Ventilation system and Fire detection & alarm system for GIS hall & relay panel room

vi. Any other equipment/material required to complete the specified GIS scope of work

b) Air insulated switchyard equipment:

i. 400kV Equipment for AC Filter Sub-banks (if applicable): Circuit breakers, Isolators, Earth switches, Current transformers, Capacitive voltage transformers, Bus post insulators & Surge arresters

c) Substation Automation System (SAS):

Augmentation of bays under present scope i.e. 400kV AC VSC Converter bays, 400kV AC filter main bays (if applicable) and tie bays with existing Section Substation Automation (including hardware and software) along with associated equipment. The scope of bidder shall include but not limited to integration of IED's under present scope of augmentation with existing substation automation of Make (which is based on IEC 61850): shall be conveyed during detail engineering and capability enhancement of same as required including up-dating of system database, displays, development of additional displays and reports as per requirement. Necessary Licenses for the SAS shall also be provided.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

d) Relay and protection system:

Control, Relay and Protection system for bays under present scope i.e. 400kV AC VSC Converter bays, 400kV AC filter main bays (if applicable) and Bus-bar as per 'Section–Control and Relay Panels'.

Further, augmentation of the existing 400kV bus bar protection scheme including peripheral bay units is under present scope. BCU for future bays is also included in present scope. Necessary modifications, wiring, shifting, augmentation and integration of 400kV bus bar protection etc. for completion of the bus bar protection scheme for bays under present scope has to be carried out by the contractor. Any modification required in the existing protection scheme is included in the present scope.

Details of Existing 400kV bus bar protection scheme shall be provided during detailed engineering.

The contractor shall also supply necessary BCUs based on IEC-61850 for control and monitoring of substation 33kV auxiliary system.

e) Controlled Switching device for Main & Tie Bay for VSC Converter bays, AC filter (if required) for minimizing switching transients and inrush currents.

1.3.2.2 Other auxiliary facilities:

a) Fire Protection system for substation:

Augmentation and extension of existing fire detection, alarm and protection system including Smoke detection, Fire alarm & Annunciation System and Fire Extinguishers for extension work is under present scope.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

b) Air conditioning system:

Augmentation of existing air-conditioning/ additional air-conditioning system is required for extension work shall be under present scope of contractor.

Augmentation of existing ventilation system for GIS hall/ additional ventilation system is required for extension work shall be under present scope of the contractor**.**

c) Cables:

1.1kV grade Power & Control cables (and special optical fiber cables, if any) and cable sealing systems along with complete accessories for the present scope. Methodology for supply, installation & sizing of cables shall be as per 'Section- Power and control cables'.

d) Illumination system:

Extension of existing LED based Indoor Illumination in GIS building, AHU room & LCC room including new LED fixtures/ switchboard etc. along with wiring is under present scope of work.

Complete illumination design/ drawing/BOM, supply, installation of Transit camp scope shall be under present scope of Contractor. LED based indoor illumination System for Transit camp is under present scope. Indoor Illumination (with all fittings, wirings, fixtures, power receptacles switches, MCBs, switch boxes, sockets, JB, Lighting DB, Power DB etc) shall be provided using fixture types as specified in Section: Lighting System.

The bidder shall provide the illumination load requirement during detailed engineering. The required number of feeder in MLDB, ELDB etc. shall be provided by Employer. The bidder shall provide, lay & terminate the necessary cable from MLDB & ELDB to the interface DB (under present scope) to complete its scope of work.

Further, for other buildings, Supply & installation of GI Conduits, bends, flush mounted plates, MS boxes etc. (concealed type) inside buildings i.e service building, Ventilation and cooling building, MV & LV Switchgear building, FFPH building etc. is under present scope. These conduits shall be laid during construction of buildings. All other works of illumination system for these buildings i.e. fittings, fixtures, fixtures on false ceiling, switchboards, connection with distribution boards, wiring, power receptacles switches, MCBs, switch boxes, sockets, fixtures, JB, Lighting DB, Power DB etc. shall be under scope of Employer.

For GIS building extension the LAN cable shall be extended/provided by the bidder including necessary cable and its laying from adjacent panel/AC control room building to GIS building is under present scope
For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

Solar PV Power Plant/ Roof top Solar Grid as mentioned in Section lighting section and Illumination system of Transit camp/ Township is not part of present scope.

e) Erection Hardware:

Conductor(s), Al tube, bus-bar materials, cable trays & covers, Bay MB (as applicable), spacers, clamps & connectors, Junction box, earth-wire, earthing material risers above ground, pipes for equipment & lighting cables, cable supporting angles/channels, insulating mats, cable sealing arrangement, all accessories etc. as required for AC GIS package.

400kV Busbar current rating shall be 4000 Amp.

f) Insulator strings and associated Hardware

Insulator strings and associated hardware fittings under present scope shall be provided by the contractor as required.

g) Earthing system:

Earthing of GIS bays Extension, GIS Buildings extension and other earthing equipment shall be under present scope of Contractor. The existing Main Earth mat (40 mm MS rod) shall be used for connection of earthing. If required, the new Main Earth mat (40 mm MS rod) shall be laid by the bidder. However, design of earthing system and supply of material of main Earth mat (40 mm MS rod) for the works is under Contractor's scope.

Design of complete earthing system (HVDC part) shall be carried out by Employer. Supply and installation of Main Earth mat (40 mm MS rod), Aux. Earth mat, pipe & rod electrodes, risers (below ground level), construction of Earthing pits etc. for all the entire AC & DC switchyards including AC and DC equipment, converter valve hall, GIS hall & their associated equipment, MV & LV switchgears, FFPH, DG set, service building area, panels, auxiliary mats for isolators, buildings etc. shall be under the present scope of Contractor. Further, installation of Earthing connection (above ground level) from riser to equipment/ panels (as per scope specified in Section Project for GIS package) shall be carried under the present scope of Contractor.

All material/supplies/services required for risers, GS Flats, and other accessories required for connection of the equipment (as per scope specified in Section Project) to main earth mat are in the present scope. Earthing of GIS bays Extension under present scope and extension of GIS Buildings shall be under present scope of Contractor. The existing Main Earth mat (40 mm MS rod) shall be used for connection of earthing. If required, the new Main Earth mat (40 mm MS rod) shall be laid by the bidder.

Earthing pit (if required) shall also be designed and constructed by the bidder under present scope.

All the structures, equipment's support, structures, cable trenches, auxiliary Earthmat, Panels, fences, etc. shall be earthed by connecting them to the main Earthmat by the contractor under present scope. All material/supplies/services required for rod electrode, pipe electrode, risers, GS Flats, and other accessories required for connection of the equipment to main earth mat are in the present scope.

For the equipment, panels supplied by Employer, Contractor shall bring the 40mm MS rod risers from main earth mat to the nearest location of equipment/ panel/ building as per design layout provided by Employer. Earthing connection from riser to GS flat shall be carried out by the Employer.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

h) Lightning Protection (DSLP)

The lightning protection (DSLP) for extension works of GIS Building/ GIB duct/switchyard is under present scope of contractor. The lighting protection shall be designed as per the Rolling sphere method or Razevig method. The contractor shall design the lightning protection by utilizing the structures being provided under present scope. In case, additional structures (Lightning Masts) are required to meet the lightning protection, the contractor shall provide the same without any additional cost to Employer. For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

i) Phasor Measuring Unit (PMU)

i. Synchro phasor measurement using Phasor Measurement Units along with fibre optic connectivity, Global Positioning System Receiver and communication equipment shall be provided for 400kV Converter bays.
ii. Phasor Measurement Units shall comply with IEC/IEEE 60255-118-1-2018 and shall support IEEE C 37.118 protocols.
iii. These PMUs shall be integrated with Phasor data Concentrator (PDC) at RLDC/SLDC for the subject project.
iv. The Bidder shall extend technical support at local end for seamless integration of PMU with PDC at RLDC end. The integration work at RLDC/SLDC end will not be under the scope of the Bidder. The Existing PDC Software/application at RLDC/SLDC shall be informed during detailed engineering.
v. Each of the PMUs supplied in this project shall support measurement of voltage and current of at least 2 feeders/bays.
vi. All cabling and interconnections for extension of CT/CVT, Digital inputs from the Line Bays, ICTs/Reactors/STATCOM bays up to PMU panel for measurement by PMU, shall be in the scope of the Bidder. Accordingly, the associated 1.1KV Control cables as required for Non-Adjacent Inter- Control and Relay panel (CRP) CT /PT connections & Digital input connections to PMU panel shall also be under the Bidder's scope.

j) Lattice and pipe structures (galvanized):

Design, engineering, fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of Gantry structures, Towers, Beams, Lightning masts and all Equipment support structures complete in all respect are under present scope.

Design and drawings of tower, beams and equipment support structures shall be prepared by the Contractor and put up for approval of Employer during detailed engineering. These shall be developed by the contractor based on the approved design. The proto corrected drawings along with BOM are to be approved by the contractor and final copies of approved proto corrected drawings shall be submitted to POWERGRID for information only. Contractor shall provide editable soft copies of design & drawings during detailed engineering. The Support structure for Circuit Breaker shall be as per manufacturer's design. In the bid price schedule, the structures including foundation bolts and fasteners are indicated in the form of sets/lot.

For diameter/bays where transformer is to be terminated, the structure must also consider the load and deviation which is arising due to the interconnection with other side. Further, for the last diameter/bay, the end towers must be extendable type for connecting future beams. Bus work(s) may be optimized by the contractor by suitably considering the number of diameters/bays in a bus work section.

Line take-off gantry structures are required to be considered with ±30-degree deviation and maximum 200m slack span. For design of Gantry structures, the conductor tension shall be considered based on actual requirement for present & future scope of work.

k) Remote operation:

The employer intends to operate the 400kV AC GIS bays from remote location (NTAMC/ RTAMC). Augmentation of existing remote operation facilities at South Olpad station is under present scope. Necessary interfacing equipment including software and hardware, Router, Firewall, Ethernet Switches, HMI etc. (if required) for remote operation are under present scope.

Communication channel shall be provided by Employer.

l) LT switchgear extension (ACDB & DCDB extension)

Suitable feeders in existing ACDB & DCDB panels shall be provided by Employer. Bidder shall calculate their load requirement as per standard practice and shall lay & terminate the cable for it's requirement. In case feeders are not available, Bidder has to make arrangement to extend the ACDB & DCDB at it's own cost without any implication to Employer.

The bidder shall supply, lay and terminate the necessary cables from the LT switchgear to Transit camp to meet the auxiliary power requirements of transit camp. Suitable sub

sheet shall be provided with PVDF (Polyvinyl di fluoride) paint coating in place of SMP (Silicon Modified Polyester) paint.

A.1.7 Protective coating shall be applied to the surface of all the structural steel members after grit/shot blasting of structural members. The final DFT (dry firm thickness) shall not be less than 200 microns. The complete Work shall be as below: Shot blasting to SA 2 ½ + Zinc silicate primer of thickness 40-60 microns DFT + MIO (Micaceous Iron Oxide) Epoxy Intermediate coat of thickness 100-120 microns DFT + PU (Polyurethane) finish coat of thickness 40-60 microns DFT.

A.1.8 All other details shall be as per technical specification

A.1.9 The Contractor shall submit design reports with calculations where applicable, drawings for architectural works, structural works and foundations, detailed layout & section drawings etc. in accordance with the Specification, for works mentioned below during detailed engineering for Employer's approval. Editable copies of relevant design calculations shall be submitted by the contractor for employer's approval during detailed engineering.

A.1.10 The design of the foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification. The foundations may be open foundation or pile foundation as per the site requirement / soil report. Soil Investigation and preparation of soil report shall be in bidder's scope.

A.1.11 Wind and seismic data shall be considered as per the latest NBC 2016

A.1.12 The Execution of Civil Works based on design submitted by Contractor for the equipment/building mentioned at 'Clause A.2' below is in bidder's scope

A.2 DETAILED SCOPE OF DESIGN AND DRAWING WORK IS AS FOLLOWS:

A.2.1 Site levelling: The item site levelling works includes Contouring of whole plot area within the boundary as per technical specification Section-Civil. The HFL data of the plot shall also be furnished by the bidder. The final area of levelling may be less than the whole plot area, which will be decided during detailed engineering. The layout of site levelling works showing terraces / FGLs shall be proposed by bidder for approval of employer based on the approved contour level drawing and site HFL data.

Mode of measurement of this item is in Cubic meter of earthwork as per BOQ and technical specification. The contouring of the plot area is in the scope as per technical specification is also deemed to be included in quoted rates of this item.

Soil investigation needs to be conducted as per the technical specification Section-Civil.

Mode of measurement of this item is Lumpsum as per BPS

A.2.2 Design of Foundations for:

A.2.2.1 GIS equipment/ module/ GIB foundation and outdoor switchyard equipment (if applicable)

A.2.2.2 GIS building Extension (GIS HALL, LCC room, AHU room etc.)

A.2.2.3 Tower and Gantry (if applicable)

A.2.2.4 Bay Marshalling Boxes, Panels and Control Cubicles wherever required

A.2.3 **Buildings** (complete design, including foundation, architectural, structural, electrical etc.):

A.2.3.1 Pre-Engineered building (PEB) GIS hall extension – Structure, wall & roof panels, cage ladder, door gates, shutter etc.

A.2.3.2 Structure and foundations of Equipment inside and outside GIS Hall

A.2.3.3 Extension of LCC room and AHU room

The dimensions of the above buildings shall be finalized during detailed engineering.

Complete design of buildings including architectural, structural designs shall be carried out in accordance with the technical specifications and the electrical requirements.

A.2.4 Layout of Barbed Wire Switchyard fencing (for scope as defined in section project) based on drawings from Employer.

A.2.5 Layout for Antiweed Treatment, Geo-synthetic fabric/PCC (as applicable) and Stone Spreading

A.2.6 Cable Trenches: Layout of cable trenches shall be developed by the Contractor based on standard cable trench sections of Employer (for scope as defined in section project).

A.2.7 Roads: Detailed layout drawings of bitumen road showing slopes etc. shall be developed by the Contractor (for scope as defined in section project) based on standard road sections of Employer.

The scope of civil design work also includes Preparation of Construction drawings including Overall civil layouts, Cable trench layout including invert levels, Conduit layout of Buildings, Fencing layout, Stone spreading and anti-weed treatment including

PCC/Geosynthetic (as applicable) layout, Water supply system layout, Contour layout and other engineering layout/design/ drawing activities.
The supply and erection of Foundation nuts and bolts/anchor bolts required for civil foundations for structures/ equipment of present scope are under scope of Contractor.

The contractor shall submit above design reports, layouts, drawings for the above works during detailed engineering for Employer's approval.

A3 List of specific exclusion to this scope:

i. Design and execution of Boundary Wall
ii. Design of Security Post and Main Gate.
iii. Design of Transit Camp/ Residential Quarters.
iv. Design of Converter Halls, Service Building, MV & LV Switchgear building, FFPH Building, Ventilation & cooling building, DG set, Converter Transformer foundation and firewall, approach road to service building, drain of switchyard, DC Switchyard Equipment and Converter Bay equipment etc.

B. Other Civil works Scope (Based upon Employer's design)

The detailed Scope of Civil works to be carried out by the bidder based on the designs, architectural, structural, foundation drawings furnished by the Employer during detailed engineering for the entire HVDC Station including AC &DC Yard Equipment, Mechanical & Electrical Auxiliaries, road, drain, trenches and buildings is as per following details:

I. Reinforced Cement Concrete

i. The environmental exposure condition of the site falls under severe category as per IS:456. All RCC shall be of Design mix with **minimum M-30 grade**.
ii. The type of cement to be used for this project shall be as per the recommendation of soil consultant / soil investigation report.
iii. All foundations surfaces including boundary walls, Cable Trenches, underground RCC works, RCC drains etc. touching with soil shall be painted with bituminous or silica-fluoride coatings as per IS:456. The cost of painting/coating shall be deemed to be included in the corresponding item of BPS.
iv. Water used for mixing of any type of concrete and curing shall be conforming to IS456.

II. Reinforced Steel

i. The corrosion resistant steel (CRS) shall be used.
ii. The minimum grade of reinforcement steel shall be 500D.

B.1 Site Levelling:

The item site levelling works includes Contouring of whole plot area within the boundary as per technical specification Section-Civil. The HFL data of the plot shall also be furnished by the bidder. The final area of levelling may be less than the whole plot area, which will be decided during detailed engineering.

The layout of site levelling works showing terraces / FGLs shall be proposed by bidder for approval of employer based on the approved contour level drawing and site HFL data.

Mode of measurement of this item is in Cubic meter of earthwork as per BOQ and technical specification. The contouring of the entire plot area is in the scope as per technical specification is also deemed to be included in quoted rates of this item.

B.2 Soil Investigation.

Soil investigation needs to be conducted as per the technical specification Section-Civil. Soil investigation layout shall be provided by the employer. Soil investigation report shall be submitted by the bidder for approval of POWERGRID.

Mode of measurement of this item is Lumpsum as per BOQ.

B.3 Execution of Foundations works (including all material, T&P, labour etc.):

i. ±500kV DC switchyard and DC Neutral switchyard comprising of DC valve/phase Reactors, DC Blocking filter (if required), DC high speed & commutating Switches, DC measuring devices, DC Disconnectors, discharge devices (if required), Surge Arresters, DC & RI Filters (if required), Neutral Surge Capacitors (if required), common neutral area equipment, Online fault locator (standalone or built in with HVDC Controls), Converter current control and voltage transducers, Circuit Breaker, Pre-insertion resistor with bypass device, support structures, erection hardware, insulators, pipe bus, flexible conductors , DC Bus, Post insulators, Tower, Gantries, Lightning masts etc.

   At South Olpad HVDC, the DC yard shall be indoor yard. At South Olpad HVDC, Indoor DC Yard building (DC Hall) shall be constructed. For these DC Halls, the civil works pertaining to the foundation, PCC& RCC works, flooring, painting, brickwall etc. are in bidder's scope. Tentative height of the DC hall building shall be around 22-25 meters.

ii. 500kV DC Class Converter Transformers and spare transformers.

iii. 400kV AC Filter Equipment (if required) and PLC Filter Equipment (Capacitor, Reactors, Resisters), Surge Arresters, Circuit breakers, Disconnectors and Earth Switches, Measuring devices etc.

iv. 400KV Equipment: BPI, SF6/Air Bushing and Bus Duct

v. LT Transformers (including firewall.) and DG set
vi. Towers, Gantries and Lightning masts for HVDC & AC Yard under present scope
vii. Lighting Poles, Bay Marshalling Boxes, Panels and Control Cubicles.
viii. 72.5kV Equipment: Circuit breakers, Isolators, Earth switches, Current transformers, Capacitive voltage transformers, Bus post insulators & Surge arresters.
ix. Valve cooling Fans
x. Equipment inside Valve Hall & DC Halls (Disconnectors, Grounding switches, BPIs, Measuring Equipment, any other equipment as applicable)
xi. Fire walls for Converter Transformers
xii. Oil storage tanks/ Oil treatment and handling system, Common oil pits.

The erection of foundation bolts and nuts by fixing them on template and grouting the same in concrete is in the bidder's scope. No separate payment shall be applicable for erection of foundation bolts and the entire work shall be deemed to be included in the RCC work of the corresponding foundation.

Supply of foundation bolts and nuts is under the scope of Employer.

Foundation of any other equipment/ item required during detailed engineering shall be in the scope of bidder.

B.4 Buildings (Including Complete Foundation/ Erection/Finishing works, Foundation of equipment/panels inside buildings, cable trenches/trays/ pipes/ MS chequered plates/MS Channels inside buildings based on the drawings furnished by the Employer):

a.) RCC works for Pre-Engineered building (PEB) for Converter (Valve) Halls: -

Valve Hall Building foundation, construction of RCC Fire rated wall of Valve Hall towards Converter Transformers, Other PCC and RCC work of the side walls and Roof of the Valve Hall building. Tentative height of Valve Hall buildings shall be in the range of 25-30 meters. Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope

b.) RCC works for Pre-Engineered building (PEB) for Indoor DC halls: -

The indoor DC Hall building shall be constructed adjacent to the valve hall. DC Hall Building foundation, PCC and RCC work including side walls are also in present scope. Further, flooring, painting, Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope. The floor of the indoor DC yard shall have a heavy-duty floor slab suitable for the movement of heavy equipment as designed by Employer. Tentative height of the DC hall building shall be around 22-25 meters

Specific Exclusion pertaining to Valve Hall and DC Hall Building:

Following works of Valve Hall building (above ground) & DC Hall Building (above ground) are excluded from the bidder's scope

(i) Super-Structure including paneled walls, Screening, Faraday Cage, piping, drainpipe, Doors/Gates etc. of Valve hall and DC halls building.

(ii) Interface with Conv. Transformer, Valve Bushings, DC Yard Wall Bushings

(iii) Interface with Valve Cooling and Ventilation building including the Ventilation Ducting/Piping

(iv) Interface with Service Building, Additional Service Building including Fibre optic cables

(v) All Control and Power Cable, Fire detection system related cabling / piping works supply, conduiting, laying and sealing.

However, any minor earthworks, miscellaneous supply/works associated with Interface to Valve Hall Building Works, Earthing system, Fire-fighting system, HVAC system, Construction power and water supply etc. shall be in Bidder's scope. Foundation of equipment inside the building is also in bidder's scope.

b) Valve Cooling Buildings: The construction of Valve Cooling Building as per the drawing provided by the employer is in the bidder's scope.

The Installation and Commissioning of Valve Cooling System is in Employer's scope. However, necessary coordination & interface work including minor Earthwork/ miscellaneous supply related to above in order to have a operational system pertaining to above is in bidder's scope.

c) Valve Hall Ventilation Buildings: The construction of Valve Hall Ventilation Building as per the drawing provided by the employer is in the bidder's scope.

Valve Hall Ventilation system is in Employer's scope. However, necessary coordination& interface work including minor Earthwork/ miscellaneous supply related to above in order to have a functional system pertaining to above is in bidder's scope.

d) Foundations of Equipment inside Valve Halls & DC Halls comprising of Measuring devices, Earth switches, Arresters, Bus bar, BPIs etc

e) Main Service Building for Bipole is under present scope. Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope.

f) MV and LV switchgear room, DG set foundation. Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope

g) Firefighting pump house: Foundation of equipment, cable trenches, cable trays, pipes for cables inside the building is also in bidder's scope.

h) 1 no. of Store building of size 1500sqm. The building shall be of RCC Structure with trussed roof. One outdoor store area platform (of size 1200 sqm). Spare foundations near outdoor storage area for spare CTs, CVTs & DC VD is also under bidder's scope.

i) Transit Camp Building

j) Main gate and Car Parking Shed

B.5 Fire Water tanks and Diesel storage tank.

B.6 Barbed Wire Switchyard fencing and AC and DC filter fencing with gates and Switchyard Gate ~~(motorized)~~

B.7 Rail cum roads for converter transformers, transformers (if applicable), reactors (if applicable), aux. transformers

B.8 Fire walls for HVDC Converter Transformer

B.9 Antiweed Treatment Stone Spreading for switchyard areas

B.10 Providing & laying Geo-synthetic fabric in switchyard area and slope pitching

B.11 Sewerage treatment and water supply system for Service Buildings, Transit Camp and Security Hut including internal and external plumbing complete.

B.12 Oil storage tanks & Common Oil Pits.

B.13 Filter Switchyard panel room (if applicable).

B.14 Storm Water Drainage.

B.15 Roads all types

B.16 Cable Trenches in switchyard areas and Buildings, Buried trenches/ pipes for cable laying in switchyard area, buildings, cable trenches inside valve hall and buildings.

B.17 All cable trenches shall be covered with RCC covers. Cable trenches inside buildings shall have chequered plates

B.18 Foundations of Repeater shelter system

B.19 Security Post & Watch Towers

B.20 Dry Stone Pitching for slope protection

B.21 Sump Pits with covers

B.22 Rainwater Harvesting, Borewell and construction water supply

B.23 Fire Protection system for substation:

Installation, Testing and Commissioning of Fire Fighting system including piping work for Hydrant and HVWS system, Deluge Valve system is in the employer's scope. Civil work of Deluge valve buildings (housing) is under bidder's scope of work. Further, necessary coordination/interface work including minor Earthwork/ miscellaneous supply related to above in order to have a functional system pertaining to above is in bidder's scope.

B.24 Air conditioning system:

Foundation of AC Chillers shall be in bidder's scope. Supply, Installation and Commissioning of Air conditioning system for Service building, switchyard panel room (if provided) shall be in employer's scope. However, necessary coordination/interface work including minor Earthwork/ miscellaneous supply related to above in order to have a functional system pertaining to above is in bidder's scope.

B.25 Illumination system:

Necessary coordination/interface work including minor Earthwork/ miscellaneous supply related to Employer's supplied illumination system, in order to have a functional system pertaining to above is in bidder's scope.

B 26 Earthing system:

Necessary coordination/interface work including minor Earthwork/ miscellaneous supply related to scope of earthing system as specified above in order to have a functional system pertaining to above is in bidder's scope.

B.27 Lightning Protection (DSLP)

Foundation work for Lightning masts, Necessary coordination/interface work related to scope of DSLP system (including Employer's supplied) above in order to have a functional system pertaining to above is in bidder's scope.

B.28 Water supply system:

Design of water supply system, supply and installation of pipes including underground pipes, fittings, valves, pumps with control panel from borewell to Fire Water tanks, Service buildings, other buildings, security hut, transit camp, switchyard areas is under bidder's scope.

Two nos. of borewells shall be constructed inside station boundary by bidder under bidder's scope for construction water supply and station water supply system.

B.29 Dismantling work :

(i) Dismantling and re-erection of existing switchyard fence and disposal of unserviceable material.
(ii) Dismantling of existing roads and disposal of unserviceable material
(iii) Dismantling of any RCC foundation if required

B.30 Other miscellaneous requirements & scope:

a) Stone has already been laid in some portion of the switchyard area under present scope. In this area scope shall be removal, cleaning and washing of existing stone, refurbishing with additional stone (if required) and re-spreading after doing anti-weed treatment & laying of non-woven Geo-synthetics fabric. In the area under present scope where stone spreading does not exist, the same shall be provided along with anti-weed treatment & laying of non-woven Geo-synthetics fabric as per section – Civil works. Layout for the same shall be developed by the bidder

b) Providing & laying of non-woven Geo-synthetics fabric of minimum 200 GSM in separation layer between sub grade and stone spreading in switchyard.

1.3.2.4 The contractor shall provide all the interface requirement/ input as required by the Employer for civil works buildings, equipment, road, cable trenches, drain etc.

1.3.2.5 Any other equipment/system/interface not specifically mentioned in the specification but are required for successful completion of work (erection, testing & commissioning) in line with scope/TS requirement for entire AC and HVDC system are deemed to be included in the scope of the specification unless specifically excluded.

1.3.3 KPS3 (GIS EXTENSION)

1.3.3.1 HVAC:

The existing KPS3 (Khavda Power Station 3) is a 400kV GIS Substation. New GIS at KPS-3 (HVDC) shall be interconnected with existing KPS3 GIS station by means of 400kV 2 x D/c transmission lines. Works required to be carried out in existing GIS Hall of Section-I & Section-II (which inter alia includes extension of existing GIS Halls, EOT Cranes, LCC rooms for feeders/ Bus modules etc.) is under present scope of contractor. Make and other Details of existing GIS shall be provided during detailed engineering. Other modifications required in auxiliary systems (ventilation system, illumination system, earthing system, cable trench etc.) of existing GIS due to extension is under present scope of works. Civil foundation works including detail design and drawing for extension of existing GIS Halls & Civil works of extension of LCC Rooms (if required), Cable trenches, earthing etc. shall be under present scope.

a) Air Insulated equipment:

400kV 4400pF CVT, 336kV LA, 400kV class Bus Post Insulator

b) Gas insulated switchgear:

The SF6 gas insulated switch gear (50 Hz) shall be of the indoor metal-enclosed type.

420kV SF6 gas insulated switch gear shall have one and a half breaker bus bar arrangement. The Switchgear shall be complete with all necessary terminal boxes, SF_6 gas filling, interconnecting power and control wiring, grounding connections, gas monitoring equipment & piping and support structures along with necessary base plate & foundation bolts. In addition, all necessary platforms, supports, ladders and catwalks etc. as required for operation & maintenance work shall also be provided.

420kV GIS modules/Equipment as per present scope and specified in BPS. Description of GIS module is given in Annexure-Description of 420kV GIS Modules/Equipment. The scope of work in 400kV GIS is as below:-

i. 420kV GIS modules/Equipment as per present scope and specified in BPS. Four (4) nos. of new 400kV GIS line bays & associated tie bays (2 no. on section I & 2 no. on section II) have been envisaged under present scope at KPS3 GIS extension.
ii. 420kV Gas Insulated Single phase enclosure Bus Duct (Including support structure, gas monitoring device, gas barrier, UHF PD Sensor etc.) from GIS building to Centre line of SF6/Air Bushing shall be in scope of contractor. SF6 gas duct inside GIS building are part of respective GIS Module.
iii. 400kV GIS main Bus-I & Bus II from existing GIS section -I & section-II in GIS hall shall be extended for present scope of work.
iv. Extension of GIS hall for accommodating above mentioned bays

c) Control and Protection system:

Complete Control, Relay and Protection system for bays under present scope (i.e. 4 nos. of 400kV line bays and 4 nos. of tie bays) as per 'Section–Control and Relay Panels' in 'Section-HVAC'. Further, augmentation of the existing 400kV bus bar protection scheme including peripheral bay units is under present scope. Necessary modifications, wiring, shifting, augmentation and integration of existing 400kV bus bar protection for completion of the bus bar protection scheme for bays under present scope has to be carried out by the contractor. Any modification required in the existing protection scheme is included in the present scope.

Details of Existing 400kV bus bar protection scheme shall be provided during detailed engineering.

d) Substation Automation system:

Augmentation of bays under present scope (i.e. 4 nos. of 400kV line bays and 4 nos. of tie bays) with existing Substation Automation Systems. These line bays are distributed as 2 no. on section I of 400kV Bus & 2 no. on section II of 400kV Bus. The scope of bidder shall include but not limited to integration of IED's under present scope of augmentation with existing substation automations of Make (which is based on IEC 61850) shall be conveyed during detail engineering and capability enhancement of

same as required including up-dating of system database, displays, development of additional displays and reports as per requirement.

i. In the present scope, contractor shall also provide BCUs required for bays under present scope (i.e. 4 nos. of 400kV line bays and 4 nos. of tie bays) (bays as defined in Section: Substation Automation System of Section-HVAC)

ii. Any upgradation of hardware and software for above integration shall be in the scope of contractor including license fee (if any).

Main-I and Main-II relay for protection of 400kV transmission lines from existing KPS3 GIS shall be provided as distance function at KPS3 GIS end of which both channel shall be through DTPC. Protection channel through DTPC shall be realized through Optical fiber cable over 400kV lines.

For GIS building extension the LAN cable shall be extended/provided by the bidder including necessary cable and its laying from adjacent panel/service building to GIS building is under present scope.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

e) Tele-Communication equipment:

The broad Scope of FO based Communication Equipment shall include:

- SDH Equipment along with suitable interfaces and line cards.
- All cabling, wiring, Digital Distribution frame patch facilities and interconnection to the supplied equipment at the defined interfaces,
- System integration of all supplied subsystem
- Integration with the existing communication system based on SDH and PDH of employer
- Integration of supplied subsystem with SCADA system, ~~PLCC equipment~~, PABX of RLDC/SLDC, VOIP (SIP compliant) for voice.
- Fibre Optic Approach Cable (FOAC) along with duct and Fibre Optic Distribution Panel (FODP)
- Integration of new Communication equipment in the existing regional NMS. All required support to existing NMS vendor for integration of new Communication equipment.

Refer 'Section-Telecom' and 'Section- RFP' for scope of Telecommunication Equipment

f) Fire Protection system for substation:

Augmentation and extension of existing fire detection, alarm and protection system including Smoke detection, Fire alarm & Annunciation System and Fire Extinguishers for extension work is under present scope.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

g) Air conditioning system:

Augmentation of existing air-conditioning/ additional air-conditioning system is required for extension work shall be under present scope of contractor.
Augmentation of existing ventilation system for GIS hall/ additional ventilation system is required for extension work shall be under present scope of the contractor.

h) Cables:

1.1kV grade Power & Control cables (and special optical fiber cables, if any) and cable sealing systems along with complete accessories for the present scope. Methodology for supply, installation & sizing of cables shall be as per 'Section- Power and control cables'.

i) Illumination System :

Extension of existing LED based Indoor Illumination and illumination for the switchyard including new LED fixtures/ switchboard etc. along with wiring is under present scope of work.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

j) Erection Hardware:

Conductor(s), Al tube, bus-bar materials, cable trays & covers, Bay MB (as applicable), spacers, clamps & connectors, Junction box, earth-wire, earthing material risers, auxiliary earth-mat (excluding main earth mat), pipes for cables of equipment & lighting, cable supporting angles/channels, Insulating mats, cable sealing arrangement, cable pull pit, all accessories etc. as required

k) Earthing system:

Earthing of GIS bays Extension and GIS Buildings and other equipment shall be under present scope of Contractor. The existing Main Earth mat (40 mm MS rod) shall be used for connection of earthing. If required, the new Main Earth mat (40 mm MS rod) shall be laid by the bidder. However, design of earthing system and supply of material of main Earth mat (40 mm MS rod) for the present scope of work is under Contractor's scope.

Earthing pit (if required) shall also be designed and constructed by bidder under present scope.

All the structures, equipment's support, structures, cable trenches, auxiliary Earthmat, Panels, fences, etc. shall be earthed by connecting them to the main Earthmat by the contractor under present scope. All material/supplies/services required for rod electrode, pipe electrode, risers, GS Flats, and other accessories required for connection of the equipment to main earth mat are in the present scope.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

l) Lightning Protection (DSLP)

The lightning protection (DSLP) for extension works of GIS Building/ GIB duct/switchyard is under present scope of contractor. The lighting protection shall be designed as per the Rolling sphere method or Razevig method. The contractor shall design the lightning protection by utilizing the structures being provided under present scope. In case, additional structures (Lightning Masts) are required to meet the lightning protection, the contractor shall provide the same without any additional cost to Employer. For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

m) Phasor Measuring Unit (PMU)

The broad Scope of the procurement of PMU shall include planning, designing, engineering, supply, transportation, insurance, delivery at site, unloading handling, storage, installation, termination, testing and demonstration for acceptance, commissioning, and documentation for PMU as per BPS.

i. Synchro-phasor measurement using Phasor Measurement Units along with fibre optic connectivity, Global Positioning System Receiver and communication equipment shall be provided for 400kV AC line bays under present scope.
ii. Phasor Measurement Units shall comply with IEC/IEEE 60255-118-1-2018 and shall support IEEE C 37.118 protocols.
iii. These PMUs shall be integrated with Phasor data Concentrator (PDC) at RLDC/SLDC for the subject project.
iv. The Bidder shall extend technical support at local end for seamless integration of PMU with PDC at RLDC end. The integration work at RLDC/SLDC end will not be under the scope of the Bidder. The Existing PDC Software/application at RLDC/SLDC shall be informed during detailed engineering.
v. Each of the PMUs supplied in this project shall support measurement of voltage and current of at least 2 feeders/bays.
vi. All cabling and interconnections for extension of CT/CVT, Digital inputs from the Line Bays, ICTs/Reactors/STATCOM bays up to PMU panel for measurement by PMU, shall be in the scope of the Bidder. Accordingly, the associated 1.1KV Control cables as required for Non-Adjacent Inter- Control and Relay panel (CRP) CT /PT connections & Digital input connections to PMU panel shall also be under the Bidder's scope.

n) LT switchgear extension (ACDB & DCDB extension)

Suitable feeders in existing ACDB & DCDB panels shall be provided by Employer. Bidder shall calculate their load requirement as per standard practice and shall lay the cable for it's requirement. In case sufficient feeders are not available, Bidder has to make arrangement to extend the ACDB & DCDB at it's own cost without any implication to Employer.

For integration with Employer's scope 'Refer Annexure – Interface (PKG-II)'

o) Augmentation of Visual monitoring system for 400KV bays under present scope, and their integration with existing Substation VMS system. The detail of existing VMS system shall be provided during detailed engineering. The contractor shall provide necessary numbers of color IP camera, with PAN, TILT and ZOOM facilities, suitably located in the GIS hall and switchyard for monitoring of 400kV bays and equipment under present scope. The scope of bidder shall include providing all Items, Accessories, Line Interface units, Fiber patch cords, Power supply units, Junction Boxes, Cables, Fiber Optic Cables, Hardware and Software, etc., as are applicable to the product design, to meet functional requirements. Compatibility enhancement of exiting VMS system, as needed, shall be done to integrate visual monitoring for 400kV bays under present scope with existing Visual monitoring system of the station. The cameras to be supplied under present scope are also to be integrated with NVR of NTAMC system at site. All SDK (Software development kit) /APIs (Application programming interface) are in the scope of the bidder. Additional camera licenses in NVR shall be provided by contractor for present scope of work. The augmentation scope of existing VMS system shall be as per section - Specific Requirement to Section AC Switchyard – specification of Visual Monitoring system.

p) Insulator strings and associated hardware

Insulator strings and associated hardware fittings under present scope shall be provided by the contractor

q) Mandatory spares as per **BPS and Annexure- Mandatory spares**.

r) Testing and maintenance equipment as per BPS. Technical details shall be as per Annexure-**Testing & Maintenance equipment**.

s) The employer intends to operate the 400kV AC GIS bays from remote location (NTAMC/ RTAMC). Augmentation of existing remote operation facilities at South Olpad station is under present scope. Necessary interfacing equipment including software and hardware, Router, Firewall, Ethernet Switches, HMI etc. (if required) for remote operation are under present scope.

Communication channel shall be provided by Employer.

t) The necessary interface equipment (Router, Firewall, Ethernet Switches etc.) and integration work for transferring data to RLDC (RSCC)/NLDC/National Transmission Asset Management Centre (NTAMC) at Manesar through optical fiber based SDH communication link is also under present scope. However, no work is envisaged at remote end (RLDC/NLDC/NTAMC/RTAMC etc) in the present scope.

1.3.3.2 Civil Design & Drawing Scope for KPS3 GIS Extension:

General

1. Reinforced Cement Concrete:

a. The environmental exposure condition of the site falls under severe category as per IS:456. All RCC shall be of Design mix with minimum M-30 grade. Further, for pile foundation works RCC shall be of minimum M-30 grade with minimum cement content of 400 kg/Cum.

b. The type of cement to be used for this project shall be as per the recommendation of soil consultant/ soil investigation report.

c. All foundations surfaces including boundary walls, Cable Trenches, underground RCC works, RCC drains etc. touching with soil shall be painted with bituminous or silica-fluoride coatings as per IS:456. The cost of painting/coating shall deemed to be included in the corresponding item of BPS.

d. Water used for mixing of any type of concrete and curing shall be conforming to IS456.

2. Reinforcement Steel:

a. The corrosion resistant steel (CRS) shall be used.

b. The minimum grade of reinforcement steel shall be Fe500D.

3. PEB structure and Materials:

a. The steel sheets of walls & roofing panels, Trims, Downspouts, Flashings, Gutter etc. shall be provided with 200 GSM zinc aluminium coating. After zinc aluminium coating, the external face of the steel sheet shall be provided with PVDF (Polyvinyl di fluoride) paint coating in place of SMP (Silicon Modified Polyester) paint.

b. Protective coating shall be applied to the surface of all the structural steel members after grit/shot blasting of structural members. The final DFT (dry firm thickness) shall not be less than 200 microns. The complete Work shall be as below: Shot blasting to SA 2 ½ + Zinc silicate primer of thickness 40-60 microns DFT + MIO (Micaceous Iron Oxide) Epoxy Intermediate coat of thickness 100-120 microns DFT + PU (Polyurethane) finish coat of thickness 40-60 microns DFT.

c. All other details shall be as per technical specification.

Other Civil Scope

The design of foundations shall be based on the existing soil investigation report (shall be provided during detailed engineering) and other parameters as per relevant IS codes & technical specification. The foundations may be open foundation or pile foundation as per the site requirement / soil report. Soil report shall be handed over to successful bidder during detailed engineering

The Contractor shall submit design reports, drawings for architectural works, structural works and foundations, detailed layout drawings etc. in accordance with the Specification, for present scope of works including but not limited to the works mentioned below during

detailed engineering for Employer's approval. Editable copies of relevant design calculations shall be submitted by the contractor for employer's approval during detailed engineering. Detail scope of design and drawing shall be as follows:

a. Structure and foundations of equipment inside and outside GIS hall like GIS Equipment, GIS bus duct support, GIS air bushings, Tower, Gantry and Lightning masts (if required) for extension works.
b. Structure and Foundation for AIS Equipment.
c. Foundations for Bay Marshalling Boxes, Panels, Control Cubicles, Lighting Poles wherever required
d. Cable trenches, drain, road etc. based on employer drawing.
e. Site levelling Works: The layout of site levelling works showing terraces/ FGLs shall be prepared by Contractor.
f. Buildings (Complete design, including architectural, structural, electrical, foundation design etc.)

- Extension of 400kV GIS Hall, Relay Room and AHU Room (PEB Type) – The dimension of these buildings shall be finalized during detailed engineering considering present scope. Complete design of buildings including architectural, structural and foundation designs shall be carried out in accordance with the technical specifications and the electrical requirements.

g. Dismantling work :
(i) Dismantling and re-erection of existing switchyard fence and disposal of unserviceable material.
(ii) Dismantling of existing roads and disposal of unserviceable material
(iii) Dismantling of any RCC foundation if required

h. Other miscellaneous requirements & scope:
a) Stone has already been laid in some portion of the switchyard area under present scope. In this area scope shall be removal, cleaning and washing of existing stone, refurbishing with additional stone (if required) and re-spreading after doing anti-weed treatment & laying of non-woven Geo-synthetics fabric. In the area under present scope where stone spreading does not exist, the same shall be provided along with anti-weed treatment & laying of non-woven Geo-synthetics fabric as per section – Civil works. Layout for the same shall be developed by the bidder
b) Providing & laying of non-woven Geo-synthetics fabric of minimum 200 GSM in separation layer between sub grade and stone spreading in switchyard.
c) Ground improvement work below all structure/buildings foundation as per Section - Civil
i. Foundation of non-Standard structures, if any
j. Any other item/design/drawing required for successful completion of the scope of works.

The Execution of Civil Works based on design submitted by Contractor for the equipment/building mentioned above is in bidder's scope.

The supply and erection of Foundation nuts and bolts/anchor bolts required for civil foundations is in present scope of Contractor. No separate payment shall be applicable for erection of foundation bolts and the entire work shall be deemed to be included in the RCC work of the corresponding foundation

1.3.3.3 Any other equipment/system/interface not specifically mentioned in the specification but are required for successful completion of work (supply, erection, testing & commissioning) in line with scope/TS requirement for entire AC system are deemed to be included in the scope of the specification unless specifically excluded.

1.4 PHYSICAL PARAMETERS

1.4.1 LOCATION OF THE SUBSTATION:

The location of sub-stations are as under:

Sl.	Name of the Substation	State	Nearest Railway station	Nearest Airport
1.	KPS3 HVDC	Gujarat	Bhuj	Bhuj
2.	South Olpad(HVDC)	Gujarat	Surat	Surat

Annexure-Survey Report by BPC is attached for the location of the KPS3 (HVDC) and South Olpad (HVDC).

1.4.2 METEOROLOGICAL DATA

The meteorological data and other parameters of sub-stations are as under:

Sl.	Parameter	KPS2 (HVDC)	South Olpad
1.	Max Ambient temperature (dry bulb one-hour average) Minimum Ambient temp. Max dry bulb 24hr average	50 deg C 0 deg C 40 deg C	50 deg C 0 deg C 40 deg C
2.	Snowfall (mm)	NA	NA

3.	Average annual rainfall	As per rainfall map of IMD	As per rainfall map of IMD
4.	Iso-keraunic level	As applicable	As applicable
5.	Relative humidity	100%	100%
6.	Wind zone as per IS 875	47m/s (As per National Building Code 2016)	44m/s (As per National Building Code 2016)
7.	Seismic zone as per IS-1893	Zone-V	Zone-III
8.	Altitude (above M.S.L. in m)	<1000 m	<1000 m
9.	Pollution level (IEC 60815)	Heavy	Heavy
10.	Hottest month	May/June	May/June
11.	Annual mean dry bulb Temperature	30	30
12.	Maximum wet bulb one hour average	33	33
13.	Dry bulb temperature for low ambient condition	33	33
14.	Wet bulb temperature for low ambient condition	23	23
15.	Coastal Considerations	Yes	Yes

1.5 ENGINEERING AND DETAILED DESIGN

Design of substation including preparation of single line diagram, electrical layout, foundation & cable trench layouts (including invert levels), erection key diagrams, direct stroke lightning protection diagrams, electrical and physical clearance diagrams, Control and protection schematics, cable sizing, cable schedule and wiring and termination schedules, design of firefighting system, indoor lighting/illumination and other relevant drawings & documents required for engineering of all facilities to be provided under this contract, are covered under the scope of the Contractor.

The employer shall carry out equipment design review during detailed design. The Contractor shall provide all necessary information as shall be sought by the employer during design review. The design review shall include all the major equipment, including

at least the following:

a) 400/33kV ICT
b) 125 MVAR, 420 kV bus Reactor
c) 400kV GIS Switchgear/ Module

The contractor shall provide all necessary information as shall be sought by the employer during design review. Employer shall also carry out design review of the relevant system studies in the present scope. These design reviews can be carried out at Employer's office/ or contractor's works and shall be finalized during detailed engineering.

1.6 TYPE TESTING

The bidder shall offer type tested equipment for the project and the Employer shall accept the equipment type test reports under the following conditions:

(i) Type test in accordance with the relevant specified Standards & Technical specification.
(ii) The T ype tested equipment shall be of a similar design, insulation class as per the equipment offered under this contract. Technical justification shall be submitted for differences between tested and offered equipment, if any. Employer's interpretation in this regard shall be final.

In the event that equipment furnished includes important modifications of, or significant departure from, the designs of equipment on which type test report has been furnished or if there is evidence that the equipment does not comply with the requirements of the Specifications, type test procedure was not properly followed as laid down in standards, the Contractor shall conduct the type test without any cost implication to the Employer.

In the price bid, the test charges shall be included in the contract price and no separate test charges shall be indicated by the bidder.

Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within the years specified below from the date of NOA. In case the test reports are of the test conducted earlier than the years specified below from the date of NOA, the contractor shall repeat these test(s) at no extra cost to the Employer.

S.No	Name of Equipment	Validity of type test (in years)
1	Power Transformer	5
2	LT Transformer (33 kV and below)	5
3	Shunt Reactor	5
4	OLTC	10
5	Bushing of Power Transformers/Reactors	7

6	Fittings and accessories for Power transformers, Reactors	10
7	Circuit Breaker	10
8	Isolator	10
9	Lighting Arrester	10
10	Wave Trap	10
11	Instrument transformer	10
12	GIS & Hybrid GIS	15
13	LT Switchgear, MV Switchgear	10
14	Cable and associated accessories	10
15	Relay	7
16	Capacitors	10
17	Battery & Battery Charger	7
18	Conductor & Earth wire	10
19	AC Insulators (Porcelain/Glass)	10
20	AC Composite Insulators	5
21	PLCC	5

Table- 1 : Validity of Type test for major equipment

Fibre-optic communication equipment, ventilation system and any other equipment not covered above, tests performed **within 10 years** from date of NOA shall be considered subject to condition that either the type tests were performed on the identical equipment or performed on an equipment of similar design. A justification report shall also be submitted by Contractor along with the type-test report for Employer's review.

For standard market products (like motors, air-compressors, air-conditioners, fans etc), of reputed make, from POWERGRID approved compendium of vendors, the same can be accepted on submission of suitable documentation as per standard POWERGRID practice in other projects.

All equipment shall be supplied from same manufacturing works, where from the previous equipment/ sample of same design/ process was manufactured and successfully type tested as per relevant (IS/IEC).

Acceptance of the type test reports shall be at the discretion of the Employer. In case the test reports are of the test conducted earlier than the years specified above from the date of NOA, the contractor shall repeat these test(s) at no extra cost to the Employer.

All type tests for equipment, if performed after the date of award of the Contract shall be witnessed by the Employer unless authority to proceed with the tests in his absence is received from the Employer in writing. All expenses towards Employer deputation for witnessing of type testing, shall be borne by Employer.

The Contractor shall intimate the Employer the detailed program about the type tests at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

1.7 PACKING, TRANSPORTATION AND STORAGE

a) Packing, marking and shipping

The packing and shipping shall be carried out in accordance with the standard practice of Contractor.

b) Transportation

The Contractor shall be responsible for selecting and verifying the route, mode of transportation and making all necessary arrangements with the appropriate authorities for the transportation of the equipment. The dimensions of the equipment shall be such that when packed for transportation, it will comply with the requirements of loading and clearance restrictions for the selected route. It shall be the responsibility of the contractor to coordinate the arrangement for transportation of all equipment including transformers & reactors for all the stages from the manufacturer's work to site.
The conditions of roads, capacity of bridges, culverts etc. on the route shall also be assessed by the bidders. The scope of any necessary modification/ extension/ improvement to existing road, bridges, culverts etc. shall be included in the scope of the bidder. The contractor shall carry out the route survey along with the transporter and submit the detailed proposal and methodology for transportation of transformers & reactors within three months from the date of award.

c) Storage of equipment

The Contractor shall provide and construct adequate storage space for proper storage of equipment during construction stage. Sensitive equipment shall be stored indoors/containers. All equipment during storage shall be protected against possible damage due to acts of nature or accidents. The storage instructions of the equipment manufacturers shall be strictly adhered to.

Civil works for construction of temporary storage (indoor/ outdoor) for it's equipment is under contractor's scope.

1.8 INSTALLATION, TESTING AND COMMISSIONING

The Contractor shall construct and install all equipment, systems and services to be provided for the Works and shall be responsible for the provision of all construction labor, material and supervisory staff in accordance with the specification.

The work to be done under this specification shall include all labor, plant, equipment, material and performance of all work necessary for the complete installation and commissioning of the switchyard. All apparatus, appliances, material and labor etc. not specifically mentioned or included, but are necessary to complete the entire work or any portion of the work in compliance with the requirements implied in this specification is deemed to be included in the scope of contractor.

The Contractor shall furnish all tools and tackles and construction equipment including lifting jacks, pulling equipment, cranes etc. necessary for the proper construction, installation and erection of the Equipment.

The Contractor shall erect and install the Equipment under ordinary job conditions and not necessarily those which he considers the most desirable. The provision and eventual removal of all temporary site construction buildings and facilities, materials, water distribution, power distribution, all labor and constructional equipment, management and supervisory staff required to construct and commission the Works is in the present scope.

After completion of the work, Contractor shall dispose-off all the packing & waste materials including empty conductor drums, cable drums, wooden containers, oil drums, gas cylinders and other waste/scrapped materials from construction site at his own cost and shall make the substation area properly cleaned.

The necessity for moving materials within the Works' area or the Sites during inclement weather and all other circumstances characteristic of construction operations are to be expected and shall not be considered to be a basis for claims for extension in time or for extra payment.

The testing, commissioning and putting into operation of the said material, equipment and other systems shall be carried out in accordance with the requirements of the Specification

The provision of personnel for the supervision of operation and maintenance of the converter stations in accordance with the Specification shall be provided by the contractor.

The Employer shall reserve the right to assign Employer's personnel and/or his consultants to the Contractor's testing and commissioning team to participate in and/or witness the testing & commissioning operations at the Site(s). Employer's personnel may participate in the testing and commissioning of the complete HVDC system.

1.9 MANDATORY AND COMMISSIONING SPARES

All spares shall be of the same materials and workmanship as the corresponding parts of the equipment furnished and shall be fully interchangeable with those.

A spare part intended for use as a replacement for any one of several similar parts, for example a capacitor unit, shall be a replacement for any one of those parts without resulting in a deterioration in the performance of the equipment / system.

All spares meant for outdoor use, such as bushings, transformers, reactors, resistors, capacitors, arrestors, etc. shall be suitable for prolonged outdoor storage without being energized.

All the spares should be available at each station site prior to commencement of trial operation. Employer shall have the right to directly purchase all equipment/items as well as parts of equipment/items supplied in this contract from the original equipment manufacturer for the above equipment/items or parts of the equipment/items during Operation & Maintenance stage of the project. The contractor shall provide all data required by the employer to facilitate the same.

1.10.1 MANDATORY SPARES

Mandatory spares as per **BPS and 'Annexure- Mandatory spares'** shall be supplied by the Contractor at each station.

Wherever spares in BPS/Technical Specification have been specified as "each type/each rating/each type & rating": if the offered spare/spares are sufficient to replace the respective main equipment of all types/ratings, then such offered spare/spares shall be acceptable. It implies that common spare/spare set fulfilling the spare requirement of all types/ratings shall also be acceptable, provided it is configurable at site itself without special assistance of OEM.

Mandatory Spares, wherever mentioned, are envisaged for the equipment/items being supplied under the main equipment heads under present scope meeting the requirements of Technical Specifications. The component/sub-component of an equipment/item specified in BPS under Mandatory Spare, which is not applicable as per the offered design of respective main equipment, shall not be referred to.

All mandatory spares shall be handed over to the Employer prior to the start of the trial operation period.

1.10.2 COMMISSIONING SPARES

The Contractor shall supply additional spares which he expects to consume during installation, testing and commissioning of the systems. The quantity of these spares shall be decided based on his previous experience, such that site work shall not be hampered due to non-availability of these spares. The unutilized spares, if any, brought for

commissioning purpose, shall be taken back by the contractor.

1.10.3 SPECIAL TOOLS & TACKLES

The Contractor shall also supply at each site one set of all special tools & tackles, testing equipment, handling equipment, etc. which are required by the Employer to maintain the stations successfully.

The contractor may use these tools & tackles, testing equipment, handling equipment specified by employer at site during commissioning and same shall be handed over to site after successful commissioning. The condition of equipment shall be good at time of handing over of equipment and the damaged equipment/parts shall be rectified/ repaired to the satisfaction of site engineer or else shall be replaced by the contractor/bidder.

1.10 SERVICES TO BE PROVIDED BY THE CONTRACTOR

The services to be provided by the Contractor shall include, but not be limited to, the following major items listed below.

a) Overall Project Management
b) Site Supervision
c) Interface Coordination Activities

The Contractor shall also be responsible for the overall co-ordination with internal/external agencies, project management, loading, unloading, handling, moving to final destination for successful erection, testing and commissioning of the substation/switchyard

1.11 TECHNICAL REQUIREMENTS OF SUB-CONTRACTORS

1.0) The sub-contractor must have either of the following experience of having successfully completed similar works during last 7 years as on the last day of month previous to the one in which the sub-contractor is proposed to be engaged.

a) Three similar works costing not less than the amount equal to 40% of the cost of the work to be sub-contracted.

OR

b) Two similar works costing not less than the amount equal to 50% of the cost of the work to be sub-contracted.

OR

c) One similar works costing not less than the amount equal to 80% of the cost of the work to be sub-contracted.

2.0) Minimum Average Annual Turnover * (MAAT) for best three years i.e. 36 months of last five financial years of the sub-contractor should be as per note e) below

* Annual Gross Revenue from operations / Gross operating income as incorporated in the profit & loss account excluding other income.

Note: -

a) Similar work shall mean the work which are of similar in nature to the work to be sub-contracted e.g. for the scope of civil work to be sub-contracted, the experience should be of civil work.

b) The aforesaid qualifying requirement shall however, not be applicable for engaging labour as per extant policy.

c) The cost of the work to be sub-contracted shall be considered as available in the contract agreement. However, if the value is not available in the contract agreement, the same shall be the estimated value for such work.

d) The above criteria is in addition to extant policy on selection of sub-contractor as per WPPP, Vol-II.

e) The MAAT requirement shall be worked out basis the following formula:
Minimum Average Annual Turnover (MAAT) =

Cost of the work to be sub-contracted x 1.5 / Completion period in years**

** The completion period shall be considered 1 year even if the same is less than 1 year

1.12 EQUIPMENTS AND SERVICES SUPPLIED BY THE EMPLOYER

The supply of all equipment, materials, and services required for the execution of the Works shall be the responsibility of the Contractor with the specific exception of the items listed here under:

a) Converter Station and Repeater station sites:

The Employer shall provide land for each converter station of the tentative dimensions and area attached at **'Annexure- Outline of tentative area at KPS3 (HVDC), South Olpad (HVDC) and Existing KPS3** ' of tentative area. Bidder has to prepare layout of the switchyard area along with future bays (as specified) and associated facilities in the outline of tentative area. However, the Bidder can optimize the switchyard area

and submit details along with bid for Employer's review.

For Repeater stations, the nos. and size of repeater station shall be informed by the Employer during detailed engineering. The location of the repeater station/ shelter shall be approximately 150-200 km from the HVDC station as well as from adjacent repeater station. The foundation work, boundary wall/ fencing of Repeater Stations/shelters shall be in present scope of Contractor. All Telecommunication equipment/systems required in line with 'Section-RFP' and 'Section-Project' are in the scope of Employer.

Employer shall earmark space for temporary site establishment and equipment storage/ temporary stores of Contractor within Station boundary at KPS3 (HVDC), South Olpad (HVDC) and Existing KPS3 stations. Location of such areas shall be finalized by Employer after award.

b) HVAC/HVDC Overhead line (Pole and Dedicated Metallic Return):
500kV HVDC Line along with DMR, 400kV AC lines are under Employer's scope.

c) Access Roads
The Employer shall provide normally maintained one (1) access road joining the site with the National highways/ State Roads. Widening of existing access road (if required) to HVDC station area shall be under present scope of contractor. The same shall be paid in line with BPS.

The Employer shall not be responsible for any damage to the access roads caused directly or indirectly by the transportation of any load or other use by the Contractor or his agents. The Employer shall not be liable for any extra costs nor shall the Employer be required to grant any extension of time to the Contractor should the access road including those not under direct control of the Employer become unusable for any reason other than lack of normal maintenance by the Employer.

d) OPGW and optical fiber for communication
The Employer shall design, supply, and carry out the stringing/laying of the OPGW (for overhead line) for communication system between KPS3 HVDC & KPS3 (Existing) and between KPS3 HVDC -South olpad HVDC and Repeater stations and also on the parallel AC network for Back up Optical fiber network.

e) Construction Power and Water Supplies:
The Contractor shall be entitled to use for the purposes of the construction of facilities, such supplies of electricity and water as may be available at Site (KPS3 HVDC, South Olpad HVDC and KPS3 (existing) station) and shall provide any apparatus necessary for such use. Where such supplies are not available, the Contractor shall make his own arrangement for the provision of such supplies as per his requirement.

i. **Construction Power Supply:**

Employer shall provide 415 Volt supply for construction power on chargeable basis at the perimeter of the site selected by Employer for KPS3 (HVDC) and South Olpad (HVDC). The Contractor shall be responsible for the provision of any switchgear, enclosures and transformation, cables, further extension and distribution of the 415 Volt power required for the construction power feeder line. Any minor earth work associated with above is in contractor scope.

The Contractor shall pay the Employer at the applicable tariff including fixed charges in line with local discom charges, for such use.

The Employer shall neither be liable nor responsible for the interruption of power supply to the sites and shall not be liable for any extra costs or to grant extension of time as a result of the said interruption. The Contractor shall indicate the requirement of construction power in KVA to the Employer within one month of award.

Contractor shall bear expenditure of auxiliary power charges consumed (Auxiliary power consumption for Transformers/ Reactors, air conditioning, ventilation system etc.) till DOCO of present scope assets. After DOCO of assets, aux. power consumption charges shall be borne by Employer.

ii. Construction Water Supply:

Construction Water Supply at KPS3 HVDC, South Olpad HVDC and KPS3 (existing) shall be under contractor's scope. The Contractor shall provide two borewells at the site periphery for Construction work. The contractor shall be responsible for the installation of necessary pumps, piping at each site. Any minor earth work associated with the above is in contractor's scope. The contractor shall also be responsible for water treatment, if required for construction purposes. If sufficient water qty. is not available or interruption in construction water supply, Contractor shall arrange construction water at its cost without any time and cost implication to Employer.

The Contractor shall pay the Employer at the applicable tariff including fixed charges for such use.

1.13 REQUIREMENT OF CYBER SECURITY:

The designed system shall be compliant with:

a) ISO-27001 Information security management

b) IEC-62443

c) CEA (Cyber Security in Power Sector) Guidelines, 2021 Cyber security shall be incorporated in the overall design of the HVDC controls, protection, communications, HMI and SCADA systems.

The Contractor shall propose a secure and robust design in the control and LAN systems, using next generation firewalls, dual firewall communication designs, routers, gateways, data diodes, etc. that have built in cyber secure measures.

The Contractor shall ensure security of all in-service phases as well as standby Cyber Assets, supplied under the project, through Vulnerability management and Penetration testing (of combined installations) during FST or at site.

Further, the regular firmware/ software updates and patches of Cyber Assets supplied under the project shall be under scope of Contractor upto two (2) years after DOCO of Project.

1.14 REQUIREMENT OF SYSTEM OPERATOR

Grid-India has published the procedure for First time charging/ Energization (FTC) of electrical installations.

Refer 'Annexure-1st time charging requirements of System Operator' for Procedure for integration of a new or modified HVDC transmission elements into the Indian grid. The contractor needs to comply with the Procedure laid out, data sharing requirements and the details as listed in the said Annexure, as applicable.

The latest guidelines during execution/charging (available at GRID-INDIA website (www.posoco.com)) for first time charging needs to be mandatorily complied by the Contractor.

1.15 DOCUMENTATION

The Contractor shall submit to the Employer all documents (engineering, site, quality etc.) like technical description, specifications, literature, correspondence, prints, drawings, civil and electrical layouts instruction manuals, test reports (both factory and site), control and protection schematic diagram, plant circuit diagram/ schemes, HVDC control software schematic, pre-commissioning & commissioning test reports, sub-system and system test reports, progress photographs, booklets, schedules and all supplementary data or documents furnished in compliance with the requirements of the Contract in accordance with an approved schedule of submissions and shall submit any further information (in the form of drawings, documents, manuals, literature, reports etc.) when asked by the

Employer while commenting/approving any drawings/documents etc. These shall become the property of the Employer and the costs shall be considered as included in the Contract price.

The contractor shall submit all engineering Documents (Drawings/Design documents/data/detailed bill of quantity/ type test reports) through online Document Review and Engineering Approval Management System (herein after DREAMS) for the approval of the employer. The bidder / contractor shall be provided with login credentials for submission of drawings and documents. The DREAMS portal shall be used for collecting the approved / commented drawings by POWERGRID. After approval in Cat-I/Cat-II/Cat-IV, two sets hard copies of Construction drawings shall be made available to POWERGRID Site-in-charge at each site in A0/A1/A2/A3 formats (as applicable) for supervision and execution.
The final documentation for the project shall be supplied in 02 sets of Hard-disks to the Employer (01 set at each site and 1 set at CC, Engg-HVDC). Further, one (01) set of hardcopies of all final/as built documents in binders shall be supplied at each site.

1.16 SCHEDULE OF QUANTITIES

Wherever the quantities of items/works are indicated in Set/LOT/LS, the bidder is required to estimate the quantity required for entire execution and completion of works and incorporate their price in respective Bid price schedules (BPS).

For erection hardware items, Bidders shall estimate the total requirement of the works and indicate line-item wise lump sum price and include the same in relevant Bid price schedules. Any material/works not specifically mentioned in the description in BPS, as may be required shall be deemed to be included.

Bidder should include all such items in the bid proposal sheets, which are not specifically mentioned but are essential for the execution of the contract. Item which explicitly may not appear in various schedules and are required for successful commissioning of substation shall be included in the bid price and shall be provided at no extra cost to Employer.

1.17 BASIC REFERENCE DRAWINGS

It is responsibility of contractor to develop all construction drawing including all design documents, calculations, equipment drawings and construction drawings, overall general arrangement drawing, layout drawings, single line drawing, foundation & cable trench layout, erection key diagram, earthing layout, all other layout drawings, civil drawings etc. Plot plan and coordinates for land shall be provided to successful bidder during detailed engineering. The Single line diagram of the AC and DC switchyard including future bays and Overall General Arrangement shall be provided by the Contractor along with the bid.

1.18 PREFERENCE TO MAKE IN INDIA

Bidder to procure the products associated with the Transmission System (except for HVDC system) as per provisions of Public Procurement (Preference to Make in India) orders issued by Ministry of Power vide orders No. 11/5/2018 – Coord. dated 28.07.2020 for transmission sector, as amended from time to time read with Department for Promotion of Industry and Internal Trade (DPIIT) orders.

Bidder may also refer **Annexure-K Rev-01** of Section-GTR for AC Switchyard equipment. Further, Bidder may also take necessary efforts to increase the Minimum Local Content in HVDC system.

ANNEXURE-MANDATORY SPARES Rev 01

Mandatory spares for KPS3 (HVDC) & South Olpad (HVDC)		
S. no.	**Description**	**Quantity for Each Make & Type applicable for each HVDC terminal station**
1.0	**CURRENT TRANSFORMER**	
1.1	Complete CT with Terminal connector & stool structure	2 Nos. of each rating (Not make) for Population up to 20 Nos.
		3 Nos. of each rating (Not make) for Population more than 20 Nos.
1.2	Primary Terminal Bushing	2 sets
2.0	**VOLTAGE TRANSFORMER**	
2.1	Complete CVT with Terminal connectors & stool structure	2 Nos. of each rating (Not make) for Population up to 20 Nos.
		3 Nos. of each rating (Not make) for Population more than 20 Nos.
3.0	**SURGE ARRESTOR**	
3.1	Complete LA with insulating base and Terminal connector & stool structure	2 Nos. of each rating (Not make) for Population up to 10 Nos.
		3 Nos. of each rating (Not make) for Population more than 10 Nos.
3.2	Surge counter/monitor	5 Nos.
4.0	72.5 KV complete pole for each type of CB including operating mechanism , control cabinet and all accessories but excluding support structure	2 set
5.0	72.5kV voltage transformer (Single phase complete CVT with terminal connector and stool structures)	2 No
6.0	72.5kV current transformer with 120% extended (Single phase complete CT with terminal connector and stool structures)	2 No
7.0	30kV Surge Arrester (1-Phase)-Complete LA with insulating base and Terminal connector & stool structure	2 No
8.0	72.5 KV Isolators	1 No.
9.0	AC Bus Post Insulator Assembly (complete) of each Voltage rating	2 Sets
10.0	AUTO TRANSFORMERS & REACTORS	
Major spares		
10.1	Bushing of each rating with metal parts & gaskets	1 Set
Minor spares		
10.2	Oil cooler pumps with motor	1 Set
10.3	Cooler Fan with motor	1 Set
10.4	Buchholz relay (each type & rating) complete (main tank) with floats & contacts	1 Set
10.5	Local Winding temperature indicator with sensing device & contact (each type & rating)	1 Set
10.6	Magnetic oil level gauge	1 Set
10.7	Set of starters, contactors, relays and switches for electrical control panel (one set of each type)	1 Set
10.8	Remote tap position indicator	1 Set
10.9	Oil flow indicator with flow switch	1 Set
10.10	Spare Insulating Oil (Transformer & Reactor)	5 kL
10.11	OTI with contacts and sensing device (each type & rating)	1 No.

11.0	**Control & Protection System**	
Major spares		
11.1	**CSD**	
i	Controlled Switching Devices	1 (each make)
11.2	**Line Protection Panel Equipment spare**	
i	Numerical Distance relay	1 (each make)
11.3	**Transformers Protection Panel**	
i	Transformer Differential Protection	1 Set
ii	REF with non-linear resistor	1 Set
11.4	**Reactor Protection Panel**	
i	Reactor Differential Protection	1 Set
ii	REF with non-linear resistor	1 Set
iii	Reactor Back up impedance	1 Set
11.5	**Common Spares**	
i	Power Supply module for Bus Bar Protection	1 No.
ii	Bay unit module	1 Set
iii	LBB Relay (if standalone)	1 No.
iv	Auxiliary & Trip relays (installed CRP Panel)	2 (each type)
11.6	**Substation Automation/SCADA System**	
i	Bay control unit (IED) each type	1 Set
ii	Ethernet Switch of each type	1 Set
11.7	**PLCC EQUIPMENT/DTPC**	
i	Set of Prints for Carrier terminal (Speech & Protection)	1 Set
ii	Set of Prints for analog protection coupler	1 Set
iii	Digital Tele Protection Coupler	1 No.
12.0	**FIRE PROTECTION SYSTEM:**	
12.1	Smoke/Heat Detectors	4 No.
12.2	Pressure Gauge	1 No.
12.3	Pressure Switch	1 No.
13.0	**Control Cables**	
13.1	10CX2.5 sq. mm	1km
14.0	**Power Cable**	
14.1	4CX6 sq. mm	500m
14.2	4CX16 sq. mm	500m
14.3	3.5CX35 sq. mm	500m
14.4	1CX300 sq. mm	500m
15.0	**Clamps & Connectors**	
15.1	Each type (excluding equipments)	3 Nos.
GIS Mandatory spares for for KPS3 (HVDC) & South Olpad (HVDC)		
S. no.	**Description**	**Quantity per susbstation (Each make and type)**
16.0	**General (For 765 kV, 400KV, 220KV, 132 KV & 66kV)**	
16.1	Cable Connection Enclosure with the main Circuit (if applicable)	1 No.
16.2	SF6 gas Pressure Relief Devices of each type along with O-rings	1 set
16.3	SF6 Pressure gauge cum switch OR Density monitors and pressure switch, as applicable, of each type	2 sets
16.4	Coupling device of each type for pressure gauge cum switch for connecting Gas handling plant	2 sets

16.5	Rubber Gaskets, “O” Rings and Seals for SF6 gas of each type	3 sets
16.6	Molecular filter for SF6 gas with filter bags	3% of total weight
16.7	Control Valves for SF6 gas of each type	3 Nos.
16.8	SF6 gas	5% of total gas quantity
16.9	Locking device to keep the Dis-connectors (Isolators) and Earthing switches in close or open position in case of removal of the driving Mechanism	3 Nos.
16.10	Spare EHV Cable of longest phase of a feeder as applicable (if applicable)	1 Run (1-phase)
16.11	Spares for local control cabinet including MCB, Fuses, Timers, Aux. relays, Contactor, Push Buttons, Switches, Lamps, Annunciation Windows etc. of each type & rating and terminal of each type	2 sets
16.12	HV Cable Termination kit of each type (if applicable)	1 No.
16.13	HV Cable Jointing kit of each type (if applicable)	1 No.
16.14	UHF PD Sensors of each type	5 Nos.
16.15	Support Insulator/Gas Barrier of each type along with associated contacts and shields	3 sets
16.16	SF6 to air bushing of each type & rating along with conductor and enclosure	1 No.
17.0	**400kV SF6 CIRCUIT BREAKER:**	
17.1	Complete Circuit Breaker (1 phase unit) of each type & rating complete with interrupter, main circuit, enclosure and Marshalling Box with operating mechanism (without PIR) to enable replacement of any type/rating of CB by spare (as applicable)	1 set for KPS3 (HVDC) 1 set for South olpad (HVDC) 1 set for KPS3 Existing
17.2	Trip coil assembly with resistor as applicable, 3 Nos. of each type	1 set
17.3	Closing coil assembly with resistor as applicable, 3 Nos. of each type	1 set
17.4	Relays, Power contactors, push buttons, timers & MCBs etc. of each type and rating	1 set
17.5	Auxiliary switch assembly, 3 Nos. of each type	1 set
17.6	Operation Counter, 3 Nos. of each type	1 set
17.7	Windowscope/ Observing window, 3 Nos. of each type	1 set
17.8	**For Hydraulic Operated Mechanism, if applicable**	
17.8.1	Hydraulic operating mechanism with drive motor of each type	1 set
17.8.2	Ferrules, joints and couplings of each type	1 Set
17.8.3	Hydraulic filter of each type	1 Set
17.8.4	Hose pipe of each type	1 Set
17.8.5	N2 Accumulator of each type	1 Set
17.8.6	Valves of each type	1 Set
17.8.7	Pipe length (copper & steel) of each size & type	1 Set
17.8.8	Pressure switches of each type	1 Set
17.8.9	Pressure gauge with coupling device of each type	1 Set
17.8.10	Hydraulic oil	5% of total qty. used
17.8.11	Pressure Relief Device of each type	1 Set
17.9	**For Spring Operated Mechanism, if applicable**	

17.9.1	Complete Spring Operating Mechanism including charging mechanism etc. of each type	1 set
18.0	**400kV ISOLATORS:**	
18.1	Complete set of of single phase isolator of each type, dimension, current & voltage rating including main circuit, enclosure, driving mechanism and support Insulator etc. to enable replacement of any type/rating of Isolator by spare	1 Set
18.2	1 No. of single phase Maintenance Earthing switch of each type, dimension, current & voltage including main circuit, enclosure, driving mechanism and support Insulator etc. to enable replacement of any type/rating of Earth Switch by spare	1 Set
18.3	1 No. of single phase Fast Earthing switch of each type, dimension, current & voltage including main circuit, enclosure, driving mechanism and support Insulator etc. to enable replacement of any type/rating of Earth Switch by spare (if applicable)	1 Set
18.4	**Open / Close contactor assembly, timers, key interlock, interlocking coils, relays, push buttons, indicating lamps Power contactors, resistors, fuses, MCBs & drive control cards etc. for one complete MOM box (3 – phase gang operated or 1 – phase unit) dis-connector and (3 phase) earthing switch of each type and rating**	
18.4.1	For isolator	1 Set
18.4.2	For Maintenance Earth switch	1 Set
18.4.3	For Fast Earthing Switch (if applicable)	1 Set
18.5	**Limit switch and Aux. Switches for complete 3 phase equipment**	
18.5.1	For isolator	2 Sets
18.5.2	For Maintenance Earth switch	2 Sets
18.5.3	For Fast Earthing Switch (if applicable)	2 Sets
18.6	**Drive Mechanism of each type**	
18.6.1	For isolator	1 No.
18.6.2	For Maintenance Earth switch	1 No.
18.6.3	For Fast Earthing Switch (if applicable)	1 No.
18.7	**Motor for Drive Mechanism of each type**	
18.7.1	For isolator	1 No.
18.7.2	For Maintenance Earth switch	1 No.
18.7.3	For Fast Earthing Switch (if applicable)	1 No.
19.0	**400kV CURRENT TRANSFORMER**	
19.1	Complete CT of each type and rating with enclosure to enable replacement of any type/rating of CT by spare	1 No.
20.0	**400kV Voltage Transformer**	
20.1	Complete VT of each type and rating with enclosure to enable replacement of any type/rating of VT by spare (if applicable)	1 No.
21.0	**400kV SURGE ARRESTOR**	
21.1	Gas insulated SA for of each type and ratings enclosure & surge monitor counter to enable replacement of any type/rating of Gas Insulated SA by spare (if applicable)	1 No.
21.2	Surge counter/ monitor of each rating and type	1 No.

Note:

1.0	*Wherever spares in BPS/Technical Specification have been specified as "each type/each rating/each type & rating": If the offered spare/spares is sufficient to replace the respective main equipment of all types/ratings, then such offered spare/spares shall be acceptable. It implies that common spare/spare set fulfilling the spare requirement of all types/ratings shall also be acceptable, provided it is configurable at site itself without special assistance of OEM.*
2.0	*Respecitve Spares shall be applicable only if main equipment is supplied in that station.*

ANNEXURE: BOQ_400kV GIS_SUPPLY_KPS3-S.OLPAD

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Sl. No.	Item Description	Unit	Qty.	Remarks
1. 400kV GIS AC station at KPS3 (HVDC)				
1.1	**SUPPLY- GIS : 400KV, 63KA FOR 1S, GAS INSULATED SWITCHGEAR (GIS) AS PER TS**			
1.1.01	400KV, 3150A, 63KA, Single phase,SF6 Gas Insulated Bus Duct (GIB) outside GIS Hall alongwith associated support structure	Mtr	2500	
1.1.02	420kV, 3150 A, 63 kA, SF6 GIS Converter feeder bay module as per Section-Project, Technical specification	SET	2	
1.1.03	420kV, 3150 A, 63 kA, SF6 GIS Tie bay module (of Converter Feeder) as per Section-Project, Technical specification	SET	2	
1.1.04	420kV, 3150 A, 63 kA, SF6 GIS Line feeder bay module as per Section-Project, Technical specification	SET	4	
1.1.05	420kV, 3150 A, 63 kA, SF6 GIS Tie bay module as per Section-Project, Technical specification	SET	4	
1.1.06	420kV, 3150 A, 63 kA, SF6 GIS Reactor feeder bay module as per Section-Project, Technical specification	SET	2	
1.1.07	420kV, 3150 A, 63 kA, SF6 GIS Transformer feeder bay module as per Section-Project, Technical specification	SET	2	
1.1.08	420kV, 4000 A, 63 kA, SF6 GIS Bus sectionaliser module as per Section-Project, Technical specification	SET	2	
1.1.09	420kV, 4000 A, 63 kA, SF6 GIS Busbar module as per Section-Project, Technical specification	SET	4	
1.1.10	420kV GIS Interface Module for Future Extension of Bus Bar As per TS	SET	4	
1.1.11	420KV, 3150A, 63kA Single Phase SF6 to Air bushing connecting GIS to AIS alongwith support structure	EA	30	
1.1.12	Local Control Cubicle (LCC)	SET	18	INCLUDING POWER, CONTROL & INSTRUMENTATION CABLE AS APPLICABLE.
1.2	**SUPPLY- GIS : SPECIAL TOOLS AND TESTING & MAINTENANCE INSTRUMENTS AS PER TS**			
1.2.01	SF6 Gas Processing unit	Set	1	
1.2.02	Gas Analyzer [Dew Point Meter]	Set	1	
1.2.03	SF6 gas leak detector	Set	1	
1.3	**SPARES- GIS : 400KV, 63KA FOR 1S, GAS INSULATED SWITCHGEAR (GIS) AS PER TS**			
1.3.01	400KV GIS-SF6 GAS PRESSURE RELIEF DEVICE ASSEMBLY OF EACH TYPE with 'O' Rings	SET	1	1 SET= 1 Nos. of each type and rating
1.3.02	SF6 PRESSURE GAUGE CUM SWITCH /DENSITY MONITORS AND PRESSURESWITCH AS APPLICABLE, OF EACH TYPE-400KV GIS	SET	2	
1.3.03	COUPLING DEVICE FOR PRESSURE GAUGE CUM SWITCH FOR CONNECTINGGAS HANDLING PLANT OF EACH TYPE-400KV GIS	SET	2	
1.3.04	RUBBER GASKETS, 'O' RINGS AND SEALS FOR SF6 GAS FOR GISENCLOSURE OF EACH TYPE-400KV GIS	SET	3	
1.3.05	400KV GIS-MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS (3 % OF TOTALWEIGHT)	SET	1	
1.3.06	CONTROL VALVES FOR SF6 GAS OF EACH TYPE-400KV GIS	SET	3	
1.3.07	400KV GIS-SF6 GAS (5 % OF TOTAL GAS QUANTITY)	LOT	1	1 LOT= 5 % OF TOTAL GAS QUANTITY
1.3.08	LOCKING DEVICE TO KEEP THE DIS-CONNECTORS (ISOLATORS)AND EARTHING/FAST EARTHING SWITCHES IN CLOSE OR OPEN POSITION IN CASEOF REMOVAL OF THE DRIVING MECHANISM-400KV GIS	SET	3	
1.3.09	UHF PD SENSORS OF EACH TYPE ALONG WITH BNC CONNECTOR FOR 420KV GIS	SET	5	1 SET= 1 Nos. of each type and rating
1.3.10	400KV GIS-SUPPORT INSULATORS (GAS THROUGH) OF EACH TYPE (COMPLETE WITHMETAL RING ETC.) ALONG WITH ASSOCIATED CONTACTS AND SHIELDS	SET	3	1 SET= 1 Nos. of each type and rating
1.3.11	400KV GIS-GAS BARRIERS OF EACH TYPE (COMPLETE WITH METAL RING ETC.)ALONG WITH ASSOCIATED CONTACTS AND SHIELDS	SET	3	1 SET= 1 Nos. of each type and rating
1.3.12	420KV, 3150A, 63kA Single phase SF6 to Air bushing of each type	SET	1	1 SET= 1 Nos. of each type and rating
1.3.13	LCC SPARES - AUX. RELAYS, CONTACTORS,PUSH BUTTONS, SWITCHES,LAMPS,ANNUNCIATION WINDOWS, MCB, FUSES,TIMERS, TERMINAL BLOCKS ETC. OF EACHTYPE & RATING-400kV GIS	SET	2	
1.3.14	400KV GIS-ONE POLE OF 3150A CIRCUIT BREAKER WITHOUT PIR WITHINTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND OPERATING MECHANISM COMPLETEIN ALL RESPECT	SET	1	
1.3.15	400KV GIS-ONE POLE OF 4000A CIRCUIT BREAKER WITHOUT PIR WITHINTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND OPERATING MECHANISM COMPLETEIN ALL RESPECT	SET	1	
1.3.16	Trip coil assembly with resistor for420kV GIS Circuit Breaker (asapplicable)	SET	3	
1.3.17	Closing coil assembly with resistor for420kV GIS Circuit Breaker (asapplicable)	SET	3	
1.3.18	Ferrules, Joints & Coupling of each type for CB	SET	1	

ANNEXURE: BOQ_400kV GIS_SUPPLY_KPS3-S.OLPAD

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Sl. No.	Item Description	Unit	Qty.	Remarks
1.3.19	Window slope/ observing glass each type	SET	3	1 SET= 1 Nos. of each type and rating
1.3.20	RELAYS, POWER CONTACTORS, PUSH BUTTONS, TIMERS & MCBS ETC. (ASAPPLICABLE) OF EACH TYPE FOR 400KV GIS CIRCUIT BREAKER	SET	1	
1.3.21	Auxiliary switch assembly of each type for 420kV GIS Circuit Breaker	SET	3	
1.3.22	400KV GIS CIRCUIT BREAKER-OPERATION COUNTER Each Type	SET	3	
1.3.23	400KV GIS CIRCUIT BREAKER-HYDRAULIC OPERATING MECHANISM WITH DRIVEMOTOR (FOR HYDRAULIC OPERATED MECHANISM, IF APPLICABLE)	SET	1	
1.3.24	HYDRAULIC FILTER OF EACH TYPE (FOR HYDRAULIC OPERATED MECHANISM, IFPPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
1.3.25	400KV GIS CIRCUIT BREAKER- HOSE PIPE OF EACH TYPE (AS APPLICABLE) (FORHYDRAULIC OPERATED MECHANISM, IF APPLICABLE)	SET	1	
1.3.26	400KV GIS CIRCUIT BREAKER - N2 ACCUMULATOR (FOR HYDRAULIC OPERATEDMECHANISM, IF APPLICABLE)	SET	1	
1.3.27	VALVES OF EACH TYPE (FOR HYDRAULIC OPERATED MECHANISM, IFAPPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
1.3.28	PIPE LENGTH (COPPER & STEEL) OF EACH SIZE & TYPE (FOR HYDRAULICOPERATED MECHANISM, IF APPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
1.3.29	PRESSURE SWITCHES OF EACH TYPE (FOR HYDRAULIC OPERATED MECHANISM, IFAPPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
1.3.30	PRESSURE GAUGE WITH COUPLING DEVICE OF EACH TYPE (FOR HYDRAULICOPERATED MECHANISM, IF APPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
1.3.31	400KV GIS CIRCUIT BREAKER-HYDRAULIC OIL (5% OF TOTAL OIL QUANTITY)(FOR HYDRAULIC OPERATED MECHANISM, IF APPLICABLE)	SET	1	
1.3.32	PRESSURE RELIEF DEVICE OF EACH TYPE (FOR HYDRAULIC OPERATED MECHANISM,IF APPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
1.3.33	400KV GIS CIRCUIT BREAKER-COMPLETE SPRING OPERATING MECHANISMINCLUDING CHARGING MECHANISM ETC. (FOR SPRING OPERATED MECHANISM, IFAPPLICABLE) of each type	SET	1	
1.3.34	400kV GIS- Single phase of 3150Adisconnector switch including maincircuit, enclosure, driving mechanismand support insulator etc., complete inall respect (Note 1- The contractorshall supply spare for disconnectorswitch to ensure one to one replacementof all disconnector switch supplied asmain equipment without any requirementof modification in fittings at site tocover all different types ofdisconnector switch supplied. In case,quantity of supplied dis-connectorswitch types (for one to onereplacement) are more than the quantitymentioned in BPS for spare, thecontractor shall supply theseadditional types of disconnector switchwithout any additional priceimplication to POWERGRID and quantitiesof these additional type ofdisconnector switch are deem to beincluded in the quantities mentioned inBPS for spare disconnector. Note 2 - Incase, Dis-connector Switch (DS) & EarthSwitch (ES) is provided in a sameenclosure with common operatingmechanism, then the module comprisingof Dis-connector & Earth switch insingle enclosure with common operatingmechanism is to be provided under thehead of spare Dis-connector only. Note3- In case, Dis-connector Switch (DS)&Earth Switch (ES) is provided in asame enclosure with separate operatingmechanism, then the module comprisingof Dis-connector & Earth switch insingle enclosure with separateoperating mechanism is to be providedunder the head of spare Dis-connectoronly.)	SET	1	1 SET= 1 Nos. of each type and rating
1.3.35	400KV GIS- SINGLE PHASE MAINTENANCE EARTHING SWITCH INCLUDING MAINCIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC.,COMPLETE IN ALL RESPECT (NOTE 1 - IN CASE, DIS-CONNECTOR SWITCH (DS) &EARTH SWITCH (ES) IS PROVIDED IN A SAME ENCLOSURE WITH COMMONOPERATING MECHANISM, THEN THE MODULE COMPRISING OF DIS-CONNECTOR &EARTH SWITCH IN SINGLE ENCLOSURE WITH COMMON OPERATING MECHANISM IS TOBE PROVIDED UNDER THE HEAD OF SPARE DIS-CONNECTOR ONLY. NOTE 2 - INCASE, DIS-CONNECTOR SWITCH (DS) & EARTH SWITCH (ES) IS PROVIDED IN ASAME ENCLOSURE WITH SEPARATE OPERATING MECHANISM, THEN THE MODULECOMPRISING OF DIS-CONNECTOR & EARTH SWITCH IN SINGLE ENCLOSURE WITHSEPARATE OPERATING MECHANISM IS TO BE PROVIDED UNDER THE HEAD OF SPAREDIS-CONNECTOR ONLY.)	SET	1	1 SET= 1 Nos. of each type and rating
1.3.36	400KV GIS - SINGLE PHASE FAST EARTHING SWITCH INCLUDING MAIN CIRCUIT,ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC., COMPLETE INALL RESPECT (NOTE 1 - IN CASE, DIS-CONNECTOR SWITCH (DS) & EARTHSWITCH (ES) IS PROVIDED IN A SAME ENCLOSURE WITH COMMON OPERATINGMECHANISM, THEN THE MODULE COMPRISING OF DIS-CONNECTOR & EARTH SWITCHIN SINGLE ENCLOSURE WITH COMMON OPERATING MECHANISM IS TO BE PROVIDEDUNDER THE HEAD OF SPARE DIS-CONNECTOR ONLY. NOTE 2 - IN CASE,DIS-CONNECTOR SWITCH (DS) & EARTH SWITCH (ES) IS PROVIDED IN A SAMEENCLOSURE WITH SEPARATE OPERATING MECHANISM, THEN THE MODULECOMPRISING OF DIS-CONNECTOR & EARTH SWITCH IN SINGLE ENCLOSURE WITHSEPARATE OPERATING MECHANISM IS TO BE PROVIDED UNDER THE HEAD OF SPAREDIS-CONNECTOR ONLY.)	SET	1	1 SET= 1 Nos. of each type and rating
1.3.37	OPEN/CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKINGCOILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS,RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC. (AS APPLICABLE) ONEOF EACH TYPE FOR ONE COMPLETE MOM BOX FOR 400KV GIS DISCONNECTORSWITCH	SET	1	
1.3.38	OPEN/CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKINGCOILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS,RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC. (AS APPLICABLE) ONEOF EACH TYPE FOR ONE COMPLETE MOM BOX FOR 400KV GIS MAINTENANCE EARTHSWITCH	SET	1	

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Sl. No.	Item Description	Unit	Qty.	Remarks
1.3.39	OPEN/CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKINGCOILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS,RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC. (AS APPLICABLE) ONEOF EACH TYPE FOR ONE COMPLETE MOM BOX FOR 400KV GIS FAST EARTHINGSWITCH	SET	1	
1.3.40	LIMIT SWITCHES AND AUX. SWITCHES FOR ONE COMPLETE MOM BOX FORDISCONNECTOR-400KV GIS	SET	2	
1.3.41	LIMIT SWITCHES AND AUX. SWITCHES FOR ONE COMPLETE MOM BOX FORMAINTENANCE EARTHING SWITCH-400KV GIS	SET	2	
1.3.42	LIMIT SWITCHES AND AUX. SWITCHES FOR ONE COMPLETE MOM BOX FOR FASTEARTHING SWITCH (IF APPLICABLE)-400KV GIS	SET	2	
1.3.43	DRIVE MECHANISM FOR 400KV GIS DISCONNECTOR SWITCH	SET	1	
1.3.44	DRIVE MECHANISM FOR 400KV GIS MAINTENANCE EARTH SWITCH	SET	1	
1.3.45	DRIVE MECHANISM FOR 400KV GIS FAST EARTHING SWITCH	SET	1	
1.3.46	MOTOR FOR DRIVE MECHANISM FOR 400KV GIS DISCONNECTOR SWITCH	SET	1	1 SET= 1 Nos. of each type and rating
1.3.47	MOTOR FOR DRIVE MECHANISM FOR 400KVGIS MAINTENANCE EARTH SWITCH	SET	1	1 SET= 1 Nos. of each type and rating
1.3.48	MOTOR FOR DRIVE MECHANISM FOR 400KV GIS FAST EARTHING SWITCH	SET	1	1 SET= 1 Nos. of each type and rating
1.3.49	400KV GIS- SINGLE PHASE OF CURRENT TRANSFORMER (3 CORES, TYPE-CTA)WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR COMPLETE IN ALLRESPECT	SET	1	1 SET= 1 Nos. of each type and rating
1.3.50	400KV GIS- SINGLE PHASE OF CURRENT TRANSFORMER (2 CORES, TYPE-CTB)WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR COMPLETE IN ALLRESPECT	SET	1	1 SET= 1 Nos. of each type and rating
1.3.51	GIS SPARES: 400KV GIS- SINGLE PHASE VT WITH ASSOCIATED ENCLOSURE COMPLETE IN ALL RESPECT	SET	1	1 SET= 1 Nos. of each type and rating
1.3.52	GIS SPARES: 400KV GIS- SINGLE PHASE LA WITH ASSOCIATED ENCLOSURE COMPLETE IN ALL RESPECT	SET	1	1 SET= 1 Nos. of each type and rating
2. 400kV GIS AC station at KPS-3 STATION (EXTN)				
2.1	**SUPPLY- GIS : 400KV, 63KA FOR 1S, GAS INSULATED SWITCHGEAR (GIS) AS PER TS**			
2.1.01	400KV, 3150A, 63KA, Single phase,SF6 Gas Insulated Bus Duct (GIB) outside GIS Hall alongwith associated support structure	Mtr	3000	
2.1.02	420kV, 3150 A, 63 kA, SF6 GIS Line feeder bay module as per Section-Project, Technical specification	SET	4	
2.1.03	420kV, 3150 A, 63 kA, SF6 GIS Tie bay module as per Section-Project, Technical specification	SET	4	
2.1.04	420kV, 4000 A, 63 kA, SF6 GIS Bus extension as per Section-Project, Technical specification	SET	4	
2.1.05	400KV, 4000A, 63KA, Single phase,SF6 Gas Insulated Bus Duct (GIB) outside GIS Hall alongwith associated support structure	Mtr	60	
2.1.06	420kV GIS Interface Module for Future Extension of Bus Bar As per TS	SET	4	
2.1.07	420KV, 3150A, 63kA Single Phase SF6 to Air bushing connecting GIS to AIS alongwith support structure	SET	12	
2.1.08	Local Control Cubicle (LCC)	SET	8	INCLUDING POWER, CONTROL & INSTRUMENTATION CABLE AS APPLICABLE.

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Sl. No.	Item Description	Unit	Qty.	Remarks
3. 400kV AC GIS Extension South Olpad				
3.1	**SUPPLY- GIS : 400KV, 63KA FOR 1S, GAS INSULATED SWITCHGEAR (GIS) AS PER TS**			
3.1.01	400KV, 3150A, 63KA, Single phase,SF6 Gas Insulated Bus Duct (GIB) outside GIS Hall alongwith associated support structure	Mtr	600	
3.1.02	420kV, 3150A, 63 kA, SF6 GIS Converter feeder bay module as per Section-Project, Technical specification	SET	2	
3.1.03	420kV, 3150A, 63 kA, SF6 GIS Tie bay module (of Converter Feeder) as per Section-Project, Technical specification	SET	2	
3.1.04	420kV, 4000 A, 63 kA, SF6 GIS Bus extension as per Section-Project, Technical specification	SET	2	
3.1.05	420kV GIS Interface Module for Future Extension of Bus Bar As per TS	SET	2	
3.1.06	420KV, 3150A, 63kA Single Phase SF6 to Air bushing connecting GIS to AIS alongwith associated support structure	SET	6	
3.1.07	Local Control Cubicle (LCC)	SET	4	INCLUDING POWER, CONTROL & INSTRUMENTATION CABLE AS APPLICABLE.
3.2	**SUPPLY- GIS : SPECIAL TOOLS AND TESTING & MAINTENANCE INSTRUMENTS AS PER TS**			
3.2.01	SF6 Gas Processing unit	Set	1	
3.2.02	Gas Analyzer [Dew Point Meter]	Set	1	
3.2.03	SF6 gas leak detector	Set	1	
3.3	**SPARES- GIS : 400KV, 63KA FOR 1S, GAS INSULATED SWITCHGEAR (GIS) AS PER TS**			
3.3.01	400KV GIS-SF6 GAS PRESSURE RELIEF DEVICE ASSEMBLY OF EACH TYPE with 'O' Rings	SET	1	1 SET= 1 Nos. of each type and rating
3.3.02	SF6 PRESSURE GAUGE CUM SWITCH /DENSITY MONITORS AND PRESSURESWITCH AS APPLICABLE, OF EACH TYPE-400KV GIS	SET	2	
3.3.03	COUPLING DEVICE FOR PRESSURE GAUGE CUM SWITCH FOR CONNECTINGGAS HANDLING PLANT OF EACH TYPE-400KV GIS	SET	2	
3.3.04	RUBBER GASKETS, 'O' RINGS AND SEALS FOR SF6 GAS FOR GISENCLOSURE OF EACH TYPE-400KV GIS	SET	3	
3.3.05	400KV GIS-MOLECULAR FILTER FOR SF6 GAS WITH FILTER BAGS (3 % OF TOTALWEIGHT)	SET	1	
3.3.06	CONTROL VALVES FOR SF6 GAS OF EACH TYPE-400KV GIS	SET	3	
3.3.07	400KV GIS-SF6 GAS (5 % OF TOTAL GAS QUANTITY)	LOT	1	1 LOT= 5 % OF TOTAL GAS QUANTITY
3.3.08	LOCKING DEVICE TO KEEP THE DIS-CONNECTORS (ISOLATORS)AND EARTHING/FAST EARTHING SWITCHES IN CLOSE OR OPEN POSITION IN CASEOF REMOVAL OF THE DRIVING MECHANISM-400KV GIS	SET	3	
3.3.09	UHF PD SENSORS OF EACH TYPE ALONG WITH BNC CONNECTOR FOR 420KV GIS	SET	5	1 SET= 1 Nos. of each type and rating
3.3.10	400KV GIS-SUPPORT INSULATORS (GAS THROUGH) OF EACH TYPE (COMPLETE WITHMETAL RING ETC.) ALONG WITH ASSOCIATED CONTACTS AND SHIELDS	SET	3	1 SET= 1 Nos. of each type and rating
3.3.11	400KV GIS-GAS BARRIERS OF EACH TYPE (COMPLETE WITH METAL RING ETC.)ALONG WITH ASSOCIATED CONTACTS AND SHIELDS	SET	3	1 SET= 1 Nos. of each type and rating
3.3.12	420KV, 3150A, 63kA Single phase SF6 to Air bushing of each type	SET	1	1 SET= 1 Nos. of each type and rating
3.3.13	LCC SPARES - AUX. RELAYS, CONTACTORS,PUSH BUTTONS, SWITCHES,LAMPS,ANNUNCIATION WINDOWS, MCB, FUSES,TIMERS, TERMINAL BLOCKS ETC. OF EACHTYPE & RATING-400kV GIS	SET	2	
3.3.14	400KV GIS-ONE POLE OF 3150A CIRCUIT BREAKER WITHOUT PIR WITHINTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND OPERATING MECHANISM COMPLETEIN ALL RESPECT	SET	1	
3.3.15	400KV GIS-ONE POLE OF 4000A CIRCUIT BREAKER WITHOUT PIR WITHINTERRUPTER, MAIN CIRCUIT, ENCLOSURE AND OPERATING MECHANISM COMPLETEIN ALL RESPECT	SET	1	
3.3.16	Trip coil assembly with resistor for420kV GIS Circuit Breaker (asapplicable)	SET	3	
3.3.17	Closing coil assembly with resistor for420kV GIS Circuit Breaker (asapplicable)	SET	3	
3.3.18	Ferrules, Joints & Coupling of each type for CB	SET	1	
3.3.19	Window slope/ observing glass each type	SET	3	1 SET= 1 Nos. of each type and rating
3.3.20	RELAYS, POWER CONTACTORS, PUSH BUTTONS, TIMERS & MCBS ETC. (ASAPPLICABLE) OF EACH TYPE FOR 400KV GIS CIRCUIT BREAKER	SET	1	
3.3.21	Auxiliary switch assembly of each type for 420kV GIS Circuit Breaker	SET	3	
3.3.22	400KV GIS CIRCUIT BREAKER-OPERATION COUNTER Each Type	SET	3	
3.3.23	400KV GIS CIRCUIT BREAKER-HYDRAULIC OPERATING MECHANISM WITH DRIVEMOTOR (FOR HYDRAULIC OPERATED MECHANISM, IF APPLICABLE)	SET	1	

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Sl. No.	Item Description	Unit	Qty.	Remarks
3.3.24	HYDRAULIC FILTER OF EACH TYPE (FOR HYDRAULIC OPERATED MECHANISM, IFPPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
3.3.25	400KV GIS CIRCUIT BREAKER- HOSE PIPE OF EACH TYPE (AS APPLICABLE) (FORHYDRAULIC OPERATED MECHANISM, IF APPLICABLE)	SET	1	
3.3.26	400KV GIS CIRCUIT BREAKER - N2 ACCUMULATOR (FOR HYDRAULIC OPERATEDMECHANISM, IF APPLICABLE)	SET	1	
3.3.27	VALVES OF EACH TYPE (FOR HYDRAULIC OPERATED MECHANISM, IFAPPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
3.3.28	PIPE LENGTH (COPPER & STEEL) OF EACH SIZE & TYPE (FOR HYDRAULICOPERATED MECHANISM, IF APPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
3.3.29	PRESSURE SWITCHES OF EACH TYPE (FOR HYDRAULIC OPERATED MECHANISM, IFAPPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
3.3.30	PRESSURE GAUGE WITH COUPLING DEVICE OF EACH TYPE (FOR HYDRAULICOPERATED MECHANISM, IF APPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
3.3.31	400KV GIS CIRCUIT BREAKER-HYDRAULIC OIL (5% OF TOTAL OIL QUANTITY)(FOR HYDRAULIC OPERATED MECHANISM, IF APPLICABLE)	SET	1	
3.3.32	PRESSURE RELIEF DEVICE OF EACH TYPE (FOR HYDRAULIC OPERATED MECHANISM,IF APPLICABLE)-400KV GIS CIRCUIT BREKAER	SET	1	
3.3.33	400KV GIS CIRCUIT BREAKER-COMPLETE SPRING OPERATING MECHANISMINCLUDING CHARGING MECHANISM ETC. (FOR SPRING OPERATED MECHANISM, IFAPPLICABLE) of each type	SET	1	
3.3.34	400kV GIS- Single phase of 3150Adisconnector switch including maincircuit, enclosure, driving mechanismand support insulator etc., complete inall respect (Note 1- The contractorshall supply spare for disconnectorswitch to ensure one to one replacementof all disconnector switch supplied asmain equipment without any requirementof modification in fittings at site tocover all different types ofdisconnector switch supplied. In case,quantity of supplied dis-connectorswitch types (for one to onereplacement) are more than the quantitymentioned in BPS for spare, thecontractor shall supply theseadditional types of disconnector switchwithout any additional priceimplication to POWERGRID and quantitiesof these additional type ofdisconnector switch are deem to beincluded in the quantities mentioned inBPS for spare disconnector. Note 2 - Incase, Dis-connector Switch (DS) & EarthSwitch (ES) is provided in a sameenclosure with common operatingmechanism, then the module comprisingof Dis-connector & Earth switch insingle enclosure with common operatingmechanism is to be provided under thehead of spare Dis-connector only. Note3- In case, Dis-connector Switch (DS)&Earth Switch (ES) is provided in asame enclosure with separate operatingmechanism, then the module comprisingof Dis-connector & Earth switch insingle enclosure with separateoperating mechanism is to be providedunder the head of spare Dis-connectoronly.)	SET	1	1 SET= 1 Nos. of each type and rating
3.3.35	400KV GIS- SINGLE PHASE MAINTENANCE EARTHING SWITCH INCLUDING MAINCIRCUIT, ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC.,COMPLETE IN ALL RESPECT (NOTE 1 - IN CASE, DIS-CONNECTOR SWITCH (DS) &EARTH SWITCH (ES) IS PROVIDED IN A SAME ENCLOSURE WITH COMMONOPERATING MECHANISM, THEN THE MODULE COMPRISING OF DIS-CONNECTOR &EARTH SWITCH IN SINGLE ENCLOSURE WITH COMMON OPERATING MECHANISM IS TOBE PROVIDED UNDER THE HEAD OF SPARE DIS-CONNECTOR ONLY. NOTE 2 - INCASE, DIS-CONNECTOR SWITCH (DS) & EARTH SWITCH (ES) IS PROVIDED IN ASAME ENCLOSURE WITH SEPARATE OPERATING MECHANISM, THEN THE MODULECOMPRISING OF DIS-CONNECTOR & EARTH SWITCH IN SINGLE ENCLOSURE WITHSEPARATE OPERATING MECHANISM IS TO BE PROVIDED UNDER THE HEAD OF SPAREDIS-CONNECTOR ONLY.)	SET	1	1 SET= 1 Nos. of each type and rating
3.3.36	400KV GIS - SINGLE PHASE FAST EARTHING SWITCH INCLUDING MAIN CIRCUIT,ENCLOSURE, DRIVING MECHANISM AND SUPPORT INSULATOR ETC., COMPLETE INALL RESPECT (NOTE 1 - IN CASE, DIS-CONNECTOR SWITCH (DS) & EARTHSWITCH (ES) IS PROVIDED IN A SAME ENCLOSURE WITH COMMON OPERATINGMECHANISM, THEN THE MODULE COMPRISING OF DIS-CONNECTOR & EARTH SWITCHIN SINGLE ENCLOSURE WITH COMMON OPERATING MECHANISM IS TO BE PROVIDEDUNDER THE HEAD OF SPARE DIS-CONNECTOR ONLY. NOTE 2 - IN CASE,DIS-CONNECTOR SWITCH (DS) & EARTH SWITCH (ES) IS PROVIDED IN A SAMEENCLOSURE WITH SEPARATE OPERATING MECHANISM, THEN THE MODULECOMPRISING OF DIS-CONNECTOR & EARTH SWITCH IN SINGLE ENCLOSURE WITHSEPARATE OPERATING MECHANISM IS TO BE PROVIDED UNDER THE HEAD OF SPAREDIS-CONNECTOR ONLY.)	SET	1	1 SET= 1 Nos. of each type and rating
3.3.37	OPEN/CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKINGCOILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS,RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC. (AS APPLICABLE) ONEOF EACH TYPE FOR ONE COMPLETE MOM BOX FOR 400KV GIS DISCONNECTORSWITCH	SET	1	
3.3.38	OPEN/CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKINGCOILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS,RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC. (AS APPLICABLE) ONEOF EACH TYPE FOR ONE COMPLETE MOM BOX FOR 400KV GIS MAINTENANCE EARTHSWITCH	SET	1	

ANNEXURE: BOQ_400kV GIS_SUPPLY_KPS3-S.OLPAD

REV No: 0

DATE: 22.11.2024

Sl. No.	Item Description	Unit	Qty.	Remarks
3.3.39	OPEN/CLOSE CONTACTOR ASSEMBLY, TIMERS, KEY INTERLOCK, INTERLOCKINGCOILS, RELAYS, PUSH BUTTONS, INDICATING LAMPS, POWER CONTACTORS,RESISTORS, FUSES, MCBS & DRIVE CONTROL CARDS ETC. (AS APPLICABLE) ONEOF EACH TYPE FOR ONE COMPLETE MOM BOX FOR 400KV GIS FAST EARTHINGSWITCH	SET	1	
3.3.40	LIMIT SWITCHES AND AUX. SWITCHES FOR ONE COMPLETE MOM BOX FORDISCONNECTOR-400KV GIS	SET	2	
3.3.41	LIMIT SWITCHES AND AUX. SWITCHES FOR ONE COMPLETE MOM BOX FORMAINTENANCE EARTHING SWITCH-400KV GIS	SET	2	
3.3.42	LIMIT SWITCHES AND AUX. SWITCHES FOR ONE COMPLETE MOM BOX FOR FASTEARTHING SWITCH (IF APPLICABLE)-400KV GIS	SET	2	
3.3.43	DRIVE MECHANISM FOR 400KV GIS DISCONNECTOR SWITCH	SET	1	
3.3.44	DRIVE MECHANISM FOR 400KV GIS MAINTENANCE EARTH SWITCH	SET	1	
3.3.45	DRIVE MECHANISM FOR 400KV GIS FAST EARTHING SWITCH	SET	1	
3.3.46	MOTOR FOR DRIVE MECHANISM FOR 400KV GIS DISCONNECTOR SWITCH	SET	1	1 SET= 1 Nos. of each type and rating
3.3.47	MOTOR FOR DRIVE MECHANISM FOR 400KVGIS MAINTENANCE EARTH SWITCH	SET	1	1 SET= 1 Nos. of each type and rating
3.3.48	MOTOR FOR DRIVE MECHANISM FOR 400KV GIS FAST EARTHING SWITCH	SET	1	1 SET= 1 Nos. of each type and rating
3.3.49	400KV GIS- SINGLE PHASE OF CURRENT TRANSFORMER (3 CORES, TYPE-CTA)WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR COMPLETE IN ALLRESPECT	SET	1	1 SET= 1 Nos. of each type and rating
3.3.50	400KV GIS- SINGLE PHASE OF CURRENT TRANSFORMER (2 CORES, TYPE-CTB)WITH ASSOCIATED ENCLOSURE AND PRIMARY CONDUCTOR COMPLETE IN ALLRESPECT	SET	1	1 SET= 1 Nos. of each type and rating
3.3.51	GIS SPARES: 400KV GIS- SINGLE PHASE VT WITH ASSOCIATED ENCLOSURE COMPLETE IN ALL RESPECT	SET	1	1 SET= 1 Nos. of each type and rating
3.3.52	GIS SPARES: 400KV GIS- SINGLE PHASE LA WITH ASSOCIATED ENCLOSURE COMPLETE IN ALL RESPECT	SET	1	1 SET= 1 Nos. of each type and rating

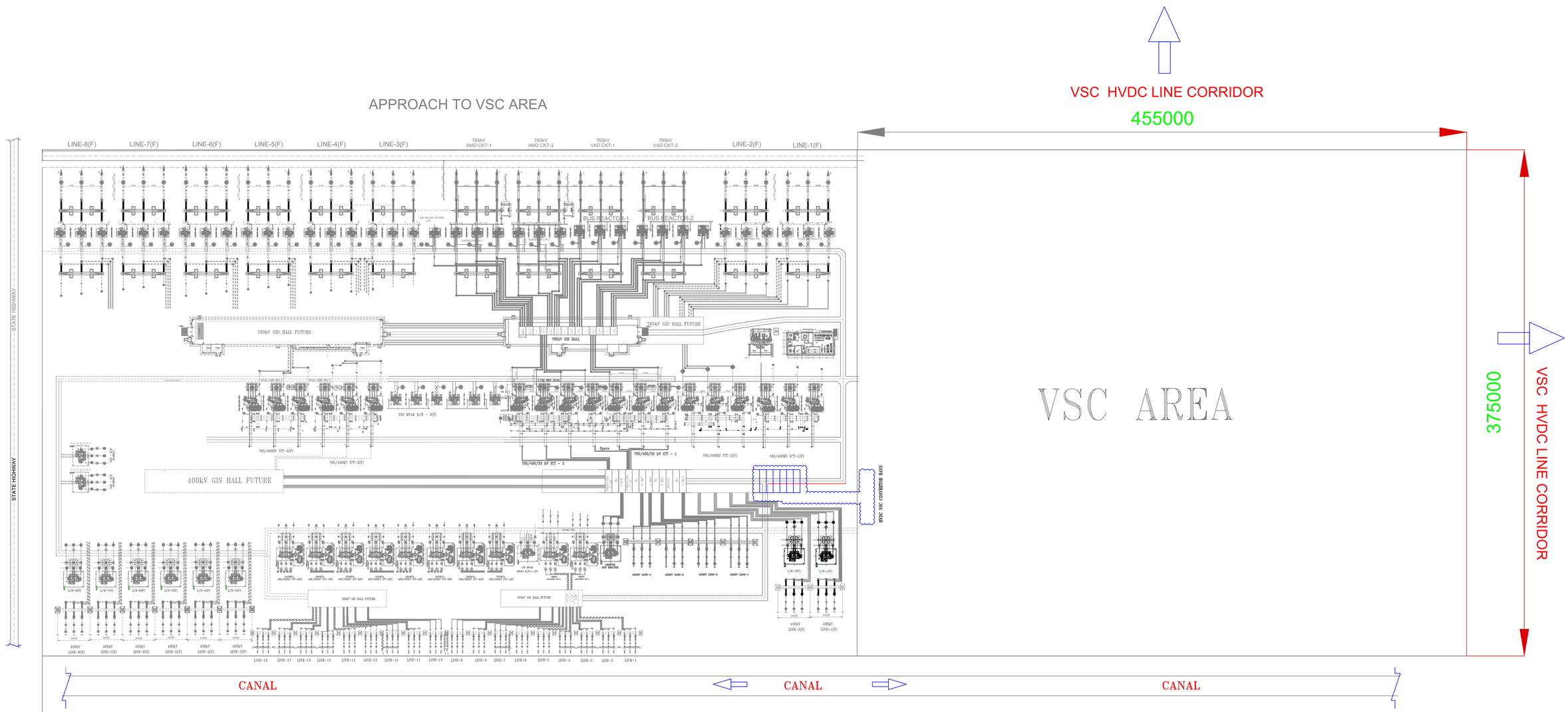
4	SPARES- GIS : **REFERENCE UNIT PRICE FOR ADDITION / DELETION** OF SUPPLY ITEMS (Unit Prices of Individual Equipment included here or in manadatory spares are required for any Addition/Deletion of Equipment and replacement of damaged items. Bidder to ensure that the unit prices have a logical relationship with prices of assemblies in main items. Quoting for unit prices is mandatory and shall be considered for evaluation)			
4.01	SPARES: 400KV GIS- GIS METALLIC ENCLOSURE	KG	50	
4.02	SPARES: 400KV GIS- EXPANSION BELLOWS/ JOINTS	SET	1	1 SET= For Single Phase of any type and any rating.
4.03	SPARES: 400KV GIS- TEE BEND	SET	1	1 SET= For Single Phase of any type and any rating.
4.04	SPARES: 400KV GIS- L BEND	SET	1	1 SET= For Single Phase of any type and any rating.
4.05	SPARES: Controlled Switching Device for 420 kV, 3-ph Circuit Breaker	SET	1	1 SET= For Single Phase of any type and any rating.

ANNEXURE BOQ 400kV GIS SERVICES KPS3-S.OLPAD
REV No: 01
DATE: 14.11.2024

Sl. No.	Description	Unit	Quantity	Remarks
400kV GIS AC station at KPS3 (HVDC)				
5	SERVICES- GIS : 400KV, 63KA FOR IS, GAS INSULATED SWITCHGEAR (GIS) AS PER TS			
5.01	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF GIS	Bays	18	Supervision of erection of GIS with main bus, complete as per TS in all respect including LCC and its accessories. It also includes verification of materials for proper storage at site for final storage. Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item. GIS Bus Duct & SF6 to Air Bushing (SAB) are not covered in this BOQ item.
5.02	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF GAS INSULATED BUS DUCT	MTR	2500	Supervision of erection of GIB complete as per TS in all respect. GIB outside the GIS Hall wall shall be considered for mode of measurement. Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item. Inner side GIB / Aux Bus Module etc are to be considered as part of respective GIS Assembly and cost of the same shall be deemed inclusive.
5.03	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF SF6 TO AIR BUSHING	SET	30	Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item.
5.04	SERVICES- 400kV GIS: TESTING & COMMISSIONING OF GIS	Bays	18	Testing and commissioning of complete GIS system including main bus, LCC and associated system is to be executed by bidder. All the special testing instruments, kits, T&P etc. are to be arranged by bidder on returnable basis. Please refer relevant section of technical specification for details.
5.05	SERVICES- 400kV GIS : TESTING & COMMISSIONING OF GAS INSULATED BUS DUCT	MTR	2500	GIB outside the GIS Hall wall shall be considered for mode of measurement. Inner side GIB / Aux Bus Module e.t.c. are to be considered as part of respective GIS Assembly and cost of the same shall be deemed inclusive. All the special testing instruments, kits, T&P etc. are to be arranged by bidder on returnable basis. Please refer relevant section of technical specification for details.
5.06	SERVICES- 400kV GIS : TESTING & COMMISSIONING OF SF6 TO AIR BUSHING	SET	30	
5.07	SERVICES- 400kV GIS : FINAL SUCCESSFUL HV/ POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	Bays	18	Carrying out successful HV/ Power Frequency Testing of GIS as per IEC including Arrangement of HV Test kit with operator (on returnable basis) shall be in scope of bidder, which includes charges of HV test kit with operator, accessories & tools required for completion of HV testing. The quoted price shall include GIS bays including Main Bus, GIB & SAB and other common items as per TS complete in all respect. In this BOQ item, mobilization and demobilization for HV test kit is considered for
5.08	SERVICES- 400kV GIS : INSULATION CO-ORDINATION STUDIES FOR GIS SYSTEM	LOT	1	1 Lot means Complete study report as per technical specification, Including VFTO report
5.09	SERVICES- 400kV GIS : TRAINING FOR GIS AT SITE	DAY	2	
5.1	SERVICES- 400kV GIS : TRAINING FOR GIS AT MANUFACTURER WORKS	DAY	2	
400kV GIS AC station at KPS-3 STATION (EXTN)				
6	SERVICES- GIS : 400KV, 63KA FOR IS, GAS INSULATED SWITCHGEAR (GIS) AS PER TS			
6.01	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF GIS	Bays	12	Supervision of erection of GIS with main bus, complete as per TS in all respect including LCC and its accessories. It also includes verification of materials for proper storage at site for final storage. Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item. GIS Bus Duct & SF6 to Air Bushing (SAB) are not covered in this BOQ item.
6.02	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF GAS INSULATED BUS DUCT	MTR	3060	Supervision of erection of GIB complete as per TS in all respect. GIB outside the GIS Hall wall shall be considered for mode of measurement. Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item. Inner side GIB / Aux Bus Module etc are to be considered as part of respective GIS Assembly and cost of the same shall be deemed inclusive.
6.03	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF SF6 TO AIR BUSHING	SET	12	Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item.
6.04	SERVICES- 400kV GIS: TESTING & COMMISSIONING OF GIS	Bays	12	Testing and commissioning of complete GIS system including main bus, LCC and associated system is to be executed by bidder. All the special testing instruments, kits, T&P etc. are to be arranged by bidder on returnable basis. Please refer relevant section of technical specification for details.
6.05	SERVICES- 400kV GIS : TESTING & COMMISSIONING OF GAS INSULATED BUS DUCT	MTR	3060	GIB outside the GIS Hall wall shall be considered for mode of measurement. Inner side GIB / Aux Bus Module e.t.c. are to be considered as part of respective GIS Assembly and cost of the same shall be deemed inclusive. All the special testing instruments, kits, T&P etc. are to be arranged by bidder on returnable basis. Please refer relevant section of technical specification for details.
6.06	SERVICES- 400kV GIS : TESTING & COMMISSIONING OF SF6 TO AIR BUSHING	SET	12	
6.07	SERVICES- 400kV GIS : FINAL SUCCESSFUL HV/ POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	Bays	12	Carrying out successful HV/ Power Frequency Testing of GIS as per IEC including Arrangement of HV Test kit with operator (on returnable basis) shall be in scope of bidder, which includes charges of HV test kit with operator, accessories & tools required for completion of HV testing. The quoted price shall include GIS bays including Main Bus, GIB & SAB and other common items as per TS complete in all respect. In this BOQ item, mobilization and demobilization for HV test kit is considered for
6.08	SERVICES- 400kV GIS : INSULATION CO-ORDINATION STUDIES FOR GIS SYSTEM	LOT	1	1 Lot means Complete study report as per technical specification, Including VFTO report
6.09	SERVICES- 400kV GIS : TRAINING FOR GIS AT SITE	DAY	2	
6.1	SERVICES- 400kV GIS : TRAINING FOR GIS AT MANUFACTURER WORKS	DAY	2	

ANNEXURE BOQ 400kV GIS SERVICES KPS3-S.OLPAD
REV No: 01
DATE: 14.11.2024

Sl. No.	Description	Unit	Quantity	Remarks
400kV AC GIS Extension South Olpad				
7	SERVICES- GIS : 400KV, 63KA FOR IS, GAS INSULATED SWITCHGEAR (GIS) AS PER TS			
7.01	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF GIS	Bays	4	Supervision of erection of GIS with main bus, complete as per TS in all respect including LCC and its accessories. It also includes verification of materials for proper storage at site for final storage. Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item. GIS Bus Duct & SF6 to Air Bushing (SAB) are not covered in this BOQ item.
7.02	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF GAS INSULATED BUS DUCT	MTR	600	Supervision of erection of GIB complete as per TS in all respect. GIB outside the GIS Hall wall shall be considered for mode of measurement. Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item. Inner side GIB / Aux Bus Module etc are to be considered as part of respective GIS Assembly and cost of the same shall be deemed inclusive.
7.03	SERVICES- 400kV GIS: SUPERVISION OF ERECTION OF SF6 TO AIR BUSHING	SET	6	Earthing, SF6 Gas Fiiling works, Internal Cabling from GIS to LCC, including Structure Works are covered under this item.
7.04	SERVICES- 400kV GIS: TESTING & COMMISSIONING OF GIS	Bays	4	Testing and commissioning of complete GIS system including main bus, LCC and associated system is to be executed by bidder. All the special testing instruments, kits, T&P etc. are to be arranged by bidder on returnable basis. Please refer relevant section of technical specification for details.
7.05	SERVICES- 400kV GIS : TESTING & COMMISSIONING OF GAS INSULATED BUS DUCT	MTR	600	GIB outside the GIS Hall wall shall be considered for mode of measurement. Inner side GIB / Aux Bus Module e.t.c. are to be considered as part of respective GIS Assembly and cost of the same shall be deemed inclusive. All the special testing instruments, kits, T&P etc. are to be arranged by bidder on returnable basis. Please refer relevant section of technical specification for details.
7.06	SERVICES- 400kV GIS : TESTING & COMMISSIONING OF SF6 TO AIR BUSHING	SET	6	
7.07	SERVICES- 400kV GIS : FINAL SUCCESSFUL HV/ POWER FREQUENCY TESTING OF GIS INCLUDING ARRANGING OF HV TEST KIT ALONG WITH OPERATOR	Bays	4	Carrying out successful HV/ Power Frequency Testing of GIS as per IEC including Arrangement of HV Test kit with operator (on returnable basis) shall be in scope of bidder, which includes charges of HV test kit with operator, accessories & tools required for completion of HV testing. The quoted price shall include GIS bays including Main Bus, GIB & SAB and other common items as per TS complete in all respect. In this BOQ item, mobilization and demobilization for HV test kit is considered for
7.08	SERVICES- 400kV GIS : INSULATION CO-ORDINATION STUDIES FOR GIS SYSTEM	LOT	1	1 Lot means Complete study report as per technical specification, Including VFTO report
7.09	SERVICES- 400kV GIS : TRAINING FOR GIS AT SITE	DAY	2	
7.1	SERVICES- 400kV GIS : TRAINING FOR GIS AT MANUFACTURER WORKS	DAY	2	
8	SERVICES- GIS : **REFERENCE UNIT PRICE FOR ADDITION / DELETION** OF SERVICES: (UNIT PRICES OF INDIVIDUAL SERVICES INCLUDED HERE ARE REQUIRED FOR ANY ADDITION/DELETION OF EQUIPMENT AND REPLACEMENT OF DAMAGED ITEMS. VENDOR TO ENSURE THAT THE UNIT PRICES HAVE A LOGICAL RELATIONSHIP WITH PRICES OF ASSEMBLIES IN MAIN ITEMS. QUOTING FOR UNIT PRICES IS MANDATORY AND SHALL BE CONSIDERED FOR EVALUATION)			
8.01	SERVICES- 400kV GIS: REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - **SERVICES FOR SUPERVISION OF ERECTION OF GIS**	MANDAY	10	Charges for repetition of services - (if required due to reasons not attributed to the bidder) This item will be executed only if repetition of services is required by BHEL.
8.02	SERVICES- 400kV GIS: REF. UNIT PRICE OF GIS INDIVIDUAL ITEM/ EQUIPMENT - **SERVICES FOR TESTING & COMMISSIONING OF GIS**	MANDAY	10	Charges for repetition of services - (if required due to reasons not attributed to the bidder) This item will be executed only if repetition of services is required by BHEL.
	DEMOBILIZATION AND REMOBILIZATION CHARGES			
8.03	SERVICES- 400kV GIS: DEMOBILIZATION AND REMOBILIZATION CHARGES FOR GIS **ERECTION SUPERVISION TEAM**	Set	2	THIS BOQ ITEM SHALL BE EXECUTED IF REQUIRED FOR REASONS NOT ATTRIBUTABLE TO BIDDER.
8.04	SERVICES- 400kV GIS: DEMOBILIZATION AND REMOBILIZATION CHARGES FOR GIS **TESTING & COMMISSIONING TEAM**	Set	2	BOQ ITEM SHALL BE PAYABLE IF REQUIRED FOR REASONS NOT ATTRIBUTE TO BIDDER. HV TESTING IS NOT PART OF THIS ITEM.
8.05	SERVICES- 400kV GIS: DEMOBILIZATION & REMOBILIZATION CHARGES OF **HV TEST KIT** ALONG WITH OPERATOR	Lot	1	In this BOQ item, mobilization and demobilization chages for HV test kit is considered for second time or more , for reasons not attributable to bidder. HV testing charges shall be paid per bay basis as per main HV testing charge.



NOTE–

1. ALL DIMENSIONS ARE IN mm UNLESS SPECIFIED OTHERWISE
2. BIDDER HAS TO FIT THEIR HVDC LAYOUT AND ASSOCIATED FACILITIES IN THE AVAILABLE AREA ONLY.
3. NEW GIS FOR HVDC IS UNDER PRESENT SCOPE OF BIDDER.

POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

PROJECT :
TRANSMISSION SYSTEM FOR EVACUATION OF POWER FROM POTENTIAL RENEWABLE ENERGY ZONE IN KHAVDA AREA OF GUJARAT UNDER PHASE–V (8GW) PART–C

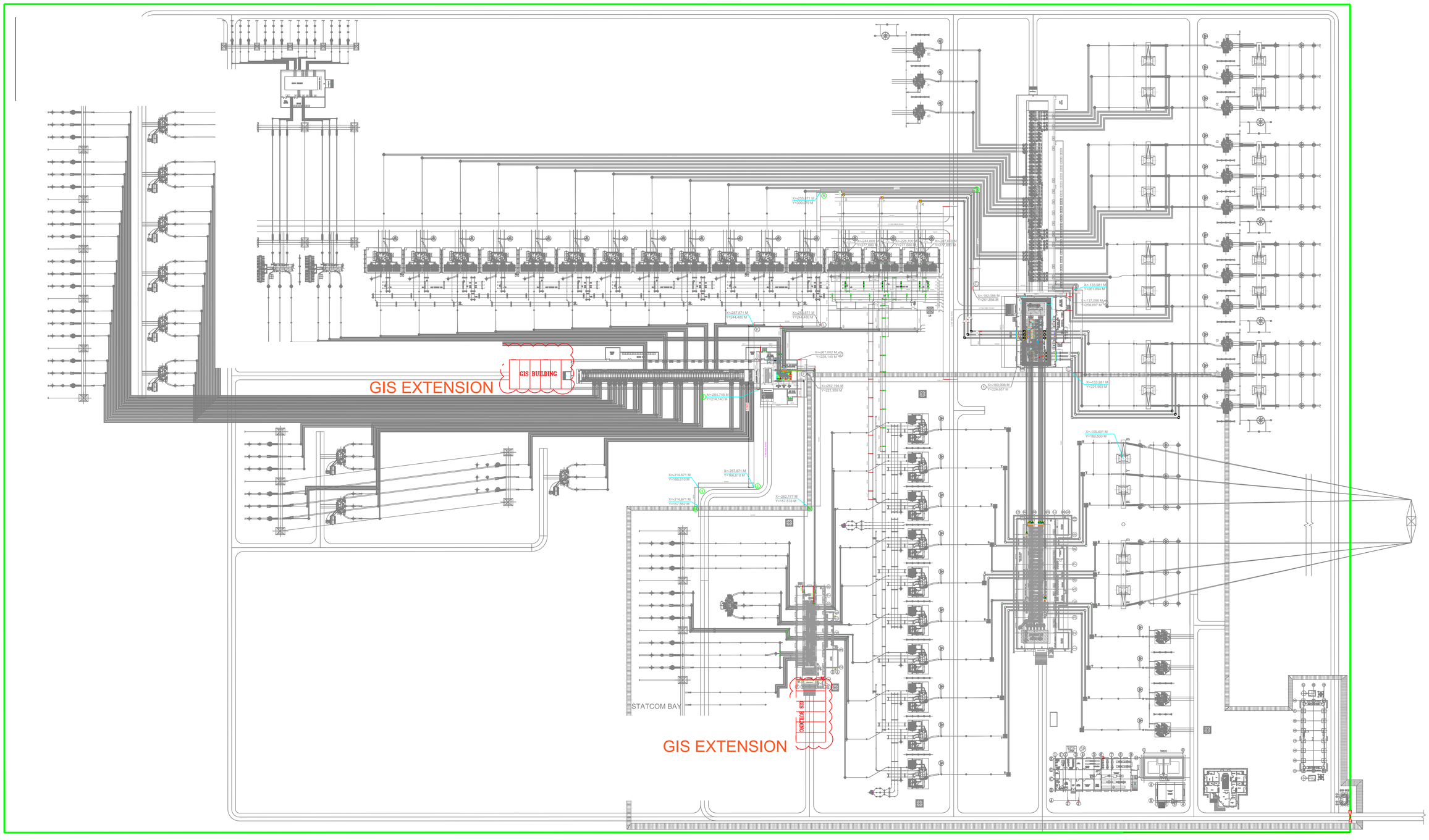
SUBSTATION:
+/– 500kV, 2500MW HVDC TERMINAL SOUTH OLPAD

TITLE :
PLOT AREA DRAWING

DATE	DRAWN BY	DRAWING NO.	REV.
		C/ENGG/HVDC/SOUTH OLPAD/GA	01

SHEET SIZE – A1(594x841)

765/400 kV KPS-3 (EXISTING) SUBSTATION EXTN. TENTATIVE GA DRAWING REV.01



NOTE–

1. ALL DIMENSIONS ARE IN mm.

SHEET SIZE – A1(594x841)

NOTE:

1. Bidder has to fit their HVDC Layout and associated faciilities in the available area only.
2. New GIS for HVDC is under present scope of Bidder.
3. ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED OTHERWISE.

FOR TENDER PURPOSE ONLY

POWER GRID CORPORATION
OF INDIA LIMITED
(A Government of India Enterprise)

PROJECT :

+/- 500 kV 2500 MW HVDC LINK BETWEEN KPS3 AND SOUTH OLPAD
(2 X 1250 MW)

TITLE : PLOT AREA DRAWING
KPS-3 HVDC TERMINAL

CHECKED BY	DRAWING NO.	SCALE NTS	REV. 00
DRAWN BY NARENDRA			JAN. 2024

SPECIFIC REQUIREMENT'S (Section- Project)

C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT REV NO 08

Employer has standardized its Specific Requirement for various equipment and works for different voltage levels. Items or clauses, which are not applicable for the scope of this package as per schedule of quantities described in BPS or as per scope defined elsewhere in Section Project, the technical specification/clauses for the items specified below should not be referred to.

S.No.	Clause No.	Amended As (As per Specific Requirement Rev 08)
A.	**Section: GTR Rev 15**	
1.	Section GTR, Rev-15 Clause 2.1 (a)	"All equipment/materials/items, as per **Annexure-K (Rev 01),** as applicable under present scope of works, shall be procured and supplied from domestic manufacturers only with Minimum Local Content for individual items as listed in the above annexure. Any imported equipment/material/item/parts/component (comprising of embedded systems) to be supplied under the contract shall be tested in the certified laboratories to check for any kind of embedded malware/trojans/cyber threats and for adherence to Indian Standards as per the directions issued by Ministry of Power/Govt. of India from time to time. In case of such import from specified "prior reference" countries, the requirement of prior permission from the Govt. of India including protocol for testing in certified and designated laboratories by Ministry of Power/Govt. of India shall also be complied with by the contractor. The bidder/contractor shall list out the products and components producing Toxic e-waste under the contract and shall furnish to the Employer the procedure of safe disposal at the time of closing of the contract."
2.	**New Clause no 2.1 C**	Equipment/Material/Items from a Indian manufacture who have specified transfer of technology (TOT) arrangement with an entity from a country which shares land border with India shall be accepted only if the Indian Manufacturer is complying the requirement of prevailing Guideline by Government of India under Rule 144(xi) of the General financial Rule (GFR) 2017
3.	**New Clause No. 4.7**	**Planning and Designing in purview of Vulnerability Atlas of India** Vulnerability Atlas of India (VAI) is a comprehensive document which provides existing hazard scenario for the entire country and presents the digitized State/UT wise hazard, maps with respect to earthquakes, winds and floods for district wise identification of vulnerable areas. It also includes additional digitized maps for thunderstorms, cyclones and landslides. The main purpose of this Atlas is its use for disaster preparedness and mitigation at policy planning and project formulation stage. This Atlas is one of its kind single point source for the various stakeholders including policy makers, administrators, municipal commissioners, urban managers, engineers, architects, planners, public etc. to ascertain proneness of any city/ location/ site to multi-hazard which includes earthquakes, winds, floods thunderstorms, cyclones and landslides. While project formulation, approvals and implementation of various urban housing, buildings and infrastructures schemes, this Atlas provides necessary information for risk analysis and hazard assessment. The Vulnerability Atlas of India has been prepared by Building Materials and Technology Promotion Council under Ministry of Housing and Urban Affairs, Government of India and available at their website https://www.bmtpc.org/. It is mandatory for the bidders to refer Vulnerability Atlas of India for multi-hazard risk assessment and include the relevant hazard proneness specific to project location while planning and designing the project in terms of:

<table>
<tr><td></td><td></td><td>i) Seismic zone for earthquakes,
ii) Wind velocity
iii) Area liable to floods and Probable max. surge height
iv) Thunderstorms history
v) Number of cyclonic storms/ severe cyclonic storms and max sustained wind specific to coastal Region
vi) Landslides incidences with Annual rainfall normal
vii) District wise Probable Max. Precipitation</td></tr>
<tr><td>4.</td><td>New Para under Clause no. 8.3.2</td><td>Wherever references to SFQP is made in Technical Specifications, it shall be the latest edition/revision of the same uploaded up to seven (7) days prior to the actual date of bid opening.</td></tr>
<tr><td>5.</td><td>Clause no. 9.2</td><td>The reports for all type tests as per technical specification shall be furnished by the Contractor along with equipment / material drawings. However, type test reports of similar equipments/ material already accepted in POWERGRID shall be applicable for all projects with similar requirement. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by POWERGRID/representative authorized by POWERGRID/representative of Utility /representative of accredited test lab/ representative of The National Accreditation Board for Certification Bodies (NABCB) certified agency shall also be acceptable.

Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within the years specified below from the date of NOA. In case the test reports are of the test conducted earlier than the years specified below from the date of NOA, the contractor shall repeat these test(s) at no extra cost to the Employer:-

<table>
<tr><th>S. No.</th><th>Name of Equipment</th><th>Validity of type test(in years)</th></tr>
<tr><td>1</td><td>Power Transformer</td><td>5</td></tr>
<tr><td>2</td><td>LT Transformer</td><td>5</td></tr>
<tr><td>3</td><td>Shunt Reactor</td><td>5</td></tr>
<tr><td>4</td><td>OLTC</td><td>10</td></tr>
<tr><td>5</td><td>Bushing of Power Transformers/Reactors</td><td>7</td></tr>
<tr><td>6</td><td>Fittings and accessories for Power transformers & Reactors</td><td>10</td></tr>
<tr><td>7</td><td>Circuit Breaker</td><td>10</td></tr>
<tr><td>8</td><td>Isolator</td><td>10</td></tr>
<tr><td>9</td><td>Lighting Arrester</td><td>10</td></tr>
<tr><td>10</td><td>Wave Trap</td><td>10</td></tr>
<tr><td>11</td><td>Instrument transformer</td><td>10</td></tr>
<tr><td>12</td><td>GIS & Hybrid GIS</td><td>15</td></tr>
<tr><td>13</td><td>LT Switchgear</td><td>10</td></tr>
<tr><td>14</td><td>Cable and associated accessories</td><td>10</td></tr>
<tr><td>15</td><td>Relays</td><td>7</td></tr>
<tr><td>16</td><td>Capacitors</td><td>10</td></tr>
<tr><td>17</td><td>Battery and Battery charger</td><td>10</td></tr>
<tr><td>18</td><td>Conductor & Earth wire</td><td>10</td></tr>
<tr><td>19</td><td>Insulators (Porcelain/Glass)</td><td>10</td></tr>
<tr><td>20</td><td>Composite Insulators</td><td>5</td></tr>
<tr><td>21</td><td>PLCC</td><td>5</td></tr>
</table>
</td></tr>
</table>

		Note:- For all other equipment's validity of type test shall be 10 years from date of NOA. Further, in the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to non-compliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost implication to the Employer. The Contractor shall intimate the Employer the detailed program about the type tests atleast two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies**.**
6.	Section GTR Rev 15 Clause No 24.1	**Technical requirements for 765/400/220/132kV* Air Insulated Switchgear (AIS) Equipment*:** **A) Circuit Breaker** (i) The manufacturer(s) whose 765/400/220/132kV* Circuit Breaker(s) are offered, must have, manufactured, type tested (as per IEC/IS or equivalent standard) and supplied 715/345/220/132kV* or higher voltage class Circuit Breaker(s), which are in satisfactory operation# for atleast two (2) years as on the date of NOA. (ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India for the offered Circuit Breaker and not meeting the requirement stipulated in (i) above, can also be considered provided that a) 715/345/220/132kV* or higher Voltage class Circuit Breaker(s) must have been manufactured in the above Indian works & type tested (as per IEC/IS standard) and supplied as on the date of NOA. b) In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two (2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of the offered Circuit Breaker(s) to be supplied under the contract. Further, contractor shall furnish performance guarantee for an amount of 10% of the ex-works cost of the Circuit Breaker(s)* for the additional warranty period in addition to the contract performance guarantee to be submitted by the contractor. **B) Isolator, Current Transformer, Capacitive Voltage transformer, Inductive Voltage transformer, Surge Arrester and Wave Trap)** (i) The manufacturer whose 765/400/220/132kV* equipment(s) are offered, must have manufactured, type tested (as per IS/IEC or equivalent standard) and supplied 715/345/220/132kV* or higher voltage class equipment(s), which are in satisfactory operation# for at least two (2) years as on the date of NOA.

		OR (ii) The manufacturer, who have established manufacturing and testing facilities in India for the offered equipment(s) and not meeting the requirement stipulated in (i) above, can also be considered provided that: a) 715/345/220/132kV* or higher Voltage class equipment(s) must have been manufactured in the above Indian works & type tested (as per IS/IEC standard) as on the date of NOA b) Manufacturer has manufactured, type tested (as per IS/IEC or equivalent standard) and supplied equipment(s) of 345kV or above voltage class (applicable for 765kV* Equipment)/220kV or above voltage class (applicable for 400kV* equipment) /132kV or above voltage class (applicable for 220kV* equipment) / 66kV or higher voltage class (applicable for 132kV* equipment), which are in satisfactory operation# for at least two (2) years as on the date of NOA. c) Warranty obligations for additional warranty of two (2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of the offered equipment(s) to be supplied under the contract. Further, contractor shall furnish performance guarantee for an amount of 10% of the ex-works cost of the equipment(s)* for the additional warranty period in addition to the contract Performance guarantee to be submitted by the contractor. OR (iii) The manufacturer, who have established manufacturing and testing facilities in India for the offered equipment(s) based on technological support of a parent company or collaborator and not meeting the requirement stipulated in (i) above, can also be considered provided that: a) 715/345/220/132kV* or higher Voltage class equipment(s) must have been manufactured in the above Indian works & type tested (as per IS/IEC standard) as on the date of NOA. b) The parent company or collaborator meets the qualifying requirements stipulated under (i) given above. A valid collaboration agreement for technology transfer / license to design, manufacture, test and supply the 765/400/220/132kV* Air Insulated Switchgear (AIS) Equipment(s)* in India, shall be submitted. c) The parent company/collaborator shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s) and this performance guarantee shall be in

		addition to contract performance guarantee to be submitted by the contractor Legends: * : voltage class of respective equipment as applicable. # : satisfactory operation means certificate issued by the Employer/Utility certifying the operation without any adverse remark. NOA: Notification of Award
7.	**Clause No 24.2**	**Technical Requirement for 765kV class Transformer** (i) The Manufacturer whose 765kV Transformer(s) are offered must have designed, manufactured, tested & supplied 715 kV or higher voltage class one (1) number 1-phase Transformer of at least 500 MVA capacity or at least three (3) numbers 1-phase Transformers each having a capacity of at least 166 MVA, and the same transformer (s) should have been in satisfactory operation# for atleast two (2) years as on the date of NOA. (ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that a) 715 kV or higher voltage class either One (1) no. 1-phase Transformer of at least 166 MVA capacity or One (1) no. 1-phase Reactor of at least 80 MVAR capacity must have been manufactured in the above Indian works based on technological support of collaborator, type tested (as per IEC/IS standard) and same should have been supplied as on the date of NOA. b) The collaborator meets the requirements stipulated in (i) above. A valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 765kV transformer in India, shall be submitted. c) the collaborator shall furnish performance guarantee for an amount of 10**%** of the ex-works cost of such equipment(s) and this performance guarantee shall be in addition to contract performance guarantee to be submitted by the contractor
8.	**Clause No 24.3**	**Technical Requirement for 765kV class Reactor** (i) The Manufacturer whose 765kV Reactor(s) are offered must have designed, manufactured, tested & supplied 715 kV or higher voltage class one (1) number 1-phase Reactor of at least 110 MVAR capacity or at least three (3) numbers 1-phase Reactors each having a capacity of at least 36.7 MVAR and the same Reactor(s) should have been in satisfactory operation# for atleast two (2) years as on the date of NOA. OR The Manufacturer must have designed, manufactured, tested & supplied 715 kV or higher voltage class one (1) number 1-phase Transformer of at least 500 MVA capacity or at least three (3) numbers 1-phase Transformers each having a capacity of at least 166 MVA and the bidder should have designed, manufactured, tested & supplied 345 kV or higher voltage class one (1) number 3-phase Reactor of at least 50 MVAR capacity or at least three (3) numbers 1-phase Reactors each having a capacity of at least 16.7 MVAR and the same Transformer(s) & Reactor(s) should have been in satisfactory operation# for atleast two (2) years as on the date of NOA.

<table>
<tr><td></td><td></td><td>(ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that

a) 715 kV or higher voltage class either One (1) no. 1-phase Reactor of at least 80 MVAR capacity or One (1) no. 1-phase Transformer of at least 166 MVA capacity must have been manufactured in the above Indian works based on technological support of collaborator, type tested (as per IEC/IS standard) and same should have been supplied as on the date of NOA.

b) The collaborator meets the requirements stipulated in (i) above. A valid collaboration agreement for technology transfer/license to design, manufacture, test and supply 765kV Reactor in India, shall be submitted.

c) the collaborator shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s) and this performance guarantee shall be in addition to contract performance guarantee to be submitted by the contractor</td></tr>
<tr><td>9.</td><td>Clause No 24.4</td><td>Technical Requirement for 400kV, 220kV, 132kV class Transformer

(i) The manufacturer whose transformer(s) are offered must have designed, manufactured, tested and supplied transformers as per table below:

<table>
<tr><td>345kV or above class 3-phase transformers of at least 200 MVA or at least three (3) nos. 1-phase Transformers each having capacity of at least 66.7 MVA</td><td>applicable for supply of 400kV class Transformer</td></tr>
<tr><td>220kV or above class 3-phase transformers of at least 50 MVA or at least three (3) nos. 1-phase Transformers each having capacity of at least 16.7 MVA</td><td>applicable for supply of 220kV class Transformer</td></tr>
<tr><td>commissioned 132kV or above class 3-phase transformers of at least 20 MVA or at least three (3) nos. 1-phase Transformers each having capacity of at least 6.7 MVA</td><td>applicable for supply of 132kV class Transformer</td></tr>
</table>
These Transformer(s) must have been in satisfactory operation# for atleast two (2) years as on the date of NOA.

(ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that

a) 220kV (applicable for supply of 400kV class Transformer)/ 132kV (applicable for supply of 220kV class Transformer)/ 66kV (applicable for supply of 132kVclass Transformer)or higher voltage class transformers must have been designed, manufactured in the above Indian works based on technological support of collaborator, type tested (as per IEC/IS standard) and supplied as on the date of NOA.</td></tr>
</table>

<table>
<tr><td></td><td></td><td>b) The collaborator meets the requirements stipulated in (i) above. A valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 400kV/220kV/132kV* transformer in India, shall be submitted.

c) The collaborator shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s) and this performance guarantee shall be in addition to contract performance guarantee to be submitted by the contractor.</td></tr>
<tr><td>10.</td><td>Clause No 24.5</td><td>Technical Requirement for 400kV, 220kV and 132kV class Reactor

(i) The Manufacturer whose 400kV/220kV/132kV* Reactor(s) are offered must have designed, manufactured, tested & supplied Reactor as per table below:

<table>
<tr><td>345kVor above class 3-phase shunt reactor of at least 50 MVAR capacity or at least three (3) nos. 1-phase Shunt Reactors, each having capacity of at least 16.7 MVAR</td><td>applicable for supply of 400kV class Reactors</td></tr>
<tr><td>220kV or above class 3-phase shunt reactor of at least 20 MVAR capacity or at least three (3) nos. 1-phase Shunt Reactors each having capacity of at least 6.67 MVAR</td><td>applicable for supply of 220kV class Reactors</td></tr>
<tr><td>132kV or above class 3-phase shunt reactor of at least 15 MVAR capacity or at least three (3) nos. 1-phase Shunt Reactors each having capacity of at least 5 MVAR</td><td>applicable for supply of 132kV class Reactors</td></tr>
</table>
These Reactor(s) must have been in satisfactory operation# for atleast two (2) years as on the date of NOA.

(ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that

a) Such manufacturer has designed, manufactured based on technological support of collaborator, type tested (as per IEC/IS standard) and supplied 400kV class transformer or 220kV or above class shunt reactors (applicable for supply of 400kV class Reactors) / 220kV class transformer or 132kV or above class shunt reactors (applicable for supply of 220kV class Reactors)/ 132kV class transformer or 66kV or above class shunt reactors (applicable for supply of 132kV class Reactors) as on the date of NOA.

b) The collaborator meets the requirements stipulated in (i) above. A valid collaboration agreement for technology transfer/license to design, manufacture, test and supply the Reactor in India, shall be submitted.

c) the collaborator shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s) and this performance guarantee shall be in addition to contract performance guarantee to be submitted by the contractor</td></tr>
</table>

11.	**Clause No 24.6**	**Technical Requirement for 400 kV Grade XLPE Power Cables** (i) The manufacturer(s) whose XLPE Power Cables are offered must have designed, manufactured, type tested and supplied in a single contract atleast 5 (five) km of single core, 400kV grade XLPE insulated cable which must be in operation for atleast 2 (two) years as on the date of NOA. (ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that a) The manufacturer must have designed, manufactured, type tested and supplied 400kV grade XLPE insulated cable and which must be in satisfactory operation# for atleast one (1) year as on the date of NOA. OR b) The manufacturer must have designed, manufactured, type tested and completed Pre-qualification (PQ) tests as per IEC for 400kV grade XLPE insulated Cable as on the date of NOA. Note: In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two(2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of cable to supplied under the contract. Further, contractor shall furnish performance guarantee for an amount of 10% of the ex-works cost of the equipments(s)* and this performance guarantee shall be in addition to the contract performance guarantee to be submitted by the contractor
12.	**Clause No 24.7**	**Technical Requirement for 220KV,132kV,110kV Grade XLPE Power Cables** (i) The manufacturer(s) whose XLPE Power Cables are offered must have designed, manufactured, type tested and supplied in a single contract atleast 5 (five) km of single core, 220kV/132kV/110kV* or higher grade XLPE insulated cable which must be in operation for atleast 2 (two) years as on the date of NOA. (ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that a) The manufacturer must have designed, manufactured, type tested and supplied 220kV/132kV/110kV* or higher grade XLPE insulated cable and which must be in satisfactory operation# for atleast one (1) year as on the date of NOA. OR b) The manufacturer must have designed, manufactured, type tested and completed Pre-qualification (PQ) tests as per IEC for 220kV/132kV/110kV* or higher grade XLPE insulated Cable as on the date of NOA. Note: In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two(2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of cable to supplied under the contract. Further, contractor shall furnish performance guarantee for an amount of 10% of the ex-works cost of the equipments(s)* and this performance guarantee

		shall be in addition to the contract performance guarantee to be submitted by the contractor
13.	**Clause No 24.15**	**Technical Requirements for LT Transformer** (i) The manufacturer, whose LT transformer(s) are offered, must have designed, manufactured, type tested including short circuit test as per IEC/IS or equivalent standards and supplied transformer(s) of atleast 33kV class of 315kVA or higher. The transformer must have been in satisfactory operation# for atleast two (2) years as on the date of NOA. (ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that At least 33kV class of 315kVA or higher rating LT transformer(s) must have been designed, manufactured in the above Indian works, type tested (as per IEC/IS standard) including short circuit test and supplied as on the date of NOA. Note In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two(2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of the offered equipment to be supplied under the contract. Further, contractor shall furnish performance guarantee for an amount of **10%** of the ex-works cost of the equipments(s)* for the additional warranty period in addition to the contract performance guarantee to be submitted by the contractor.
14.	**Clause no 24.16**	**Technical Requirements for Composite Long Rod Polymer Insulator (765kV & 400kV)** (i) The manufacturer whose Composite Long rod Insulator are offered, must have designed, manufactured, tested and supplied Composite Long rod Insulator of 120KN or higher electro-mechanical strength for 765kV/400kV* or higher voltage class and the same must have been in satisfactory operation# for at least two (2) years as on the date of NOA. (ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that a) The manufacturer must have designed, manufactured, type tested and supplied Composite Long rod Insulator of 120KN or above electro-mechanical strength for 765kV/400kV* or higher voltage class and the same must have been in satisfactory operation# as on the date of NOA. b) Contractor shall furnish performance guarantee for an amount of 10% of the ex-works cost of the equipments(s)* and this performance guarantee shall be in addition to the contract performance guarantee to be submitted by the contractor. Note: In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two(2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of the offered equipment to be supplied under the contract. Further, contractor shall furnish performance guarantee for an amount of 10% of the ex-works cost of the equipments(s)* for the additional warranty period in addition to the contract performance guarantee to be submitted by the contractor.

15.	**Clause No. 24.20**	**Technical Requirement for 400kV GIS Equipment** (i) The manufacturer whose 400kV GIS bays are offered must have designed, manufactured, type tested** (as per IEC or equivalent standard), supplied and supervised erection & commissioning of at least two (2) nos. Gas Insulated Switchgear (GIS) circuit breaker bays@ of 345kV or above voltage class in one (1) Substation or Switchyard during the last seven (7) years and these bays must be in satisfactory operation# for at least two (2) years as on the date of NOA. (ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that a) Atleast one no. 345kV or above voltage class GIS Circuit Breaker bay@ must have been manufactured in the above Indian works based on the technological support of the Collaborator(s) and either supplied or type tested the above CB bay (as per IEC or equivalent standard) as on the date of NOA. b) The collaborator(s) meets the requirements stipulated in (i) above. A valid collaboration agreement for technology transfer / license to design, manufacture, test and supply 400kV or above voltage level GIS equipment in India, shall be submitted. **c)** The Collaborator(s) shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s) and this performance guarantee shall be in addition to Contract Performance Guarantee to be submitted by the bidder. Note :- (**) Type test reports of the collaborator/ parent company/ subsidiary company/ group company shall also be acceptable.
16.	**New Clause Clause No. 24.21**	**Technical Requirement for 220/132/66 kV* level GIS/Hybrid GIS/MTS Equipment:** (i) The manufacturer whose 220/132/66 kV* level GIS/Hybrid GIS/MTS bays are offered must have designed, manufactured, type tested** (as per IEC or equivalent standard), supplied and supervised erection & commissioning of at least two (2) nos. Gas Insulated Switchgear (GIS) circuit breaker bays@ of 220/110/66kV* or above voltage class in one (1) Substation or Switchyard during the last seven (7) years and these bays must be in satisfactory operation# for at least two (2) years as on the date of NOA. (ii) Alternatively, the manufacturer, who have established manufacturing and testing facilities in India and not meeting the requirement stipulated in (i) above, can also be considered provided that a) Atleast one no. 220/110/66kV* or above voltage level GIS Circuit Breaker bay@ must have been manufactured in the above Indian works based on the technological support of the Collaborator(s) and either supplied or type tested the above GIS bay (as per IEC or equivalent standard) as on the date of NOA.

b) The collaborator(s) meets the requirements stipulated in (i) above. A valid collaboration agreement for technology transfer/license to design, manufacture, test and supply 220/110/66*kV or above voltage level GIS equipment in India shall be submitted.

c) The Collaborator(s) shall furnish performance guarantee for an amount of 10% of the ex-works cost of such equipment(s) and this performance guarantee shall be in addition to Contract Performance Guarantee to be submitted by the bidder.

Note:

1. (*) voltage class of respective equipment as applicable

2. (@) For the purpose of technical requirement, one no. of circuit breaker bay shall be considered as a bay used for controlling a line or a transformer or a reactor or a bus section or a bus coupler and comprising of at least one circuit breaker, one disconnector and three nos. of single phase CTs / Bushing CTs. GIS means SF6 Gas insulated Switchgear.

3. Experience with combination of GIS CB Bay/Hybrid GIS CB Bay/MTS CB Bay is also acceptable if supply of only Hybrid/MTS equipment is envisaged. Hybrid GIS means outdoor SF6 Gas insulated switchgear connected to outdoor Air insulated bus-bar System (AIS bus-bars System), MTS means outdoor SF6 Gas insulated Mixed Technology Switchgear connected to outdoor AIS bus bar system.

4. (**) Type test reports of the collaborator/ parent company/ subsidiary company/ group company shall also be acceptable

17. **New Clause 27.0**

The technical parameters for 36kV & 12kV Horn gap fuse

1. 36kV Horn Gap Fuse

1.	Rated voltage	33 kV
2.	Maximum Continuous voltage	36 kV
3.	Rated current	50 Amps (min)
4.	Rated short time withstand (in KA)	25KA for 1 sec.
5.	Lighting Impulse voltage withstand	170 KV (Between Live and earth) 195 KV (Across open terminals)
6.	One minute Power frequency voltage withstand (Dry and Wet)	70 KV (Between Live and earth) 80 KV (Across open terminals)
7.	Creepage	900mm

2. 12kV Horn Gap Fuse

1.	Rated voltage	11 kV
2.	Maximum Continuous voltage	12 kV
3.	Rated current	50 Amps (min)
4.	Rated short time withstand (in KA)	12KA for 1 sec.
5.	Lighting Impulse voltage withstand	75 KV (Between Live and earth) 85 KV (Across open terminals)

			6.	One minute Power frequency voltage withstand (Dry and Wet)	28 KV (Between Live and earth) 32 KV (Across open terminals)
		Applicable standard: IS9385			
B.	**Section GIS Rev 5A**				
1.	**New Para under Clause no.1**	GIS of all voltage levels above 52kV class envisaged in one substation under a single package, shall be supplied from one GIS manufacturer who shall be responsible for design, manufacturing, erection, testing and commissioning of complete GIS switchyard under the Contract and any other responsibilities stipulated in the contract with respect to GIS portion. GIS shall be accepted from manufacturer for which JDU is submitted along with the bidding documents.			
2.	**Clause no. 5.31**	Alarm circuit shall not respond to faults for momentary conditions. The following indications including those required elsewhere in the specifications shall be generally provided in the alarm and indication circuits. **Gas Insulating System:** i) Loss of Gas Density **Operating System:** i) Low operating pressure ii)Loss of operating power iii)Loss of control supply iv) Pole Discordance.			
3.	**New Clause no. 5.39.8**	Reference Guidelines for GIS Grounding shall be as per **Annexure-12 (Attached at Annexure-S10)**			
4.	**Clause no. 5.40**	Adequate number of UHF sensors shall be provided in the offered GIS of voltage level 220kV and above for detection of Partial discharge (of 5pC and above) as per IEC 60270. The number and location of these sensors…….in close proximity to VT compartments. However, adequacy of number of sensors……. to complete the technical requirement. The calibration and frequency response……..couplers meeting this requirement.			
5.	**New Clause no. 5.41(10)**	The price of Bus-duct inside the GIS hall shall be integral part of the respective bay module and it will not be paid separately. However, the payment of bus-duct for outside the GIS hall along with support structure shall be paid as per running meters in line with provision of Bid Price schedule.			
6.	**New Para added under Clause no. 5.43.2**	The gas density monitoring devices shall have IP rating of IP65 or better and Suitable canopy shall be provided to prevent ingress of rain water for outdoor application.			
7.	**New Clause no. 5.43.3**	**Requirement for Gas Zone Trip Scheme of GIS gas Tight Compartments**: a) Gas Zone tripping scheme is envisaged to isolate the GIS compartment when its gas level falls below gas zone trip level (i.e. minimum functional pressure) b) Density monitor Contact for gas zone tripping shall close when SF6 gas level falls below gas zone trip level in the respective compartment. c) Gas zone tripping shall be interlocked with the associated GIS disconnector so that tripping doesn't take place when a gas tight compartment is in electrically isolated condition from rest of the GIS (Disconnector open). Further, Gas zone tripping scheme should not mal-operate during control DC failure/changeover. Gas zone tripping scheme shall be coordinated with CRP scheme and shall be submitted for employer's approval during detailed engineering.			

<table>
<tr><td>8.</td><td>Clause no. 6.8.2</td><td>The CSD shall be provided in following circuit breakers:
a) 765kV
• Main and Tie bay for Auto Transformer
• Main and Tie bay of Bus Reactor
• Switchable Line Reactor bay
b) 400kV
• Main and Tie bay for 765/400kV Auto Transformer
• Main and Tie bay of Bus Reactor
• Switchable Line Reactor bay
c) 220 & 132kV
• Bay for operation of Shunt reactor
The requirement of CSD shall be explicitly specified in price schedule.</td></tr>
<tr><td>9.</td><td>New Clause 6.8.3 (n)</td><td>For Circuit breaker with CSD controlling a Transformer following is applicable

“The limit for inrush current for switching of Transformer by CSD shall be 1.0 p.u. of rated current of transformer after fine tuning of CSD settings during pre-commissioning checks. For site acceptance of CSD, during online CSD test after fine tuning inrush current should be less than 1.0 P.U. of rated current in five consecutive operations”.</td></tr>
<tr><td>10.</td><td>New Clause no. 10.1.3(n)</td><td>For 400kV & above voltage class GIS bay module, CT cores shall be duly distributed on both side of circuit breaker. For 220 kV and below voltage level GIS bay module, CT on one side of the circuit breaker is also acceptable.</td></tr>
<tr><td>11.</td><td>New Clause no. 15.2.14</td><td>All 765kV & 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD by using a suitable selector switch irrespective of whether circuit breakers to be supplied are envisaged along with CSD or not as per bid price schedules.</td></tr>
<tr><td>12.</td><td>Clause no. 17.1</td><td>One EOT Crane of suitable capacity shall be provided for erection & maintenance of largest/heaviest GIS component/assembly for each GIS hall. The crane shall consist of all special requirements for erection & maintenance of GIS equipment.</td></tr>
<tr><td>13.</td><td>New Para added under Clause no. 20</td><td>During detailed engineering, the type test reports of GIS equipment of the parent company/subsidiary company/group company shall also be acceptable provided that the design of offered GIS is same as that of type tested GIS equipment.</td></tr>
<tr><td>14.</td><td>Clause no 20, Sl. no. 14 of Table</td><td><table><tr><td>14</td><td>Reactor current switching test for Inductive Current switching capability as per IEC 62271-110. Further, the manufacturer whose circuit breakers tested with smaller current w.r.t current limits specified for Reactor current switching test duty-2, 3 & 4 in IEC 62271-110 shall also be acceptable.</td></tr></table></td></tr>
<tr><td>15.</td><td>Annexure-1 S.No. 20 (i)</td><td><table><tr><th>Parameter</th><th>765kV system</th><th>400kV system</th><th>220kV system</th><th>132 kV system</th></tr><tr><td>Pre-insertion resistor requirement</td><td>As per BPS</td><td>As per BPS</td><td>NA</td><td>NA</td></tr><tr><td>Rating (ohms)</td><td>Approx. 450 with tolerance as applicable</td><td>Approx. 400 with tolerance as applicable</td><td>NA</td><td>NA</td></tr></table></td></tr>
</table>

16.	**New Para under Clause no 26.**	Requirement for Mandatory spares for GIS a. Any equipment which is not supplied as main equipment or part of main equipment, mandatory spare for that is not applicable. b. It is recognized that the GIS manufacturer may have standardized the GIS design/equipment rating based on the manufacturer's standard practice. Alternate proposals, offering higher rating equipment (without additional cost implication), will also be considered provided such equipment meets the specified minimum designs rating, standard and performance requirements. c. In case contractor offers circuit breaker, dis-connector, current transformer, SF6/Air Bushing etc. under main equipment of higher rating than equipment rating specified in the specifications, the mandatory spare of same higher rating offered by contractor identical to main equipment offered in the package shall be required to be supplied against spares without any cost implication to POWERGRID.
17.	Annexure-10 Rev-1	Annexure-10 Rev-1 (Standard Mandatory Spares for Gas Insulated Switchgear) of stands deleted.
18.	New Annexure-13	Standard GIS Module Description **(Attached at Annexure-S11)**
C.	**Section Switchgear – CB Rev 11**	
1.	**Clause no. 2.6 Para 2**	The CSD shall be provided in following circuit breakers: d) 765kV • Main and Tie bay for Auto Transformer • Main and Tie bay of Bus Reactor • Switchable Line Reactor bay e) 400kV • Main and Tie bay for 765/400kV Auto Transformer • Main and Tie bay of Bus Reactor • Switchable Line Reactor bay f) 220 & 132kV • Bay for operation of Shunt reactor The requirement of CSD shall be explicitly specified in price schedule.
2.	**New Clause no. 2.6.1(n)**	For Circuit breaker with CSD controlling a Transformer following is applicable "The limit for inrush current for switching of Transformer by CSD shall be 1.0 p.u. of rated current of transformer after fine tuning of CSD settings during pre-commissioning checks. For site acceptance of CSD, during online CSD test after fine tuning inrush current should be less than 1.0 P.U. of rated current in five consecutive operations".
3.	**Clause No. 11.4**	Separate cables shall be used for AC, DC-I, DC-II and selected DC. **Each control cable shall include minimum 10% spare cores (subject to minimum 1 no. of spare core).**
4.	**Clause No. 11.5**	Requirement of Plug-In type connector for Inter-pole cabling is deleted
5.	**Clause No. 11.6**	Vertical run of cables to the operating mechanism box shall be properly supported by providing the perforated closed type galvanized cable tray (Cable tray also to be supplied along with the Circuit Breaker) to be fixed as an integral part of the structures. The load of the cable shall not be transferred to the mechanism box/terminal arrangement in any circumstances. Hanging or loose run of cable is not permitted. The drawing of cable tray including fixing arrangement shall be incorporated in the GA drawing of CB also.

<table>
<tr><td>6.</td><td>Clause No. 16.0
S.No. 20 (i)</td><td>
<table>
<tr><th>Parameter</th><th>765kV system</th><th>400kV system</th><th>220kV system</th><th>132 kV system</th><th>66kV System</th></tr>
<tr><td>Pre-insertion resistor requirement</td><td>As per BPS</td><td>As per BPS</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td>Rating (ohms)</td><td>Approx. 450 with tolerance as applicable</td><td>Approx. 400 with tolerance as applicable</td><td>NA</td><td>NA</td><td>NA</td></tr>
</table>
</td></tr>
<tr><td>D.</td><td colspan="2">Section Switchgear-INST Rev 11</td></tr>
<tr><td>1.</td><td>Clause No. 6.2 (a)(iii)</td><td>Seismic withstand test as per Annexure-B of Section-GTR or IEC62271-2 (with Seismic acceleration requirement as per Annexure-I of this specification/Section-Project) for 400kV and above voltage rating.</td></tr>
<tr><td>2.</td><td>Clause No. 6.2 (b)(iii) & (c)(iii)</td><td>Seismic withstand test (as per Annexure-B of Section-GTR) or IEC-62271-2 (with Seismic acceleration requirement as per Annexure-II of this specification/Section-Project) for 400kV and above voltage class.</td></tr>
<tr><td>3.</td><td>Clause No. 9.2
Para 3 & 4</td><td>CTs must have adequate provision for taking oil samples from the bottom of the CT without exposure to atmosphere. Manufacturer shall recommend the frequency at which oil samples should be taken and norms for various gases in oil after being in operation for different durations. Manufacturer should also indicate the total quantity of oil which can be withdrawn from CT for gas analysis before refilling or further treatment of CT becomes necessary.

Manufacturer/Contractor shall supply 2 nos. of oil sampling device for every 20 nos. of oil filled CT supplied with a minimum of 2 nos. of oil sampling device for each substation. The price of the above sampling bottles is deemed to be included in cost of equipment.</td></tr>
<tr><td>4.</td><td>Clause No. 9.3</td><td>Voltage Transformers

a) Insulation Resistance test for primary (if applicable) and secondary winding
b) Polarity test
c) Ratio test
d) Dielectric test of oil (wherever applicable)
e) Tan delta and capacitance measurement of individual capacitor stacks
f) Secondary winding resistance measurement
g) DGA of oil (for IVT/PT)

Dissolved Gas Analysis (DGA) shall be carried out twice within the first year of service, first within the first month of commissioning/charging and second between six months to one year from the date of commissioning/charging.

IVTs/PTs must have adequate provision for taking oil samples from the bottom of the IVT/PT without exposure to atmosphere. Manufacturer shall recommend the frequency at which oil samples should be taken and norms for various gases in oil after being in operation for different durations. Manufacturer should also indicate the total quantity of oil which can be withdrawn from IVT/PT for gas analysis before refilling or further treatment of IVT becomes necessary.
Manufacturer/Contractor shall supply 2 nos. of oil sampling device for every 20 nos. of oil filled IVT/PT supplied with a minimum of 2 nos. of oil sampling device for each substation. The price of the above sampling bottles is deemed to be included in cost of equipment.</td></tr>
<tr><td>5.</td><td></td><td>Defect Liability</td></tr>
</table>

<table>
<tr><td></td><td>Clause No. 10.0</td><td>The actions required to be taken by contractor in case of defects observed in CT/CVT/IVT/PT of ratings 145kV & above during the warranty period (defect liability period) shall be as per enclosed <u>Annexure-V (Revised)</u>of this specification. Further, the replaced/repaired/refurbished equipment (or part of equipment) shall have Two (2) years warranty without prejudice to contractual warranty period (defect liability period).</td></tr>
<tr><td>6.</td><td>New Table - II.C.1</td><td>
<table>
<tr><td colspan="9">REQUIREMENTS FOR 245 KV 2500A, 120% CURRENT TRANSFORMER</td></tr>
<tr><td>Nos of core</td><td>Core no.</td><td>Application</td><td>Current ratio</td><td>Output Burden</td><td>Accuracy Class</td><td>Min. knee pt. voltage (Vk)</td><td>Max CT Sec. Wdg-resistance (ohms)</td><td>Max Excitation Current at Vk (in mA)</td></tr>
<tr><td>5</td><td>1</td><td>BUS DIFF CHECK</td><td>2500-1600-800/1</td><td>-</td><td>PX</td><td>2500-1600-800 V</td><td>12.5/8/4</td><td>16 on 2500/1 tap; 25 1600/1 Tap; 50 on 800/1 Tap</td></tr>
<tr><td></td><td>2</td><td>BUS DIFF CHECK</td><td>2500-1600-800/1</td><td>-</td><td>PX</td><td>2500-1600-800 V</td><td>12.5/8/4</td><td>16 on 2500/1 tap; 25 1600/1 Tap; 50 on 800/1 Tap</td></tr>
<tr><td></td><td>3</td><td>METERING</td><td>2500-1600-800/1</td><td>20VA</td><td>0.2S</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>4</td><td>TRANS BACKUP/LINE PROTN</td><td>2500-1600-800/1</td><td>-</td><td>PX</td><td>2500-1600-800 V</td><td>12.5/8/4</td><td>16 on 2500/1 tap; 25 1600/1 Tap; 50 on 800/1 Tap</td></tr>
<tr><td></td><td>5</td><td>TRANS DIFF/LINE PROTN</td><td>2500-1600-800/1</td><td>-</td><td>PX</td><td>2500-1600-800 V</td><td>12.5/8/4</td><td>16 on 2500/1 tap; 25 1600/1 Tap; 50 on 800/1 Tap</td></tr>
</table>
Note:
1. Protection cores shall be of accuracy class PX as per IEC 61869.
2. Metering Core shall be of accuracy class 0.2S as per IEC: 61869
</td></tr>
<tr><td>7.</td><td>New Table -II G</td><td>
<table>
<tr><td colspan="9">REQUIREMENT FOR 36kV NCT 3000A (120% extended) (Outdoor type) for bank of 765kV, 1-Ph Transformer
Location: Common Neutral Side (for each three-phase bank)</td></tr>
<tr><td>Nos of core</td><td>Core no.</td><td>Application</td><td>Current ratio</td><td>Output Burden</td><td>Accuracy Class</td><td>Min. knee pt. voltage (Vk)</td><td>Max CT Sec. Wdg-resistance (ohms)</td><td>Max Excitation Current at Vk (in mA)</td></tr>
<tr><td>1</td><td>1</td><td>REF (Hig</td><td>3000/1</td><td>-</td><td>PX</td><td>3000 V</td><td>12</td><td>20 on 3000/1tap</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td>h Impedance)</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Note:
1. Protection cores shall be of accuracy class PX as per IEC 61869.
</td></tr>
<tr><td>8.</td><td>New Table -III H</td><td>
<table>
<tr><td colspan="9">REQUIREMENT FOR 36kV NCT 300A (200% extended) (Outdoor type) for bank of 765kV, 1-Ph Reactor
Location: Common Neutral Side (for each three-phase bank</td></tr>
<tr><td>Nos of core</td><td>Core no.</td><td>Application</td><td>Current ratio</td><td>Output Burden</td><td>Accuracy Class</td><td>Min. knee pt. voltage (Vk)</td><td>Max CT Sec. Wdg-resistance (ohms)</td><td>Max Excitation Current at Vk/4 (in mA)</td></tr>
<tr><td>1</td><td>1</td><td>Earth fault protection</td><td>300/1</td><td>-</td><td>PX</td><td>300 V</td><td>1</td><td>40 on 300/1tap</td></tr>
</table>
Note:
1. Protection cores shall be of accuracy class PX as per IEC 61869.
</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>E.</td><td colspan="2">Section Switchgear-ISOLATOR Rev 12</td></tr>
<tr><td>1.</td><td>New Clause No. 2.0. f)</td><td>The values of transfer current and recovery voltage of 220kV class bus isolators shall be specified by manufacturer & Bus Isolators shall be type tested for bus transfer current switching duty as per latest IEC62271-102. Test reports is to be submitted for the Employer’s review.”</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>F.</td><td colspan="2">Section Switchgear-Surge Arrester Rev 12</td></tr>
<tr><td>1.</td><td>New Clause No. 4.5</td><td>The Surge Arresters shall be provided with a common Junction box suitably for a set of three (3) Surge Arresters of each bay for extending the contact information of surge counter to SAS</td></tr>
<tr><td>G.</td><td colspan="2">Section: Lighting System Rev 07</td></tr>
<tr><td>1.</td><td>New Para under Clause No. 2.1</td><td>Wherever, Indoor Illumination of building is specified as LS/Lot/SET item in BPS, illumination shall be provided using fixture types as specified in Annexure-I of Section: Lighting System. However, contractor shall submit lighting design calculation for deciding the number of fixtures in each building/room. Following Average lux (at working plane of height 1.2Mtrs from floor level) levels to be maintained for design of illumination system:
<table>
<tr><td>Sl. No.</td><td>Building/Room Type</td><td>Average Lux Level to be maintained</td></tr>
<tr><td>1</td><td>Control Room /Station-In charge Room /Administrative Room/Conference Room / Switchyard Panel Room/ GIS Relay Panel Room</td><td>300 Lux</td></tr>
<tr><td>2</td><td>Electronic Test Lab</td><td>250 Lux</td></tr>
<tr><td>3</td><td>GIS Hall/ Battery Room/ACDC & DCDB Room</td><td>200 Lux</td></tr>
</table>
</td></tr>
</table>

		<table><tr><td>4</td><td>AHU Room/GIS Store Room/ Pantry /Reception/ FFPH Building</td><td>150 Lux</td></tr><tr><td>5</td><td>Corridor/ Toilets</td><td>100 Lux</td></tr><tr><td>6</td><td>Periphery of the Building</td><td>50 Lux</td></tr><tr><td>7</td><td>Any other room/building</td><td>200 Lux</td></tr></table> The minimum lux level to average lux level ratio should not be less than 0.6 (i.e Emin/Eav> 0.6). The maintenance factor for indoor illumination design shall be considered as 0.8. All required items /equipment /fixtures/ panels/ receptacles/ switches/ switchboards/ fans etc. for Illumination of Control Room Building, GIS Building, FFPH, SPR, Security Hut etc. (as applicable) are deemed to be included under corresponding LS/Lot/SET item of BPS.
2.	**Clause no. 6.2.1(ii)**	All Outdoor Lighting Panels shall be Stainless sheet steel of Grade 304 and shall be dust, weather and vermin proof. Panels shall be of thickness not less than 1.5 mm smoothly finished, leveled and free from flaws. Stiffeners shall be provided wherever necessary. **Alternatively, outdoor lighting panels of Aluminum shall also be acceptable as per provisions stipulated in Section GTR.**
3.	**Clause no. 6.6(i) (b)**	The outdoor junction boxes shall be complete with conduit knockouts/threaded nuts and provided with terminal strips. The junction boxes shall be suitable for termination of Cable glands of required size. The junction boxes shall be provided with 4 way knockouts suitable for street lighting/switchyard lighting terminals suitable for 2 numbers 4C x 16 Sq.mm Al. cable or as per requirement. All Outdoor Junction boxes shall be of Stainless Steel of thickness 1.5mm of grade 304. Outdoor Junction Boxes shall be suitable for mounting on columns, structures etc. for Outdoor Lighting. The outdoor Junction shall have IP 55 protection. **Alternatively, outdoor junction boxes of Aluminum shall also be acceptable as per provisions stipulated in Section GTR.**
4.	**New para under Clause no 5.1**	**EXTERNAL ELECTRIFICATION WORKS** Para-1 Para-2 Para-3 Townships DB's shall be fabricated using suitable mild steel structural sections or pressed and shaped cold-rolled sheet steel of thickness not less than 2.0 mm. Frames shall be enclosed in cold-rolled sheet steel of thickness not less than 1.6 mm. Doors and covers shall also be of cold rolled sheet steel of thickness not less than 1.6 mm. Stiffeners shall be provided wherever necessary. Gland plate shall be cold rolled sheet steel having thickness not less than 3 mm in all cases. However, in case of termination of single core power cables, gland plate shall be of non-magnetic material of at least 4mm thickness. Township DB shall be provided with a degree of protection of IP: 55.
H.	**Section: LT Switchgear Rev 05**	
1.	**Clause no. 1.21.2**	Contractor shall submit type test reports for the Lighting transformers as per IS:2026 for which test conducted once are acceptable (i.e. The requirement of test conducted within last ten years shall not be applicable)
2.	**Clause no. 1.6.1**	MCCB shall in general conform to IS: 13947 Part-2. All MCCB offered shall have Ics = 100% Icu rating.
I.	**Section DG Set Rev 05**	

<table>
<tr><td>1.</td><td>New para added under Clause no. 7.1(a)</td><td>Alternatively, AMF Panel for DG Set may be installed outside the acoustic enclosure near the DG Set. In such cases, AMF panel with or without additional enclosure shall meet IP-55 degree of protection.</td></tr>
<tr><td>J.</td><td colspan="2">Section: Battery and Battery Charger Rev 06</td></tr>
<tr><td>1.</td><td>Clause no. 1.2.12</td><td>The battery shall be capable of giving 1200 or more charge/discharge cycles at 80% Depth of discharge (DOD) at an average temperature of 27º Celsius.
DOD (Depth of Discharge) is defined as the ratio of the quantity of electricity (in Ampere-hour) removed from a cell or battery on discharge to its rated capacity.</td></tr>
<tr><td>2.</td><td>Clause no 1.1.4 table -2 (48V)</td><td>Bidder shall select number of cells, float and Boost voltage to achieve following system requirement:-
…….
…….
<table>
<tr><td rowspan="4">220V DC system</td><td>Load</td><td>Duration</td><td>Type Of Loads</td></tr>
<tr><td>…..</td><td>…..</td><td>……</td></tr>
<tr><td>…..</td><td>……</td><td>……</td></tr>
<tr><td>…….</td><td>…….</td><td>……</td></tr>
<tr><td rowspan="2">48V DC System</td><td>Continuous Load</td><td>10 hours Continuous</td><td>load associated with PLCs.(when speech is not working)</td></tr>
<tr><td>Momentary Load</td><td>15 minute</td><td>Loads associated with PLCs (when speech is working)</td></tr>
</table>
</td></tr>
<tr><td>K.</td><td colspan="2">Section Fire Protection Rev 06</td></tr>
<tr><td>1.</td><td>New para added at Clause no.2.03.00</td><td>Fire detection and alarm system shall also be provided in the GIS Hall using beam type smoke detectors to be installed at suitable mounting height, and in the Relay Panel room with ionization/optical type smoke detectors to be installed on the ceiling.</td></tr>
<tr><td>2.</td><td>New Clause no.2.01.02</td><td>Hydrant posts and Fire extinguishers (CO2 and DCP type) shall also be provided for GIS Building also.</td></tr>
<tr><td>3.</td><td>Clause No. 2.04.02 & 10.00.00</td><td>Mechanical foam type fire extinguishers wherever specified as 50 litre capacity, conforming to IS:13386, shall be read as 60 litre capacity conforming to IS 16018

Further in case of non-availability of any type of fire extinguisher (i.e. water, CO2, DPC, foam type) of a particular size as specified in BPS or technical specification, next available higher size conforming to IS shall be supplied.</td></tr>
<tr><td>4.</td><td>New Clause No. 2.06.05</td><td>For new substation, Fire Fighting LT Boards (AC & DC) and Annunciation panels (for FFPH & Control Room Building), shall have number of feeders, annunciation windows, zone-alarm modules (as applicable) required for entire present & specified future scope of the substation.</td></tr>
<tr><td>5.</td><td>Clause No.9.01.00(c) & Appendix-V</td><td>Deleted</td></tr>
<tr><td>6.</td><td>Appendix-I</td><td>Appendix-I (Rev 4) stand replaced by following <u>Appendix-I (Rev 5)</u></td></tr>
<tr><td>7.</td><td>Appendix-IV</td><td>Revised Appendix-IV Page1 of 13 is replaced by <u>Annexure-IV rev 01</u> Page1 of 13.</td></tr>
<tr><td>L.</td><td colspan="2">Section: Power & Control Cable Rev 06</td></tr>
<tr><td>1.</td><td>Clause no 1.1.4</td><td>Refer <u>Annexure-S1</u> for METHODOLOGY FOR SUPPLY, INSTALLATION & SIZING OF CABLES</td></tr>
<tr><td>2.</td><td>Clause no 1.2.2</td><td>1.2.2. XLPE Power Cables

1.2.2.1. The XLPE (90°C) insulated cables shall be of FRLSH type, C2 category conforming to IS: 7098 (Part-I) and its amendments read alongwith this specification. The conductor shall be stranded aluminium</td></tr>
</table>

		circular/sector shaped and compacted. In multicore cables, the core shall be identified by red, yellow, blue and black coloured strips or colouring of insulation. A distinct inner sheath shall be provided in all multicore cables. For XLPE cables, the inner sheath shall be of extruded PVC of type ST-2 of IS:5831. All cables shall be of armoured type. For single core cables, the armouring shall consist of aluminium wires/strips. The outer sheath shall be extruded PVC of Type ST-2 of IS:5831 for all XLPE cables
3.	**Clause no 1.2.3**	1.2.3. PVC Power Cables 1.2.3.1. The PVC (70°C) insulated power cables shall be of FRLSH type, C2 category, conforming to IS: 1554 (Part-I) and its amendments read alongwith this specification and shall be suitable for a steady conductor temperature of 70°C. The conductor shall be stranded aluminium. The Insulation shall be extruded PVC to type-A of IS: 5831. A distinct inner sheath shall be provided in all multicore cables. All cables shall be of armoured type. For multicore armoured cables, the inner sheath shall be of extruded PVC. The outer sheath shall be extruded PVC to Type ST-1 of IS: 5831 for all cables.
4.	**Clause no 1.2.4**	1.2.4. PVC Control Cables 1.2.4.1. The PVC (70°C) insulated control cables shall be of FRLSH type C2 category conforming to IS: 1554 (Part-1) and its amendments, read alongwith this specification. The conductor shall be stranded copper. The insulation shall be extruded PVC to type A of IS: 5831. A distinct inner sheath shall be provided in all cables. All cables shall be of armoured type. The over sheath shall be extruded PVC to type ST-1 of IS: 5831 and shall be grey in colour.
5.	**Clause No. 4.2**	Standard lengths for each size of power and control cables shall be 500/1000 meters. However, to avoid cable wastage and cable jointing at site, non-standard lengths of each size of Power & Control cable may also be acceptable subject to maximum length of 1000meters (+ 5% tolerance)
6.	**Clause No. 5**	5 TYPE TESTS 5.1 All cables shall conform to all type, routine and acceptance tests listed in the relevant IS. 5.2 XLPE INSULATED POWER CABLES (For working voltages up to and including 1100V):- 5.2.1 Following type tests (on one size in a contract) as per IS: 7098 (Part 1) – 1988 including its amendments shall be carried out as a part of acceptance tests on XLPE insulated power cables for working voltages up to and including 1100 V: a) Physical tests for insulation i) Hot set test ii) Shrinkage test b) Physical tests for outer sheath i) Shrinkage test ii) Hot deformation iii) Heat shock test iv) Thermal stability c) Test for Smoke density (as per relevant IS/IEC standard) d) Test for halogen acid gas evolution. e) Flame Retardant on Single cable. f) Flame Retardant on bunched cable. 5.2.2 Contractor shall submit type test reports as per clause no. 9.2 of Technical Specification, Section: GTR for the following tests

		a) Water absorption (gravimetric) test. b) Ageing in air oven c) Loss of mass in air oven d) Short time current test on power cables of sizes 240 sqmm and above on i) Conductors. ii) Armours. e) Test for armouring wires/strips. f) Oxygen and Temperature Index test. g) Flammability test. h) Smoke density test (on sheathing material) (as per relevant IS/IEC standard)
7.		5.3 PVC INSULATED POWER & CONTROL CABLES (For working voltages up to and including 1100V)- 5.3.1 Following type tests (on one size in a contract) as per IS: 1554 (Part 1) -1988 including its amendments shall be carried out as a part of acceptance tests on PVC insulated power & control cables for working voltages up to and including 1100 V: a) Physical tests for insulation and outer sheath i) Shrinkage test ii) Hot deformation iii) Heat shock test iv) Thermal stability b) High voltage test (water immersion test only a.c. test as per clause no. 16.3.1). c) Test for Smoke density (as per relevant IS/IEC standard) d) Test for halogen acid gas evolution. e) Flame Retardant on Single cable 5.3.2 Contractor shall submit type test reports as per clause no. 9.2 of Technical Specification, Section: GTR for the following a) High voltage test (water immersion d.c. test as per clause no. 16.3.2 of IS: 1554 (Part 1) - 1988). b) Ageing in air oven. c) Loss of mass in air oven. d) Short time current test on power cables of sizes 240 sqmm and above on i) Conductors. ii) Armours. e) Test for armouring wires/strips. f) Oxygen and Temperature Index test. g) Flammability test h) Flame Retardant on bunched cable i) Test for Specific optical density of smoke (as per relevant IS/IEC standard)
8.		Note:- In technical data sheet for 1.1kV XLPE/PVC Power cable & PVC control cable, wherever Type & Category of Cable is written FR & C1 shall be read as FR-LSH & C2, other details kept the same.
M.	**Section-Air Conditioning Rev-04**	
1.	**Clause No. 2.3.2.3**	Cooling capacity of 3TR AC units shall not be less than 36000btu/hr. and shall have minimum energy efficiency rating of 4 star as on the date of NOA.
2.	**Clause No. 2.3.3.4**	Cooling capacity of 2TR AC units shall not be less than 22000btu/hr. and shall have minimum energy efficiency rating of 4 star as on the date of NOA.
3.	Clause no. 2.4	Clause no. 2.4 of Section-Air Conditioning Rev-04 of Technical Specification Void

<table>
<tr><td>4.</td><td>New Annexure-S2</td><td><u>Annexure S2</u> – Air Conditioning & Ventilation System for GIS Building</td></tr>
<tr><td>N.</td><td colspan="2">Section Switchyard Erection Rev 10</td></tr>
<tr><td>1.</td><td>New Clause No. 2.5</td><td>Transmission line side insulator string along with hardware for line termination shall be in the scope of substation contractor. The erection of same shall be done by associated TL contactor.</td></tr>
<tr><td>2.</td><td>Clause No. 9.4(j) & (k)</td><td>
<table>
<tr><th>S.No</th><th>Item</th><th>Size</th><th>Material</th></tr>
<tr><td>j)</td><td>Isolator MOM Box</td><td>50X6 mm GS flat & Flexible copper braid</td><td>Galvanised steel and copper braid</td></tr>
<tr><td>k)</td><td>Insulator Guy Arrangemen</td><td>75x12mm G.S. flat</td><td>Galvanised Steel</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>New Clause No. 9.5.8</td><td>For estimation of riser of new substation/switchyard, maximum spacing of Main Earthmat shall be considered as 30 M x 30 M, 24 M x 24 M, 16 M x 16 M & 12 M x 12 M for 765kV, 400kV, 220kV & 132kV switchyard respectively.

Actual spacing for main earthmat shall be finalized during detailed engineering based on soil resistivity data and payment shall be made as per actual executed quantity at site. However, no cost compensation shall be considered in case of actual spacing of main earthmat finalized during detailed engineering is less than that mentioned above.

For switchyard extensions, main earthmat spacing shall be considered same as that in the existing switchyard.</td></tr>
<tr><td>4.</td><td>Clause no 9.10.3</td><td>Auxiliary earthing mat comprising of minimum 32mm dia M.S. rods closely spaced (300 mm x 300 mm) conductors shall be provided at depth of 300mm from ground level below the operating handles of the M.O.M. Box of the isolators. M.O.M. boxes shall be directly connected to the auxiliary earthing mat. Flexible copper braid connection to be provided between MOM box and GI flat to take care of soil sagging. The size of auxiliary earthing mat shall be of 1500mmx1500mm size for 220kV and above voltage class isolators and 900mmx900mm size for 132kV and below voltage class isolators. Factory welded auxiliary earthmat is preferable.</td></tr>
<tr><td>5.</td><td>New Clause No. 10.2</td><td>Following type of conductor for Flexible or Rigid Bus bars/Switchyard Equipment Jumpers/Interconnections shall be provided subject to suitability of conductor as per specified/applicable current ratings:

<table>
<tr><th>Voltage Level</th><th>Conductor / Al .Tube Type</th></tr>
<tr><td>Voltage Level: 765kV</td><td>AAC Bull / 4.5’’ IPS Al. Tube</td></tr>
<tr><td>Voltage Level: 400kV</td><td>ACSR Bersimis / 4.5’’ IPS Al. Tube</td></tr>
<tr><td>Voltage Level: 220kV</td><td>ACSR Moose / 4.0’’ IPS Al. Tube</td></tr>
<tr><td>Voltage Level: 132kV</td><td>ACSR Moose / 3.0’’ IPS Al. Tube</td></tr>
</table>

For substation extension works, suitable clamps & connectors for interconnection with existing buses as per drawings shall be provided by the contractor under present scope.

Conductor type with higher current rating than that specified above shall also be acceptable without any additional price implication.
Note: For existing substation, existing conductor configuration may preferably be adopted in extn. S/s package.</td></tr>
</table>

6.	**New Clause no. 20.1**	**<u>Neutral formation for Transformer(s), DELTA formation and making connection arrangement to connect spare unit in place of any unit of the bank without physical shifting and Earthing Arrangement :</u>** For Spare Unit connection to form 3-ph bank of 765kV Class Transformers with isolator based switching arrangement without physical shifting of spare unit along with necessary Neutral Formation, Earthing Arrangement & Tertiary (DELTA) formation for 3-ph bank formation with 1-ph units shall be under present scope as per the details mentioned below: **i. <u>Neutral Formation including Neutral auxiliary bus and Earthing Arrangement</u>** The contractor shall connect the neutrals of three (3) 1-phase transformers by overhead connection using 3" IPS Al tube. The neutral formation shall be such that neutral winding of single-phase spare transformer can be disconnected or connected to the three phase banks. The connection from the neutral bushing to neutral bus shall be through 3" IPS Al tube and wherever flexible jumper needs to be provided, same shall be through twin conductor. All material like Bus post insulator, Aluminium tube, conductor, clamps & connectors, earthing materials, support structure, **foundation bolts,** hardware etc. required for neutral formation and connection with neutral CT and earthing of neutral shall be provided by contractor. **ii. <u>Tertiary Delta Formation including Tertiary auxiliary bus(Insulation level 52 kV) .</u>** The contractor shall connect 33kV tertiary of single-phase auto-transformers in DELTA configuration by overhead connection to operate in 3-Ph Bank. The Delta shall be formed by 3" IPS Al tube, which shall be insulated with heat shrinkage insulating sleeve of at least 52kV class and shall be supported by structure mounted bus post insulators at suitable intervals. Jumpers (twin conductors) wherever provided shall also be insulated using suitable insulation tape or sleeve at least 52kV class at site. The minimum phase to phase horizontal spacing for delta formation shall be 1.5meter. All associated materials like bus post insulators, Aluminium tube, conductor, clamps & connectors, support structures, **foundation bolts,** hardware, earthing materials etc. required for tertiary delta formation shall be provided by the contractor. **iii. <u>HV & IV Auxiliary Buses (Applicable for AIS Substation)</u>** Formation of HV & IV auxiliary buses for connection of transformer 3-Phase bank with 1-Phase Spare transformer unit is under the present scope of the bidder. All associated materials like Bus post insulators, Aluminium tube, conductors, clamps & connectors, insulator strings, hardware, earthing materials, support structures, **foundation bolts,** required for the above-mentioned arrangement shall be provided by the contractor.
7.	**New Clause no. 20.2**	**<u>Neutral formation for Reactor banks, connection to neutral grounding reactor through 132kV Surge arrester, connection to ground through neutral CTs and connection arrangement to connect spare reactor unit in place of any other units of the bank without physical shifting and Earthing Arrangement :</u>** For Spare Unit connection to 3-ph bank of 765kV Class Reactors with isolator based switching arrangement without physical shifting of spare unit along with necessary Neutral Formation, Earthing Arrangement for 3-ph bank formation with 1-ph units shall be under present scope as per the details mentioned below:

		i. <u>Neutral Formation including Neutral auxiliary bus and Earthing Arrangement</u> The contractor shall connect the neutrals of three (3) 1-phase reactors by overhead connection using 3" IPS Al tube. The neutral formation shall be such that neutral winding of single-phase spare reactor can be disconnected or connected to the three phase banks. Neutral Connections of spare unit shall be extended upto the other unit(s) by forming Neutral auxiliary bus. The connection from the neutral bushing to neutral bus shall be through 3" IPS Al tube and wherever flexible jumper needs to be provided, same shall be through twin conductor. All material like Bus post insulator, Aluminum tube, conductor, clamps & connectors, earthing materials, support structure, **foundation bolts,** hardware etc. required for neutral formation and connection with neutral CT and earthing of neutral shall be provided by contractor. Required Insulation level is 145 kV from individual reactor neutral to point of neutral formation. However after neutral formation, the insulation level is 36kV. Connection of each Line reactor bank formed under present scope to Neutral grounding reactor through 132kV Surge Arrester including NGR by passing arrangement is also under present scope. **ii.<u>HV Auxiliary Bus (Applicable for AIS Substation)</u>** Formation of HV auxiliary bus for connection of reactor 3-Phase bank with 1-Phase Spare reactor unit is under the present scope of the bidder. All associated materials like Bus post insulators, Aluminium tube, conductors, clamps & connectors, insulator strings, hardware, earthing materials, support structures, **foundation bolts,** required for the above-mentioned arrangement shall be provided by the contractor.
8.	**New Clause no. 20.3**	Supply & Laying of Power, Control Cables & Special Cables (if any) (including all cabling works for spare unit of transformer/reactor) along with accessories for power supply, alarm, trip, control & indication, status and monitoring signals & contacts made available at MB/CMB of Transformers/Reactors upto Control & Relay Panels and BCUs located in the Switchyard Panel Room/Control Room and successful integration of same with Station Control, Protection & SAS System is in the scope of the contractor.
9.	**New Clause no. 20.4**	3½Cx300 Sq. mm XLPE power cable for oil filtration units of reactors & transformers shall be provided. The cable shall be terminated at 250A receptacle near Reactor & Transformer in the switchyard. XLPE Power cables shall be looped in & out for 250A Power receptacles.
10.	**New Clause no. 20.5**	Neutral of spare transformer/reactor is to be connected to station grounding system through a jumper/copper flat. This shall be applicable for single phase transformer/reactor wherever spare unit have been provided.
11.	**New Clause no. 20.6**	Tertiary connections made for tertiary loading of LT Transformer shall be insulated using suitable insulation tape or sleeve of at least 52kV class at site
12.	**New Clause no. 20.7**	The earthing risers from terminal of Neutral Current Transformer (NCT) of bank of 1-Phase Transformer/Reactor (as applicable) shall be brought down for connection with pipe electrodes by providing suitable insulators mounted on NCT support structure (minimum 2 nos. per support). Necessary provisions on NCT support structure for mounting of insulator shall be provided. These

		insulators shall deemed to be included in corresponding Erection Hardware item for Transformer/Reactor bay (as applicable) of BPS
13.	**New Clause No. 21**	Connection arrangement of 765kV equipment's shall be done as per the conceptual drawing (Drawing No. C/ENGG/SS/CONCEPTUAL 765KV BAY CONNECTIONS, Rev-01) enclosed as **Annexure-S3** of this Section.
14.	**New Clause No. 22**	For connection to HV bushing of LT Transformer, insulated copper rod/strip of at least 75 sq.mm cross sectional area shall be used.
15.	New annexure	Refer **Annexure-S4** for SHORT CIRCUIT FORCES & SPACER SPAN FOR 765kV & 400kV GANTRY STRUCTURE
O.	**Section: Structure Rev 06**	
1.	**New Clause No. 3.2.4 Added**	POWERGRID will issue the fabrication drawings of the standard structures to the successful bidder. The contractor shall do the proto assembly of the structures as per the issued fabricated drawings. Employer may opt to witness such proto assembly. The bidder shall follow the fabrication drawing for preparing the proto assembly and do the minor adjustments, if necessary, without affecting the strength of the structure. In case of equipment support structure, the attachment of stool and fixing of MOM box etc. shall be taken care by the contractor as per the requirement of the equipment. The proto to be witnessed and Proto corrected drawings along with BOM shall be certified by the contractor. Certified drawings and BOM shall be submitted to POWERGRID for information only. The arrangement shall however not absolve the contractor from the responsibility of supply and erection of safe sound and durable structure.
2.	**New Clause no. 3.4**	Nuts, Bolts and washers for all non-standard structures shall be payable as per BPS.
P.	**Section Civil Works Rev 11A**	
1.	**New Clause No. 21.0**	The dewatering pump shall be Portable, Self Priming, Non clog, horizontal type monobloc pump. The Pump shall be driven by electric motor suitable for outdoor application with IP-55 degree of protection. Following are the major technical parameters for the pumps to be supplied as per BPS: (A) Pump Rating : 2 HP Flow Rate : 200-400 LPM Minimum Total Head : 12 Mtrs Voltage Range : 415 ± 10% Volts (Three Phase) (B) Pump Rating : 5 HP Flow Rate : 1000-1400 LPM Minimum Total Head : 10 Mtrs Voltage Range : 415 ± 10% Volts (Three Phase)
2.	**Clause 10.5.3 of Section-Civil works Rev 11A & Clause 2.8 (b) of Section-Structures Rev 06**	**Factor of safety for design of tower and equipment structures and foundations:** a. Factor of safety for design of tower, equipment structures shall be 1.5 under normal condition and 1.2 under short-circuit condition. b. Factor of safety for design of tower, equipment foundation shall be 1.5 in both normal and short circuit condition as per IS 456. c. Factor of safety for stability of tower, equipment foundation like overturning shall be 2 (without wind or seismic), 1.5 (with wind or seismic) for normal and short circuit condition as per IS 1904.
3.	**New Clause No. 22.0**	**Slope Protection Works & Retaining Walls:** Design & Drawings pertaining to slope protection works & retaining walls (if required) shall be developed by the contractor during detailed engineering for

		Employer's approval. The work shall be measured under respective line items of BPS.
4.	New Clause of Copy right in Civil Rev 11A & Structure Rev 06	a. The copyright in all drawings, documents and other materials containing data and information for such design(s) to be developed by the Contractor or through any third party under this Contract shall remain vested in the Employer for a period of 5 years from the date of Completion of the Contract. In case the Contractor intends to use these design(s) for any purpose other than for project(s) to be executed by POWERGRID prior to the period of 5 years as above, the Contractor shall obtain a written permission from POWERGRID to this effect. The permission shall be granted or otherwise by POWERGRID keeping in view the specifics of the case and POWERGRID shall be sole judge in this regard. In case any breach of the aforesaid provisions of copyright during the copyright retention period comes to the notice, POWERGRID shall take the action as deemed fit keeping inter-alia under the provisions of the Integrity Pact. b. The Contractor may also use previous structure designs and associated foundation designs meeting specification requirements, which have been designed by them for any other project of POWERGRID, having copyright retained thereof with POWERGRID, without any financial implication and without any written permission from POWERGRID as per para (a) above. c. In case the Contractor uses previously designed structure and associated foundation designs meeting specification requirements, developed by the Contractor for any other utility/developer, POWERGRID shall be free to use designs and reproduce all drawings, documents and other material for the purpose of the Contract including, if required, in its any other project and for operation and maintenance, without any financial implication. The contractor shall ensure to submit only those documents for which they hold copyright. d. Also, all the drawings indicated at (a) & (b) above shall carry the following statement and shall be displayed conspicuously on the drawing: "WARNING: THIS IS PROPRIETORY ITEM AND DESIGN RIGHT IS STRICTLY RESERVED WITH POWERGRID UNDER NO CIRCUMSTANCES THIS DRAWING SHALL BE USED BY ANYBODY WITHOUT PRIOR PERMISSION FROM POWERGRID IN WRITING"
Q.	**Section CRP Rev 09**	
1.	**New Para added under Clause No.5.1**	Requirement of Shrouding shall not be applicable to TB's where live parts are concealed.
2.	**New para added under Clause no.18.8**	Line Differential relays used as both Main –I & Main-II protection of a line, shall be of either different make & model or shall be on different hardware platform.
3.	**New para added under**	Directional Earth Fault Relay/Function provided shall have Carrier Aided scheme feature which shall be suitable for single phase auto re-closure schemes