

SECTION -PROJECT

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Annexure-S1(Revised): METHODOLOGY FOR SIZING OF CABLES

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1.0 GENERAL

1.1 PREMBLE

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:

- World Class: Setting superior standards in capital project management and operations for the industry and ourselves.
- Global: Leveraging capabilities to consistently generate maximum value for all stakeholders in India and in emerging and growing economies.
- Inspiring, nurturing and empowering the next generation of professionals.
- Achieving continuous improvements through innovation and state-of-the-art technology.
- Committing to highest standards in health, safety, security and environment." as its mission.

1.2 POWERGRID is implementing the following Transmission Schemes through RTM Route:

- i) **Installation of 765kV, 80 MVAR Hot Spare Reactor at Sundergarh (POWERGRID) S/S associated with Eastern Region Expansion Scheme-50.**

1.3 It is the intent of this specification to describe primary features, 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.

2.0 SCOPE

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

S. No.	Scope
1.	Extn. of 765kV Sundergarh (POWERGRID) S/S • 765kV, 1x80 MVAR Switchable Line Reactor: 1 Nos. (Owner supplied) • 765kV Spare Line Reactor Bay: 1 no (Adjacent to Bay 712, Raipur LR1) • Associated Bus Works • Implementation of Spare Changeover Scheme

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

2.2.1.1 Design, engineering, manufacture, testing at manufacturer's work, supply including transportation and insurance, unloading, storage, erection, testing and commissioning at site the following equipment/items, complete in all respects.

- a) **Air Insulated Switchgear:**

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The existing 765/400kV Sundergarh Substation is of AIS cum Indoor GIS type. The proposed extension for 765 kV Bay is to be done through **AIS** which includes installation of 01 Reactor Bay for 1 phase switching of Raipur-1 & 2 Reactors.

Arrangement of Bay Equipments shall be as per SLD. The Switchgear (50 Hz) shall be complete with all necessary terminal boxes, SF6 gas filling, interconnecting power and control wiring, grounding connections, 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 supplied.

765kV AIS Equipment: Single Phase Circuit Breaker (Compatible with existing GE T&D make 3 phase CB), Bus Post Insulators and 624kV Surge Arresters.

132kV AIS Equipment: 145KV Bus Post Insulators

b) 765 kV, 80 MVAR Reactor, 1 Phase Reactor (Owner Supplied).

Supply, erection, testing and commissioning of 765kV, 80 MVar Reactor is covered under separate package. However, following associated works are covered under the scope of this package:

- i. Civil works for 765kV Reactor foundation complete in all respects, firewalls, earthing connection to main earth mat and earth pits etc. (as required) as per technical specification.
- ii. Overhead connection of HV and Neutral bushings of 765kV Reactor to substation equipment.
- iii. HVWS & Hydrant system for 765kV Reactor is in scope of the said package. Further, Piping for fire protection systems shall be extended from nearest existing Main Header existing in the switchyard.
- iv. Supply, laying and termination of cables along with associated accessories from Marshaling box of 765kV Reactor to BMK/Switchyard Panel Rooms/LCC panel/Control Room as per requirement.

c) SUBSTATION AUTOMATION SYSTEM/ CONTROL AND RELAY PANELS:

Complete Control, Relay and Protection system as per Section–Control and Relay Panels for bays under present scope.

(i) Augmentation of Existing SAS/Gateway/Local SCADA:

- I. Augmentation of Substation Automation System for bays as per BPS (bay as defined in technical specification, Section-Substation Automation System): Existing Sundergarh Substation is equipped with substation automation system (based on IEC-61850). Make & model of existing SAS: Siemens

765 kV: Main Bays: 1 Nos.

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) and capability enhancement of same as required, including updating of system database, displays, development of additional displays and reports as per requirement.

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

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

- II. Existing 765/400 kV Sundargarh S/s is a SCADA Based Substation where data is being transferred to Main SLDC/ Back up SLDC/Main RLDC/ Backup RLDC through existing Gateway (of M/s Siemens make). The data of bays under present scope shall also be transferred to Main SLDC/ Back up SLDC/Main RLDC/ Backup RLDC through existing Gateway. No work is envisaged at RLDC /SLDC end. All necessary Hardware and Software are to be supplied and integrated in the existing Gateway only including updating of system database, displays, development of additional displays and reports as per requirement.
- III. Existing 765/400 kV Sundargarh S/s is a SCADA Based Substation where data transfer to Remote control Centre (RTAMC/NTAMC) is done through existing Gateway (of M/s Siemens) For data transfer of bays under present scope to Remote control Centre (RTAMC/NTAMC), all the necessary supply, installation, Integration, testing & commissioning related scope shall deemed to be included in service item for the same.
- IV. Existing 765/400 kV Sundargarh S/s is a SCADA Based Substation where all Data are locally monitored through local SCADA. For local monitoring of Data of Bay under present scope all the necessary supply, installation, Integration, testing & commissioning related scope shall deemed to be included in service item for the same.
- V. Integration of ODS (On-line Oil Drying system) for 80 MVAr HOT Spare Reactor (being supplied under separate package) with above system is also included under present scope.
- VI. Any modification or configuration updating, etc. required in existing BCUs of Associated Bays is also included under present scope.

(ii) Augmentation of Control & Relay Panel:

All changes required in existing schemes, logics etc. for successful operation of present reactor bay for 1 phase switching are included under the present scope.

- d) **Power & Control Cables:** 1.1 kV grade Power & Control cables (and special cables, if any) along with complete accessories including cables for oil filtration units and cabling from common marshaling box of 765kV Reactors to BMK/Switchyard Panel Room/Control Room Building, Power receptacle for oil filtration unit shall also be provided under present scope of work as per BPS. ***Cable sizes shall be used as per Sizing of 1.1kV Power & Control cables specified at Annexure-S1 (Revised) attached with this section.***
- e) **Erection Hardware:** Insulator strings and associated hardware fittings, Clamps & connectors (including terminal connectors for employer supplied 765kV Reactor), Conductor, Aluminum tubes, Bus bar and earthing material risers, auxiliary earthmat (excluding main earth mat), Bay marshalling box, spacers, cable sealing arrangement, cable supporting angles/channels, Cable Pull pit, Earthwire, Junction box, all accessories, etc. as required.

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All erection hardware item required for the present scope including CB, SA, BPI etc. shall be quoted under BPS item **“ERECTION H/W-765KV SW L/R (Spare line reactor connection arrangement)”**.

- f) **Earthing:** Existing Main Earthmat is to be extended for bays under present scope. All the equipments (including employer supplied 765kV Reactor), cable trenches, auxiliary earthmat for isolators etc. shall be earthed by connecting them to the main Earthmat.

g) **LATTICE AND PIPE STRUCTURES (GALVANIZED):**

- i. The scope shall include fabrication, proto-assembly, supply including transportation & insurance, unloading, storage, erection and commissioning of 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 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 and fixing of MOM box etc. shall be taken care by the contractor as per the requirement of the equipment.
- iv. Proto-corrected drawings and Bill of Materials of all structures shall be in the scope of Contractor.
- v. The proto corrected drawings along with BOM 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 design & drawings during detailed engineering.

- h) Any other equipment/material required to complete the specified scope.

2.2.1.2 Civil works:

- A. The design of foundation shall be based on the soil investigation report and other parameters as per relevant IS codes & technical specification.
- B. The scope of civil work shall include but shall not be limited to the following based on **drawings developed by the contractor:**
- (i) Standard SFQP of POWERGRID shall be followed at all times during the contract. **SFQP Doc. No. C/FQA/SFQP/SCW (Rev 7) dtd. 10-07-2024** attached herewith for reference.
- However, following deviations can be accepted subjected to approval of the Engineer-In-Charge: -
- a) Source approval of coarse & fine aggregate shall be waived off, however, cube testing shall be carried out and testing of cubes shall be done in presence of POWERGRID Officials in “in house CTM” not in third party lab
 - b) Nominal mix concrete shall be used; however alternatively design mix concrete may also be used if mutually agreed by both the parties without cost implications. For design mix concrete, material testing and other requirements as per IS shall be applicable.
 - c) Cement and Steel procurement of POWERGRID approved brands directly from local vendors shall be allowed. To ensure quality of material, either submission of MTC with traceability to be produced or testing of material before usage shall be done.

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- d) Water supply shall be provided by owner at one point free of cost if adequate source is available in the premises.
 - e) Source approval of bricks (clay/fly ash/concrete blocks), structural steel finishing items, timber, aluminium doors & windows, barbed wire, road material (coarse aggregate, stone screening, binding material), earth work (site levelling, proctor compaction test, field compaction test) etc. shall be waived off.
- (ii) Foundation of non-Standard structures (if any) envisaged during detailed engineering. The design of foundation shall be based on the soil investigation report and other parameters as per relevant IS code & technical specification.
- (iii) **Site levelling work:** The item site levelling works (if any in BPS) includes Contouring of the present scope of switchyard area within the substation boundary as per technical specification. The final area of levelling may be less than the contouring area, which will be decided during detailed engineering.
- a) 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 FGL data.
 - b) Mode of measurement of this item is in Cum of earthwork as per BOQ and technical specification. The contouring of the present scope switchyard area as per technical specification is also deemed to be included in quoted rates of this item.
- (iv) Foundations for Reactors, circuit Breakers, LA, BPIs, Firewall etc as required.
- (v) **Other miscellaneous requirements & scope:**
- a) Stone spreading and anti-weed treatment in the switchyard for area under present scope. Layout for the same shall be developed by the contractor.
 - 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) Foundation for lighting poles, bay marshalling boxes, panels and control cubicles wherever required. The cost of these foundations shall deem to be included in erection/installation of corresponding item/ equipment of BPS.
 - d) For all building leaving labor hut, all doors except fire escape doors, windows, glazed partitions shall be of UPVC type.
 - e) Slope protection wall/Retaining wall (if any)- design & drawing pertaining to slope protection work & retaining wall (if required) shall be finalized during detailed reengineering.
 - f) Dismantling & re-erection of existing fencing (if any).
 - g) Dismantling of existing RCC road (if any).
 - h) Dismantling of Drain (if any)
 - i) Dismantling of RCC (if any)
- (vi) Any other item/design/drawing required for successful completion of the scope of works.

The scope of civil work shall include but not be limited to the following based on **drawings developed by POWERGRID:**

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- i. **Soil investigation report** of existing Sub-Station area is to be provided to successful bidder by employer during detailed engineering.
 - ii. **Equipment support structure:** Equipment support structure shall be provided as per Employer's drawings during detailed engineering. The foundations of these structures include embedment/grouting of foundation bolts.
 - iii. **Switchyard 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.
 - a. However, Cable trench layout shall be prepared by vendor for approval of POWERGRID based on the cable trench sections available in Tender Drawings.
 - b. **Mode of measurement:** Cable Trenches shall be measured in running meters. The rate shall include the cost of all works such as excavation, PCC, RCC, Reinforcement Steel, Miscellaneous Structural Steel, inserts, embedment, NP-3 RCC Hume pipes in crossings sumps, RCC cover etc. required as per technical specification and drawings for successful completion of work are deemed to be included in quoted rate.
 - iv. **Bituminous Road including Road Crossing**
Bituminous Road including approach road (if any), shall be constructed as per POWERGRID standard drawings provided in tender. However, Road layout shall be prepared by vendor for approval.
 - v. **Drains:** Drain layout including peripheral drains if any required along the boundary shall be prepared by vendor and to be submitted for approval of POWERGRID based on the standard sections. Diversion of existing Nallah/ Surface runoff, if required, the design & drawing of drains shall be prepared by contractor along with the drain layout and same shall be submitted to POWERGRID for approval. Payment shall be made under respective items of BPS.”
 - vi. **Foundation of Reactor:**
Foundation of Reactors including Rail cum road, unloading platform, jacking pad, Oil tank, pulling blocks, sump pit, gratings, Fire wall etc. as per technical specification. Foundations Drawings shall be submitted for approval of the Employer.
- 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.
- 2.4 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.
- 2.5 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 (for existing substations) and acquaint themselves with the topography, infrastructure and also the design philosophy. The bidder shall be fully responsible for providing all equipment, materials, system and services specified or otherwise which are required to

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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. The complete design (unless specified otherwise in specification elsewhere) and detailed engineering shall be done by the Contractor based on conceptual tender drawings.

- 2.6 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.
- 2.7 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.
- 2.8 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.

3.0 SPECIFIC EXCLUSIONS

The following items of work are specifically excluded from the scope of the specifications

A) Sundergarh S/S

- i) Employer's site office and stores.
- ii) Transit camp.
- iii) Store building.
- iv) Supply, erection, testing & commissioning of 765Kv, 80 MVA, 1 phase Reactor.
- v) Tariff Meter(s)
- vi) Battery and Battery charger
- vii) Approach Road and Boundary Wall

4.0 PHYSICAL AND OTHER PARAMETERS

- 4.1 Location of the Substation - The location of substation is indicated below:

Sr. No	Name of Substation	Name of State	Nearest Rail Head
1.	765/400/kV Sundergarh S/S	Odisha	Rourkela/Jharsuguda

4.2 Meteorological data

The meteorological data are as below

Station Name	765/400/kV Sundergarh S/S
Altitude	Less than 1000 meters above mean sea level (MSL)
Snow fall	NIL
Seismic Zone	Zone-II as per IS 1893 (Part 1)

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Wind Zone	II
Min./Max. Ambient Temperature	0 / 50 degree centigrade
Coastal Area consideration	No

4.3 Fault level shall be considered as mentioned below:

Sl. No.	Name of Substation	765KV	400kV	220kV	132kV
1.	765/400KV Sundergarh S/S	50 kA for Sec	63kA for 1 Sec	NA	NA

5.0 SCHEDULE OF QUANTITIES

The requirement of various items/equipments and civil works are indicated in Bid price Schedules. All equipments/items, Structures and civil works for which quantities have been given in 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.

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

The 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. Items which explicitly may not appear in various schedules and required for successful commissioning of substation shall be included in the bid price and shall be provided at no extra cost to Employer.

6.0 BASIC REFERENCE DRAWINGS

6.1 The substation shall be designed considering current ratings/conductor configuration as indicated below:

Sl. No	Description of bay	765/400KV Sundergarh S/S	
		765kV	400kV
1.	Bus Bar	4000 A	4000 A
2.	Line bay	3150 A	3150 A
3.	ICT bay	3150 A	3150 A
4.	Bus Reactor Bay	3150 A	3150 A
5.	Switched Line Reactor Bay	3150 A	3150 A

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6.2 Following switching schemes are proposed for the substations envisaged under this specification:

Name of s/s	765kV	400kV	132 kV
765/400KV Sundergarh S/S	One & half breaker scheme (I type)	One & half breaker scheme (I type)	NA

6.3 The bidder shall maintain the phase to earth clearance, phase to phase clearance and sectional clearances, clearances between buses and bus heights but may alter the locations of equipment to obtain the statutory electrical clearances required for the substation.

6.4 It is the responsibility of contractors to develop general arrangement drawing, layout drawings, single line drawing, foundation & cable trench layout, erection key diagram & all other layout drawings for present scope of work.

7.0 DIFFERENT SECTIONS OF TECHNICAL SPECIFICATION

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

1	Section-Project	Rev 00
2	Section-General Technical Requirement (GTR)	Rev 15
3	Section- 765 KV Shunt Reactor, Neutral Grounding Reactor And Surge Arrester	Rev 8
4	Section-Switchgear- CB	Rev 12
5	Section-Switchgear-Surge Arrester	Rev 13
6	Section-Power and Control Cables	Rev 06
7	Section-Fire Protection System	Rev 06
8	Section-Switchyard Erection	Rev 10
9	Section- Structures	Rev 07
10	Section-Civil Works	Rev 12
11	Section-Control and Relay Panels	Rev 09
12	Section-Substation Automation System	Rev 04
13	Section-Project Specific Requirement	Rev. No 10

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, the requirement of individual equipment section shall prevail.

8.0 SPARES

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.

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 purposes shall be taken back by the contractor.

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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.

9.0 SPECIFIC REQUIREMENT

- 9.1** Relevant/applicable clauses of Specific Requirements as mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no. 10 shall also be referred for specified scope of work. Any discrepancy between Section-PROJECT and Specific Requirements as mentioned at C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT Rev. no. 10 on scope of works, the requirement stipulated at section project shall prevail.

9.2 Annexure-S1 attached to Specific requirement rev 10 stands revised.

S. No.	Clause No.	Amended As
1.	Clause no 1.1.4	Refer Annexure-S1 (Revised) for METHODOLOGY FOR SIZING OF CABLES

- 9.0** Establishment of CCTV System for Construction Monitoring of entire switchyard shall be as per Sl. No. A.7 of SPECIFIC REQUIREMENT Rev. no 10 enclosed.

- 9.1** In Section-GTR and other technical specifications, the term ‘Employer and/or ‘Purchaser may be read as Employer

9.2 Clause under Sl. No. 13.3 of GTR (REV NO 15) is modified as follows: -

For new as well as substation extn packages, the contractor must ensure that the open storage platform is constructed for storage of outdoor type equipment/material prior to commencement of delivery at site. Outdoor equipment shall be stored on open storage platform, properly covered with waterproof and dustproof covers to protect them from water seepage and moisture ingress.

In case of extn packages wherein vacant outdoor facility is existing at Substation premises, same shall be made available to contractor for storage of equipment without any financial implications. Same shall be allowed with approval of Engineer In-charge subject to availability at the time of execution on as and where basis. Notwithstanding the same, sole responsibility of security & upkeep of storage facilities lies with Contractor.

However, all indoor equipments including control & protection panels, Communication equipments and operating mechanism boxes etc. of outdoor equipments shall be stored indoors.

Storage of equipment on top of another one is not permitted if the wooden packing is used and there is possibility of equipment/ packing damage. Material opened for joint inspection shall be repacked properly as per manufacturer’s recommendations. During storage of material regular periodic monitoring of important parameters like oil level / leakage, SF6 / Nitrogen pressure etc. shall be ensured by the contractor.

9.3 Clause under Sl. No. 13.9 of GTR (REV NO 15) is modified as follows:

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For new as well as substation extn packages, the Contractor shall be responsible for making suitable indoor storage facilities, to store all equipment which requires indoor storage.

In case of extn packages wherein vacant indoor facility is existing at Substation premises, same shall be made available to contractor for storage of indoor equipment without any financial implications. Same shall be allowed with approval of Engineer In-charge subject to availability at the time of execution as on and where basis. Notwithstanding the same, sole responsibility of security & upkeep of storage facilities lies with Contractor.

9.4 New Clause under Sl. No. 13.15 of GTR (REV NO 15) is as follow: -

Contractor is responsible for assessment of existing storage facility/space for adequacy and suitability for intended storage of equipment. In case of non-availability of suitable existing storage facility/space in existing substation premises, the contractor shall make his own necessary arrangements at his own cost so that progress of work is not affected and Employer shall in no case be responsible for any delay in works because of non-availability of storage facility.

9.5 Clause no C. Section Switchgear -CB Rev 11 of Specific requirement (Rev 10) stands deleted.

9.6 All substations proposed to be established or extended under the present scope are situated in non-coastal areas. Hence, all the specifications defined for coastal areas in various sections of Technical Specifications shall not be considered applicable. However, creepage distance of all switchyard equipments at *New and extension substations under the subject package* shall be supplied with minimum creepage distance of 31mm/kV.

9.7 Clause under Sl. No. A.5. of SPECIFIC REQUIREMENT (REV NO 10), Clause No. 9.2 of Section GTR rev 15 is modified 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 requirements. 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 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

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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 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
 - i. No change in the Design,
 - ii. No change in the material,
 - iii. No change in manufacturing process, and
 - iv. 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 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.

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