

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

TECHNICAL SPECIFICATION

for:

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandasaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandasaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandasaur PS.

SECTION- PROJECT

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1. GENERAL

1.1 Preamble:

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 the mission 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 highest standards in health, safety, security and environment.”

1.2 POWERGRID is implementing following Transmission systems under RTM.

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS

- i) 400 kV line bay – 1 No.
- ii) 220kV line bay- 1 No.

1.3 It is the intent of this specification to describe primary features, materials, 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 regarding performance, durability and satisfactory operation under the specified site conditions.

1.4 The work to be done under this specification shall include all labour, plant, equipment, material and performance of all work necessary for the complete installation and commissioning of switchyard. All apparatus, appliances, material and labour 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.

1.5 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 Civil and construction/installation work including cement and steel shall be supplied by the Contractor.

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS.

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Complete design (unless specified otherwise in specification elsewhere) and detailed engineering shall be done by the Contractor.

2. SCOPE OF WORK

2.1 The broad scope of this specification covers Establishment/Extension of following substations for elements detailed below:

S. No.	Scope
A.	Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS
1.	Extension of 400kV & 220kV Mandsaur S/s 400kV: - 400 kV line bay – 1 No. 220kV:- 220kV line bay- 1 No.

2.2 The detailed scope of work of the substation package is brought out in subsequent clauses of this section.

2.2.1 Extension of 400kV Mandsaur substation

2.2.1.1 Design, engineering, manufacture, testing and supply, including transportation & insurance, and storage of the following equipment/items, complete in all respects:

- a) 400kV VOLTAGE CLASS AIS EQUIPMENT: Circuit Breakers, Isolators, Current Transformers, Capacitor Voltage Transformers, Bus Post insulators (including BPI for Wave Trap), Wave Traps and Surge Arresters as per BPS.
- b) Complete Control, Relay and Protection system for bays under the present scope as per Section– Control and Relay Panels. Any modification required in the existing protection scheme is also included in the present scope.

Protection panels for 400kV Line Bays, Line Current Differential relay at both ends (with back up distance protection feature) as Main-I and Main-II shall be provided under present scope of work. Differential relays for remote end shall be provided as loose supply under present scope of work. Associated power and control cabling and integration with SAS at remote end shall be done by Remote Bay owner.

- 400KV Busbar Protection Augmentation:

Existing 400kV Bus bar protection scheme is distributed type, Make: GE, Model: P741 (Central unit) & P743 (Peripheral Unit).

PU for Bays under present scope shall be made available & same shall be utilized under present scope. Necessary shifting /modification, wiring/cabling, augmentation and integration of 400KV Bus bar

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS.

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protection, for completion of Bus Bar protection is under present scope and same is to be quoted under respective items available in Installation schedule of BPS.

Augmentation of said existing 400kV Bus bar protection scheme, including required trip/auxiliary relays, wirings etc. for present scope 400kV bays are under present scope.

Under present scope, necessary modification, wiring/cabling, and integration for completion of 400kV Bus Bar protection for the bays under present scope is envisaged.

- c) Augmentation of Substation Automation System for bays as per BPS (bay as defined in technical specification, Section-Substation Automation System):

400kV bays

- Main Bay: - 1 no.

Existing 765/400/220kV Mandsaur Substation is equipped with substation automation system (based on IEC-61850) of M/s GE make. Under present scope Bidder shall include BCUs required for 400kV bays mentioned above, including all necessary hardware & software to integrate with the said existing substation automation system.

The scope of bidder shall include but not limited to integration of IEDs under present scope of work with existing substation automation (which is based on IEC 61850) including up-dating of system database, displays, development of additional displays and reports as per requirement.

Necessary configuration of data at Gateway for remote operation from NTAMC, Backup NTAMC, RTAMC & supervision from RLDC/ Backup RLDC is included in present scope. However, no work is envisaged at remote end (RLDC/ Backup RLDC /RTAMC/ NTAMC / Backup NTAMC) under the present scope.

- d) LT switchgear (AC/DC Distribution boards): -
Extension of 415 Volt ACDB, 220 Volt DCDB and 48 Volt DCDB is not envisaged under present scope and necessary feeder modules with MCCB/MCB are available. Necessary cabling and connections for the Bays as required under present scope, is in the scope of the contractor.
- e) **FIRE PROTECTION SYSTEM :**
Smoke detection, Fire alarm & Annunciation System and Fire Extinguishers for Switchyard panel Room is also to be provided as per BPS and same to be integrated with existing system.
- f) Air Conditioning System for Switchyard Panel Room (6M).

- g) **ERECTION HARDWARE**

Erection hardware such as Insulator strings hardware, Disc Insulators/Long Rod Insulators (as applicable), Conductor(s), Al tube, bus-bar materials, cable trays & covers, spacers, clamps & connectors, junction box, earthwire, earthing material risers, auxiliary earthmat (excluding main earth mat), buried cable trenches/pipes for equipment & lighting, cable supporting angles/channels, Insulating mats, cable sealing arrangement, all accessories etc. as required. Supply of New BMK for 400kV Bays is envisaged under the present scope.

- h) **CABLES:**

1.1kV grade Power & Control cables (and special cables, if any) along with complete accessories including cabling works for Employer supplied equipment specified above (If any) for subject station. Methodology for supply, installation & sizing of cables shall be as per Annexure-S1 (Revised) for methodology of sizing of cables enclosed at Annexure-V.

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS.

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The quantities of Power & Control cables are indicated in LOT in BPS, 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.

i) ILLUMINATION SYSTEM:

LED based Outdoor & Indoor Lighting and illumination for the switchyard area and Switchyard Panel Rooms (As per BPS). Illumination system shall be provided using the fixture types as specified in Technical Specification Section-Lighting System.

a) MAIN EARTH-MAT (As per BPS)

Existing Main Earthmat is to be extended for the bays under present scope.

All the Gantry support structures, equipment's, structures, auxiliary earthmat for isolators etc. shall be earthed by connecting them to the main Earthmat by the contractor & the same is deemed to be included in the respective BPS Item of Erection Hardware. Details of Main earthmat spacing shall be provided during detailed engineering .

j) LIGHTNING PROTECTION (DSLPL)

The lightning protection (DSLPL) for switchyard under present scope is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the structures being provided under present scope.

k) AUGMENTATION OF VISUAL MONITORING SYSTEM:

Augmentation of Visual monitoring system (VMS) for area under present scope, and their integration with existing Substation VMS system. The existing VMS drawing shall be provided to the contractor during detailed engineering. The bidder shall provide 4(Four) Numbers of color IP camera, with PAN, TILT and ZOOM facilities, suitably located in the switchyard for monitoring of bays and equipment's 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 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.

A copy of specification for Visual Monitoring system is enclosed at Specific Requirement Rev 10, which shall, be read for the Augmentation scope of existing VMS system

- l) PLCC/DPC:** PLCC/DPC panel along with associated coupling device, HF cable for Mandsaur as well as Remote end for present scope are not included in present scope and shall be supplied /installed / commissioned under separate package. Details of same shall be provided during detailed engineering. However, integration of Protection System (CRP) and SAS with these PLCC/DPC Panels is included in the present scope. Any item required for successful integration of CRP & SAS with these PLCC/DPC panels is deemed to be included as part of respective CRP or SAS line item of BPS.

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS.

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- m) **TELE-COMMUNICATION EQUIPMENT:-** The broad Scope of the procurement of FO based Communication Equipment shall include planning, designing, engineering, supply, transportation, insurance, delivery at site, unloading handling, storage, installation, termination, testing, training and demonstration for acceptance, commissioning and documentation for:
- i. SDH Equipment along with suitable interfaces and line cards.
 - ii. All cabling, wiring, Digital Distribution frame patch facilities and interconnection to the supplied equipment at the defined interfaces,
 - iii. System integration of all supplied subsystems.
 - iv. Integration with the existing communication system based on SDH and PDH of employer.
 - v. Integration of supplied subsystem with SCADA system, PLCC equipment, PABX of RLDC/SLDC, VOIP (SIP compliant) for voice.
 - vi. Fibre Optic Approach Cable (FOAC) along with duct, GI pipe, GI Elbow, GI Flexible conduit and Fibre Optic Distribution Panel (FODP).
 - vii. Integration of new Communication equipment in the existing regional Network Management System. All required support to existing NMS vendor for integration of new Communication equipment

2.2.1.2 Design, engineering, manufacture, testing and supply including transportation & insurance, storage at site of mandatory spares.

2.2.1.3 CIVIL WORKS & SUPPORT STRUCTURE

1. The design of foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification.
2. The scope of civil work shall include but not be limited to the following based on drawings supplied by POWERGRID.
 - i. Foundation for LM, Gantries and Equipment support structures.
 - ii. Switchyard Panel Room
 - iii. Road: Road shall be constructed as per tender drawing. However, Road layout shall be prepared by contractor and submitted to POWERGRID for approval.
 - iv. Cable Trenches: Cable trenches including cable trenches in Reactor/Transformer area along with covers including road/rail crossing, sump pits, culverts etc. shall be constructed as per POWERGRID standard drawings provided in tender. However, Cable trench layout shall be prepared by vendor for approval of POWERGRID based on the cable trench sections available in Tender Drawings.
 - v. Drains: Storm water Drain layout shall be prepared by contractor based on the drain sections available in Tender drawings and to be submitted for approval of POWERGRID.
 - vi. Switchyard Barbed wire fencing
 - vii. Stone Pitching for slope protection work if required
 - viii. Retaining Wall: If required RCC retaining walls shall be constructed for which items such as excavation, PCC, RCC, reinforcement steel, etc. shall be measured and paid under respective items of BPS.
3. The scope of civil work shall include but not be limited to the following based on drawings developed by Contractor.
 - i. Site levelling work
 - a. The item site levelling works includes Contouring of levelling area as per technical specification. The final area of levelling shall be decided during detailed engineering.
 - b. The Quantity of earthwork cutting & filling, borrowed earth and FGL shall be proposed by vendor for approval of POWERGRID based on the approved contour level drawing and site HFL data.
 - c. Mode of measurement of this item is in Cum of earthwork as per BOQ and technical specification. The contouring of the plot area in scope as per technical specification is also deemed to be included in quoted rates of this item.

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS.

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- d. HFL data duly verified by POWERGRID Site is required to be arranged by contractor for finalization of FGL (Finished Ground Level).
 - ii. Anti-weed treatment, providing & laying non-woven geo-synthetic fabric and stone spreading in the switchyard as per TS. The layout for the same shall be developed by the contractor.
 - iii. Any other item/design/drawing for completion of scope of works.
4. Lattice & Pipe Structures (Galvanized):
- i. The scope shall include fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of LM, towers, beams and equipment support structures including nuts, bolts, fasteners and foundation bolts complete in all respect.
 - ii. The fabrication drawings of towers and beams shall be provided by Employer during detailed engineering. Equipment support structures except support structures for Circuit Breaker shall be provided as per Employer's drawings during detailed engineering.
 - iii. In case POWERGRID provides the Single Line Diagram (SLD) of the structures, contractor shall prepare the fabrication drawing based on the SLD and submit for approval. In case of equipment support structure, the attachment of stool, Bus height, fixing of MOM/JB box etc. shall be taken care by the contractor as per the requirement of the equipment, final equipment support structure drawings/SLD shall be released after reviewing these parameters.
 - iv. In the bid price schedule, the structures, nuts, bolts and fasteners & foundation bolts are indicated in Metric Ton (MT) and shall be paid as per respective items of BPS.
 - v. The civil works shall be payable as per relevant item of BPS.
 - vi. Proto-corrected drawings and Bill of Materials of all structures shall be in the scope of Contractor.
 - vii. The proto corrected drawings along with BOMs are to be witnessed and certified by the contractor. Certified proto corrected drawings along with BOM shall be submitted to POWERGRID for information only. Contractor shall provide editable soft copies of drawings & BOMs.
5. For buildings, the complete civil works including internal and external finishing, stone soling for flooring, plinth protection, drain along plinth protection, electrical conduit and junction boxes, fan boxes, Miscellaneous structural steel, cable transit system etc. required to complete the building in all respect as per the drawing shall be payable in the plinth area rate. However, the quantity of the earthwork (excavation, backfilling, disposal etc.), concrete (all types), reinforcement steel, shall be measured and paid under respective items under BPS.

2.2.2 Extension of 220kV Mandsaur substation

2.2.2.1 Design, engineering, manufacture, testing and supply, including transportation & insurance, and storage of the following equipment/items, complete in all respects:

- n) 220kV VOLTAGE CLASS AIS EQUIPMENT: Circuit Breakers, Isolators, Current Transformers, Capacitor Voltage Transformers, Bus Post insulators (including BPI for Wave Trap) , Wave Traps and Surge Arresters as per BPS.
- o) Complete Control, Relay and Protection system for bays under present scope as per Section–Control and Relay Panels. Any modification required in the existing protection scheme is also included in the present scope.

Protection panels for 220kV Line Bays, Line Current Differential relay at both ends (with back up distance protection feature) as Main-I and Main-II shall be provided under present scope of work. Differential relays for remote end shall be provided as loose supply under present scope of work. Associated power and control cabling and integration with SAS at remote end shall be done by Remote Bay owner.

- 220KV Busbar Protection Augmentation:

220kV Buses at Mandsaur Substation are being equipped with Numerical Distributed Bus Bar Protection scheme under a separate Package. Existing 220kV Bus bar protection scheme is distributed type, Make: GE, Model: P741 (Central unit) & P743 (Peripheral Unit). Augmentation of said existing 220kV Bus bar protection scheme, including required Bus bar protection bay modules, trip/auxiliary relays, wirings etc. for present scope 220kV bays are under present scope.

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS.

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Necessary modification, wiring/cabling, and integration for completion of 220kV Bus Bar protection for the bays under present scope is envisaged.

- p) Augmentation of Substation Automation System for bays as per BPS (bay as defined in technical specification, Section-Substation Automation System):
220kV bays
- 220kV Bay:- 1no.

Existing 765/400/220kV Mandsaur Substation is equipped with substation automation system (based on IEC-61850) of M/s GE make. Under present scope Bidder shall include BCUs required for 400kV bays mentioned above, including all necessary hardware & software to integrate with the said existing substation automation system.

The scope of bidder shall include but not limited to integration of IEDs under present scope of work with existing substation automation (which is based on IEC 61850) including up-dating of system database, displays, development of additional displays and reports as per requirement.

Necessary configuration of data at Gateway for remote operation from NTAMC, Backup NTAMC, RTAMC & supervision from RLDC/ Backup RLDC is included in present scope. However, no work is envisaged at remote end (RLDC/ Backup RLDC /RTAMC/ NTAMC / Backup NTAMC) under the present scope.

- q) LT switchgear (AC/DC Distribution boards): -
Extension of 415 Volt ACDB, 220 Volt DCDB and 48 Volt DCDB is not envisaged under present scope and necessary feeder modules with MCCB/MCB are available. Necessary cabling and connections for the Bays as required under present scope, is in the scope of the contractor.
- r) **FIRE PROTECTION SYSTEM:**
Conventional type Smoke detection, Fire alarm & Annunciation System and Fire Extinguishers for Switchyard panel Room is also to be provided as per BPS.
- s) **Air Conditioning System for Switchyard Panel Room (3M)**

t) **ERECTION HARDWARE**

Erection hardware such as Insulator strings hardware, Disc Insulators/Long Rod Insulators (as applicable), Conductor(s), Al tube, bus-bar materials, cable trays & covers, spacers, clamps & connectors, junction box, earthwire, earthing material risers, auxiliary earthmat (excluding main earth mat), buried cable trenches/pipes for equipment & lighting, cable supporting angles/channels, Insulating mats, cable sealing arrangement, all accessories etc. as required. Supply of New BMK for 220kV bay is envisaged under the present scope.

- u) **CABLES:**
1.1kV grade Power & Control cables (and special cables, if any) along with complete accessories including cabling works for Employer supplied equipment specified above (If any) for subject station. Methodology for supply, installation & sizing of cables shall be as per Annexure-S1 (Revised) for methodology of sizing of cables enclosed at Annexure-V.

The quantities of Power & Control cables are indicated in LOT in BPS, 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.

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS.

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v) ILLUMINATION SYSTEM:

LED based Outdoor & Indoor Lighting and illumination for the switchyard area and Switchyard Panel Rooms (As per BPS). Illumination system shall be provided using the fixture types as specified in Technical Specification Section-Lighting System.

b) MAIN EARTH-MAT (As per BPS)

Main Earthmat is existing for the bays under present scope.

All the Gantry support structures, equipment's, structures, auxiliary earthmat for isolators etc. shall be earthed by connecting them to the main Earthmat by the contractor & the same is deemed to be included in the respective BPS Item of Erection Hardware. Details of Main earthmat spacing shall be provided during detailed engineering .

w) LIGHTNING PROTECTION (DSLPP)

The lightning protection (DSLPP) for switchyard under present scope is to be provided by the contractor. The contractor shall design the lightning protection by utilizing the structures being provided under present scope.

x) AUGMENTATION OF VISUAL MONITORING SYSTEM:

Augmentation of Visual monitoring system (VMS) for area under present scope, and their integration with existing Substation VMS system. The existing VMS drawing shall be provided to the contractor during detailed engineering. The bidder shall provide 4(Four) Numbers of color IP camera, with PAN, TILT and ZOOM facilities, suitably located in the switchyard for monitoring of bays and equipments 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 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.

A copy of specification for Visual Monitoring system is enclosed at Specific Requirement Rev 10, which shall, be read for the Augmentation scope of existing VMS system

- y) PLCC/DPC: PLCC/DPC panel along with associated coupling device, HF cable for Mandsaur as well as Remote end for present scope are not included in present scope and shall be supplied /installed / commissioned under separate package. Details of same shall be provided during detailed engineering. However, integration of Protection System (CRP) and SAS with these PLCC/DPC Panels is included in the present scope. Any item required for successful integration of CRP & SAS with these PLCC/DPC panels is deemed to be included as part of respective CRP or SAS line item of BPS.

2.2.2.2 Design, engineering, manufacture, testing and supply including transportation & insurance, storage at site of mandatory spares.

2.2.2.3 CIVIL WORKS & SUPPORT STRUCTURE

1. The design of foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification.
2. The scope of civil work shall include but not be limited to the following based on drawings supplied by POWERGRID.
 - i. Foundation for LM, Gantries and Equipment support structures.
 - ii. Switchyard Panel Room
 - iii. Road: Road shall be constructed as per tender drawing. However, Road layout shall be prepared by contractor and submitted to POWERGRID for approval.

Construction of 1 no. 400kV line bay (Bus Section-1) at Mandsaur S/s for 600MW RPP of M/s Sprng Green Energy 2 Pvt. Ltd. and 1 no. 220kV line bay (Bus Section-1) at Mandsaur S/s for 200MW RHGS of M/s Hexa Climate Solutions Pvt. Ltd. for providing connectivity to RE generation projects at Mandsaur PS.

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- iv. Cable Trenches: Cable trenches including cable trenches in Reactor/Transformer area along with covers including road/rail crossing, sump pits, culverts etc. shall be constructed as per POWERGRID standard drawings provided in tender. However, Cable trench layout shall be prepared by vendor for approval of POWERGRID based on the cable trench sections available in Tender Drawings.
 - v. Drains: Storm water Drain layout shall be prepared by contractor based on the drain sections available in Tender drawings and to be submitted for approval of POWERGRID.
 - vi. Switchyard Barbed wire fencing
 - vii. Stone Pitching for slope protection work if required
 - viii. Retaining Wall: If required RCC retaining walls shall be constructed for which items such as excavation, PCC, RCC, reinforcement steel, etc. shall be measured and paid under respective items of BPS.
3. The scope of civil work shall include but not be limited to the following based on drawings developed by Contractor.
- i. Site levelling work
 - a. The item site levelling works includes Contouring of levelling area as per technical specification. The final area of levelling shall be decided during detailed engineering.
 - b. The Quantity of earthwork cutting & filling, borrowed earth and FGL shall be proposed by vendor for approval of POWERGRID based on the approved contour level drawing and site HFL data.
 - c. Mode of measurement of this item is in Cum of earthwork as per BOQ and technical specification. The contouring of the plot area in scope as per technical specification is also deemed to be included in quoted rates of this item.
 - d. HFL data duly verified by POWERGRID Site is required to be arranged by contractor for finalization of FGL (Finished Ground Level).
 - ii. Anti-weed treatment, providing & laying non-woven geo-synthetic fabric and stone spreading in the switchyard as per TS. The layout for the same shall be developed by the contractor.
 - iii. Any other item/design/drawing for completion of scope of works.
4. Lattice & Pipe Structures (Galvanized):
- i. The scope shall include fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of LM, towers, beams and equipment support structures including nuts, bolts, fasteners and foundation bolts complete in all respect.
 - ii. The fabrication drawings of towers and beams shall be provided by Employer during detailed engineering. Equipment support structures except support structures for Circuit Breaker shall be provided as per Employer's drawings during detailed engineering.
 - iii. In case POWERGRID provides the Single Line Diagram (SLD) of the structures, contractor shall prepare the fabrication drawing based on the SLD and submit for approval. In case of equipment support structure, the attachment of stool, Bus height, fixing of MOM/JB box etc. shall be taken care by the contractor as per the requirement of the equipment, final equipment support structure drawings/SLD shall be released after reviewing these parameters.
 - iv. In the bid price schedule, the structures, nuts, bolts and fasteners & foundation bolts are indicated in Metric Ton (MT) and shall be paid as per respective items of BPS.
 - v. The civil works shall be payable as per relevant item of BPS.
 - vi. Proto-corrected drawings and Bill of Materials of all structures shall be in the scope of Contractor.
 - vii. The proto corrected drawings along with BOMs are to be witnessed and certified by the contractor. Certified proto corrected drawings along with BOM shall be submitted to POWERGRID for information only. Contractor shall provide editable soft copies of drawings & BOMs.
5. For buildings, the complete civil works including internal and external finishing, stone soling for flooring, plinth protection, drain along plinth protection, electrical conduit and junction boxes, fan boxes, Miscellaneous structural steel, cable transit system etc. required to complete the building in all respect as per the drawing shall be payable in the plinth area rate. However, the quantity of the earthwork (excavation, backfilling, disposal etc.), concrete (all types), reinforcement steel, shall be measured and paid under respective items under BPS.

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3. SPECIFIC EXCLUSIONS

The following items of work are specifically excluded from the scope of the specification:

- a) Employer's site office and stores.
- b) Approach road to substation boundary.
- c) Tariff Meter
- d) Soil Investigation

4. PHYSICAL AND OTHER PARAMETERS OF THE SUBSTATIONS

1 LOCATION OF SUBSTATION: as indicated below

S. No.	Name of Substation	Name of State	Nearest Railway Station
1	765/400/220 kV Mandsaur S/s	Madhya Pradesh	Mandsaur

2 METOROLOGICAL DATA: Meteorological data are as below:

S. No.	Name of Sub-station	Altitude	Snow fall	Seismic Zone	Wind Zone	Min./Max. Ambient Temperature	Coastal Area Consideration
1	Mandsaur S/s		NIL	As per IS 1893	As per National Building Code (NBC) 2016	0/50 degree centigrade	NO

5. SCHEDULE OF QUANTITIES

The requirement of various items/equipment and civil works are indicated in Bid price Schedules.

All equipment/items, Structures and civil works for which quantities has been given in the BPS shall be payable on unit rate basis. During actual execution, any variation in such quantities shall be paid based on the unit rate under each item incorporated in Letter of award.

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

No cost compensation shall be considered on account of "Set/LOT/LS" items in any case if number of bays specified in section project remains unchanged.

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

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and required for successful commissioning of substation shall be included in the bid price and shall be provided at no extra cost to Employer.

6. BASIC REFERENCE DRAWINGS

- a) The reference drawings, which form a part of the specifications, are given at Annexure-I. The contractor shall maintain the phase to earth clearance, phase to phase clearance and sectional clearances, clearances between buses, bus heights but may alter the locations of equipment to obtain the statutory electrical clearances required for the substation
- b) Design of substation and its associated electrical & mechanical auxiliaries systems includes preparation of single line diagram, electrical layout, foundation & cable trench layouts (including invert levels), erection key diagrams, direct stroke lightning protection, electrical and physical clearance diagrams, Control and protection schematics, wiring and termination schedules, design of firefighting system, outdoor lighting/illumination and other relevant drawings & documents required for engineering of all facilities within the fencing to be provided under this contract, are covered under the scope of the Contractor. The layout shall be prepared based on best engineering practice.

7. DIFFERENT SECTIONS OF TECHNICAL SPECIFICATION

Employer has standardized its technical specification for various equipment and works for different voltage levels. Items, which are not applicable for the scope of this package as per schedule of quantities described in BPS, the technical specification for the items should not be referred to. 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. No.	Description	Rev
1	Section-Project	Rev 00
2	Section-General Technical Requirement (GTR)	Rev 15
3	Section-Switchgear- CB	Rev 12
4	Section-Switchgear- ISO	Rev 13
5	Section-Switchgear- Instrument Transformer	Rev 12
6	Section-Switchgear-Surge Arrester	Rev 13
7	Section-Power and Control Cables	Rev 06
8	Section-Lighting System	Rev 07
9	Section-LT Switchgear	Rev 05
10	Section-Air Conditioning System	Rev 04
11	Section-Fire Protection System	Rev 06
12	Section-Switchyard Erection	Rev 10
13	Section- Structures	Rev 07
14	Section-Civil Works	Rev 12 with corr slip
15	Section-Control and Relay Panels	Rev 09
16	Section-Substation Automation System	Rev 04
17	Section-Telecommunication Systems	Rev 06

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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.

In case of any discrepancy between Section-GTR and individual sections for various equipment, requirement of individual equipment section shall prevail.

In case of any discrepancy between Main body of Section-Project and Annexure(s) of Section-Project, provisions specified in Main body of Section-Project shall prevail

8. MANDATORY SPARES

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 BPS and shall be considered for evaluation of bid. It shall not be binding on the Employer to procure all these mandatory spares.

The bidder is clarified that no mandatory spares shall generally be used during the commissioning of the equipment. Any spares required for commissioning purpose shall be arranged by the Contractor. The unutilized spares if any brought for commissioning purpose shall be taken back by the contractor.

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.

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.

Detailed break-up for Mandatory spares of other equipment’s shall be as per Annexure-III.

9. SPECIFIC REQUIREMENT

- 9.1 The specific requirements as mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no 10 enclosed at Annexure-II and relevant/applicable clauses shall be referred for specified scope of work.
- 9.2 Relevant/applicable clauses of Specific Requirements as mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no. 10 (attached as Annexure-II) shall also be referred for specified scope of work. Any discrepancy between clause 9.0 Section-PROJECT and Specific Requirements as mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no. 10 (attached at Annexure-II) on scope of works, the requirement stipulated at clause 9.0 of section project shall prevail.
- 9.3 Clause no 1.1.4 of Section Specific requirement rev 10 is modified as “Refer Annexure-S1 (Revised) for METHODOLOGY FOR SIZING OF CABLES” attached as Annexure-V of Section Project.
- 9.4 Clause no C. Section Switchgear -CB Rev 11 of specific requirement Rev. no 10-stand deleted.
- 9.5 **Sl.No. A.5 of Annex-III of Section-Project [Specific Requirement Rev.10] is amended as follows:**

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

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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 originally scheduled last date of bid submission (Soft Copy)**. In case the test reports are of the test conducted earlier than the years specified below from the **originally scheduled last date of bid submission (Soft Copy)**, 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	10
2	LT Transformer	10
3	Shunt Reactor/ Series Reactor /Neutral Grounding Reactor	10
4	OLTC	10
5	Bushing of Power Transformers/Reactors	10
6	Fittings and accessories for Power transformers & Reactors	10
7	Circuit Breaker	15
8	Isolator	15
9	Lighting Arrester	15
10	Wave Trap	15
11	Instrument transformer	15
12	GIS & Hybrid GIS	15
13	LT Switchgear	10
14	Cable and associated accessories	10
15	Relays/ BCU/Process Interface units /Standalone Merging unit	10
16	Capacitors	10
17	Battery and Battery charger	10
18	Conductor & Earth wire	10
19	Insulators (Porcelain/Glass)	10
20	Composite Insulators	10
21	PLCC	10

Note:-

1. For all other equipment's validity of type test shall be 10 years from **the originally scheduled last date of bid submission (Soft Copy)**.
2. Equipment shall be supplied from the same manufacturing work, where from the sample unit was manufactured and successfully type tested as per relevant standard.

Further, where offered equipment is based on the design of technology transfer of Parent organization / Joint Venture (JV), type test reports of Parent organization / Joint Venture (JV) shall also be acceptable for the initial period of 03 years from the date of establishment manufacturing facility for offered equipment provided that the design, material, and manufacturing process of the offered equipment are identical to those of the type-tested sample of the original facility. In such cases, while submitting the Type Test Reports, the Original Equipment Manufacturer (OEM), shall furnish an undertaking with it declaring that there is

- A. No change in the Design
- B. No change in the material,
- C. No change in manufacturing process, and
- D. No amendment/revision in the relevant standard as regard to type test conditions, since the type test

3. In case of own manufacturing plant at different location within India, the type test of the original manufacturing works shall also be acceptable for the equipment

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manufactured and supplied from the different location
subject to the following conditions:

- i. The relevant standard does not bar the same,
- ii. The equipment being manufactured at different locations shall be identical in design, drawings, specifications, ratings to that of the type tested sample in the original facility (where it was manufactured and successfully type tested),
- iii. The equipment being manufactured at different locations shall be identical in material & critical components, manufacturing process/ practices, and quality control to that of the type tested sample in the original facility (where it was manufactured and successfully type tested),
- iv. Also, while submitting the Type Test Reports, the Original Equipment Manufacturer (OEM), shall furnish an undertaking for above conditions (i), (ii) and (iii).

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 at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

- 9.6 In Section-GTR and other technical specifications, the term 'Employer and/or 'Purchaser/Customer' may be read as Employer.