

POWER GRID CORPORATION OF INDIA LTD.

(A Government of India Enterprise)

TECHNICAL SPECIFICATION

FOR

Transmission Line Package TL01 for i) Diversion of existing POWERGRID lines infringing proposed Rewa -Sidhi-Singrauli New Broad Gauge Railway Track Project of West Central Railway (WCR) under consultancy services to WCR Jabalpur ii) Diversion of existing POWERGRID lines infringing proposed Railway track between Sahjanwa to Dohrighat by NER Construction, Gorakhpur under consultancy services to NER Construction, Gorakhpur.

VOLUME-II

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TECHNICAL SPECIFICATION
(VOLUME-II)
CONTENTS

SECTION-I A	SCOPE
SECTION-I B	GENERAL INFORMATION
SECTION-II	GENERAL TECHNICAL CONDITIONS
SECTION-III	SURVEY AND SOIL INVESTIGATION
SECTION-IV A	TOWER DESIGN
SECTION-IV B	TOWER TESTING
SECTION-IV C	FABRICATION, ERECTION AND STRINGING
SECTION-IV D	FOUNDATION (CONTRACTOR DESIGN)
SECTION-IV E	FOUNDATION (EMPLOYER DESIGN)
SECTION-IV F	POLE STRUCTURE, FOUNDATION AND ERECTION
SECTION-V	GALVANISED STEEL EARTHWIRE
SECTION-VI A	HARDWARE FITTINGS & ACCESSORIES
SECTION-VI B	CLAMP FITTINGS AND ACCESSORIES FOR HTLS CONDUCTOR
SECTION-VII A	CONDUCTOR
SECTION-VII B	HTLS CONDUCTOR
SECTION-VIII	COMPOSITE LONGROD INSULATOR
SECTION-IX A	PILE FOUNDATION
SECTION-IX B	STONE COLUMN
SECTION-X	OPGW
SECTION-XI	DRAWINGS
SECTION-XII	FAQ
SECTION-XIII	TOWER SCHEDULE OF EXISTING LINE (only applicable for Re-conductoring packages)

SECTION-I A

SCOPE

TECHNICAL SPECIFICATIONS

SECTION-I A

SCOPE

Revision History

Revision No.	Date	Clause Ref	Description
Rev-0	June'2021		First Release
Rev-1	Sept'2021		First Revision
Rev-2	Oct'2021		Second Revision
Rev-3	Jan'2022		Third Revision
Rev-4	Apr'2022		Fourth Revision
Rev-5	July'2022		Fifth Revision
Rev-6	Feb'2023		Sixth Revision
Rev-7	Sept'2023	2.1.1.1	Seventh Revision
Rev-8	Dec'2023	3.4 (v)	Eighth Revision
Rev-9	March'20 24		Ninth Revision
Rev-10	Jan'2025		Tenth Revision
Rev-11	Jan'2025	1.2 (xxvii)	Eleventh Revision
Rev-12	Jan'2025		Twelfth Revision
Rev-13	May'2025		Thirteen Revision
Rev-14	June'2025	1.4	Fourteenth Revision
Rev-15	Sept'2025		Fifteenth Revision
Rev-16	Oct'2025		Sixteenth Revision
Rev-17	Jan'2026		Seventeenth Revision
Rev-18	Feb'2026		Eighteenth Revision
Rev-19	March'20 26		Nineteenth Revision

TECHNICAL SPECIFICATIONS

SECTION-I A

SCOPE

CONTENTS

Clause No.	Description	Page No.
1.0	Scope	1
2.0	Transmission towers & line data	4
3.0	Different Sections to Technical Specification	7
4.0	Service Condition	8

TECHNICAL SPECIFICATIONS

SECTION- I A

SCOPE

1.0 Scope

1.1 The diversion of following transmission lines are included in the scope of the Contractor under the package:

Package – TL01

- a) ± 500 kV HVDC Rihand–Dadri Line
- b) 400kV S/C Singrauli–Allahabad II Line
- c) 400kV S/C Singrauli–Allahabad III Line
- d) 400kV S/C Singrauli–Lucknow Line
- e) 400kV S/C Singrauli–Fatehpur Line
- f) 400kV S/C Singrauli–Fatehpur I Line
- g) 400kV D/C (Quad) Gorakhpur–Motihari Line
- h) 400kV D/C Gorakhpur–Gorakhpur Line
- i) ± 800 kV HVDC BNC Agra Line

1.2 This Specification covers the following scope of works:

- (i) Detailed survey including route alignment, profiling, tower spotting, optimization of tower locations, soil resistivity measurement & geotechnical investigation (including special foundation locations viz. pile/well foundation locations, whenever applicable & covered under BPS);
- (ii) Check survey.
- (iii) Fabrication and supply of all type of transmission line Towers as per Employer's design/drawings including River crossing towers (wherever applicable) including fasteners, step bolts, hangers, D-shackles etc.;
- (iv) Supply of all types of tower accessories like phase plate, circuit plate (where ever applicable), number plate, pole plate (where ever applicable), danger plate, anti-climbing device, Bird guard, (where ever applicable);
- (v) Buy-back of dismantled material (if required & covered under BPS)
- (vi) Supply of
 - a) Earth wire
 - b) Hardware Fittings and accessories for Conductor/Earth wire
 - c) Conductor (ACSR Bersimis, ACSR Lapwing & ACSR Moose)
 - d) Insulators (Composite Longrod Polymer)
 - e) OPGW & associated fittings & accessories.

- (vii) Classification of foundations for different type of towers and Casting of Foundations for tower footings as per Employer's foundation design/drawing;
- (viii) Supply & Installation of Tower Earthing.
- (ix) Supply & installation of Insulated Conductor sleeve, (if required & covered under BPS);
- (x) Supply & installation of Bird Diverter, (if required & covered under BPS);
- (xi) Erection of towers by using crane (wherever feasible), tack welding of bolts and nuts including supply and application of zinc rich paint, fixing of insulator strings, stringing of conductors and earth wires/OPGW along with all necessary line accessories. For transmission lines, to promote mechanization and safe working conditions, use of crane is being promoted. However, where usage of crane is not possible, erection of towers has to be carried out by conventional method i.e using Gin pole, Derrick, Centre mast etc. through usage of Power Operated Winch Machines. No tractor shall be allowed for tower erection.;
- (xii) Destraining & dismantling of existing 765/400/220/132/66kV Transmission line. (whenever applicable & covered under BPS)
- (xiii) Stringing of Power line crossing section under Live Line Condition (where ever applicable & covered under BPS);
- (xiv) Cable bypass arrangement of 11KV/33KV/LT Powerline crossing. (whenever applicable & covered under BPS)
- (xv) Stringing of transmission line through Drones (whenever applicable & covered under BPS).
- (xvi) Painting of towers & supply and erection of span markers, obstruction lights (whenever applicable) for aviation requirements (as required).
- (xvii) Testing and commissioning of the erected transmission lines and
- (xviii) Other items not specifically mentioned in this Specification and/or BPS but are required for the successful commissioning of the transmission line, unless specifically excluded in the Specification.
- (xix) The installation/stringing of OPGW cable along with associated fittings & accessories shall be carried out by the contractor. The scope of installation/stringing shall include splicing, termination, testing, demonstration for acceptance & commissioning as well as documentation. Splicing is preferred to be carried out at Tension towers locations. However, it shall be permitted at Suspension Tower locations also as required due to site conditions. The installation/stringing and splicing shall be carried out as per owner guidelines (provided as part of TS). The FODP & Approach cable shall also be installed by the Contractor (where ever applicable as per BPS).
- (xx) The use of suitable Heavy-Duty Composite Mats (HDCM) for making temporary access road, equipment staging area, movement of heavy machineries like JCBs, Pokelane, earthmovers, Tension Stringing

Equipment's, Cranes, Concrete Mixers, etc. in paddy fields, Swampy, Marshy, Muddy, Sandy and Partially submerged area, etc. shall also be in the scope of contractor. The Provisional quantities of locations where Heavy-Duty Composite Mats required to be used are indicated in the relevant Price Schedules of BPS.

1.3 Destraining/ Dismantling

- 1.3.1 The scope of works includes destraining of conductor, earthwire & OPGW, removal of hardware fittings, insulators, conductor, earthwire & OPGW accessories, etc. and dismantling of tower from some sections of existing 400kV/ 765 kV/ +/-500kV HVDC/ +/-800kV HVDC line and transporting of dismantled materials to designated POWERGRID stores. The Employer shall arrange shut down of charged sections of existing transmission lines, if required, before carrying out destraining & dismantling works as per program finalized in co-ordination with site. Appropriate safety measures along with necessary safety tools and equipments to carry out destraining and stringing operations under the above conditions including mechanical/ structural safety of the towers shall be the responsibility of the contractor. The entire quantity of dismantled line materials viz. tower parts, conductor, earthwire, OPGW, hardware fittings, insulators and conductor, earthwire & OPGW accessories removed from the existing line shall be transported to the designated POWERGRID stores by the contractor at his own cost. The Bidder shall submit his offer taking into consideration transportation cost of the dismantled material.
- 1.3.2 The contractor shall inspect the affected stretch of transmission lines and shall accordingly devise appropriate methodology/procedure of carrying out the destraining/restringing works during detailed engineering & execution stage in consultation with the site-in-charge.

1.4 Details of Transmission Line Routes and Terrain

The detailed survey shall be carried out using Total stations along the approved route alignment. As an alternative, the contractor may also use ALTM (Airborne Laser Terrain Modeling) techniques of equal or better accuracy for the detailed survey.

Quantity of detailed survey including route alignment, profiling, tower spotting, optimization of tower locations, soil resistivity measurement & geotechnical investigation etc. of lines have been indicated in the BPS.

- 1.4.1 Bidders may visit the line route to acquaint themselves with terrain conditions and associated details of the proposed transmission lines. For this purpose they are requested to contact the following address:

**POWER GRID CORPORATION OF INDIA LTD.
Northern Region Transmission System-III**

Regional Headquarter
Plot No. 2A/I.N.S 02, Awadh Vihar Yojana,
Amar Shaheed Path, Lucknow (UP) -226002

1.5 Location Details and Terminal Points

- 1.5.1.1 I) Diversion of following portions of existing transmission lines infringing proposed Rewa Sidhi-Singrauli New Broad Gauge Railway Track Project of West Central Railway (WCR) :
- a) ± 500 kV HVDC Rihand–Dadri Line
 - b) 400kV S/C Singrauli–Allahabad II Line
 - c) 400kV S/C Singrauli–Allahabad III Line
 - d) 400kV S/C Singrauli–Lucknow Line
 - e) 400kV S/C Singrauli–Fatehpur Line
 - f) 400kV S/C Singrauli–Fatehpur I Line
- II) Diversion of following portions of existing transmission lines infringing proposed Railway track between Sahjanwa to Dohrighat by NER Construction, Gorakhpur:
- a) 400kV D/C (Quad) Gorakhpur–Motihari Line
 - b) 400kV D/C Gorakhpur–Gorakhpur Line
 - c) ± 800 kV HVDC BNC Agra Line

The transmission lines are passing through Plain area.

- 1.5.2 The Contractor shall have to construct the transmission line portions, covered under the tower package, completely up to suitable towers of the aforementioned transmission lines being diverted as per approval of Engineer-in Charge. Stringing shall also be carried out for the diverted portion of the above transmissions line so as to make it ready in all respect for power flow between the terminal stations.

2.0 Transmission towers and Line data

2.1 General Description of the Tower

- 2.1.1 The transmission towers covered under the package are of self-supporting hot dip galvanized lattice steel type, designed to carry the line conductors with necessary insulators, earth wire, OPGW(If applicable) and all fittings under all loading conditions. Outline diagram of towers are enclosed with the Specification.

- 2.1.2 The towers shall have mild steel or/and high tensile steel sections and shall be fully galvanized as specified in relevant clauses in section-IV. Bolts and nuts with spring washer are to be used for connections.

- 2.1.3 The towers are of the following types:

- A) Single Circuit
- B) Double Circuit

2.2 Classification of Towers

2.2.1 The towers for ± 800 kV HVDC/ ± 500 kV HVDC/400 kV Single Circuit/400 kV Double Circuit Lines are classified as given below:

SI No	Type of Tower	Deviation Limit	Typical Use
1	A/DA	0 – 2 deg.	To be used as Tangent tower.
2	B/DB	0 deg.	To be used as Section Tower.
		0 - 15 deg.	a) Angle towers with tension Insulator string.
			b) Also to be used for uplift force resulting from an uplift span up to 200m under broken wire conditions.
c) Also to be used for Anti Cascading Condition.			
3	C/DC	0 deg.	To be used as Section Tower.
		15-30 deg.	a) Angle tower with tension insulator string.
			b) Also to be used for uplift forces resulting from an uplift span up to 200m under broken wire condition.
c) Also to be used for anti-cascading condition.			
4	D/DD	30 - 60 deg.	a) Angle tower with tension insulator string.
			b) Also to be used for uplift forces resulting from an uplift span up to 300m under broken wire condition.
			Dead end with 0 deg to 15 deg deviation both on line side and sub-station side (slack span)
		0 deg.	a) Complete Dead end

			b) For river crossing anchoring with longer wind span.
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Note:

1. The above towers can also be used for longer span with smaller angle of deviations without infringement of ground clearance.
2. The above table provides indicative classification of Towers. Tower spotting data for various towers to be used in the transmission lines under the specific package shall be given to the contractor during execution stage.
3. For Non-Snow Regions, the contractor may also use IS Steel Sections including plates of any tested quality A or BR in conformity with IS 2062:2011 corresponding to grade E450 (Designated Yield Strength 450 MPa) in addition to provisions mentioned in clause 1.1.1 Section IV C for towers, extensions, stubs and stub setting templates

2.2.2 Special Towers

The towers which will be specially designed for very long spans which cannot be crossed by normal tower with extensions as given in relevant clause like Major River crossings etc. shall be treated as special towers.

2.3 Electrical Clearances

2.3.1 Ground Clearance

The minimum ground clearance from the bottom conductor shall not be less than 18000mm for ± 800 kV HVDC, 12500mm for ± 500 kV HVDC, 8840 mm for 400kV lines at the maximum sag conditions i.e. at max temperature as indicated in tower spotting data and still air.

- a) An allowance of 150mm shall be provided to account for errors in stringing.
- b) Conductor creep shall be compensated by over tensioning the conductor at a temperature as mentioned in section IV of this specification.-(applicable for lines with conductor other than HTLS)
- c) In case of HTLS conductor, Sag-Tension shall be carried out using PLSCADD considering Final values of modulus of elasticity, Coefficient of Linear Expansion, Stress-Strain coefficients & Creep coefficients of aluminium/ aluminium alloy / core in the cable data (.wir file) as mentioned at clause 1.5, Section -VII B.

2.4 Special Requirements

- 1) Clause 4.1.13 (type tests) under Section-VIA is modified as following:-

~~Type tests specified under Clause 4.1.1 to 4.1.12 shall not be required to be carried out if the same has been carried out if a valid test certificate is available for a similar design.~~

~~The test certificate shall be considered valid if,~~

The Supplier should have successfully completed all the following specified type tests for individual hardware fittings, accessories for conductor &

earthwire and complete strings. However, the manufacturers who have already tested, manufactured and supplied a particular type/ rating of hardware fittings and accessories for conductor & earthwire for Transmission lines against POWERGRID projects shall be deemed to have met the above type test requirements for that particular type/ rating of hardware fitting and accessories for conductor & earthwire.

The supplier shall submit copies of type test reports. The tests certificate shall be considered valid if:

2) Clause 4.1 (type tests) under Section-VIII is modified as following:-

The required type tests on composite longrod units, components, materials and complete strings are stipulated hereunder.

The Supplier should have successfully completed all the following specified type tests for individual units and complete strings. However, the manufacturers who have already tested, manufactured and supplied a particular type/ rating of composite longrod insulators for Transmission lines against POWERGRID projects shall be deemed to have met the above type test requirements for that particular type of composite insulator.

The supplier shall submit copies of type test reports. The tests certificate shall be considered valid if:

~~The specified type tests under the following clause shall not be required to be carried out if a valid test certificate is available for a similar design. The tests certificate shall be considered valid if:~~

3.0 Different Sections to Technical Specification

3.1 For the purpose of present scope of work, technical specification shall consist of following parts and they should be read in conjunction with each other: -

Sl. No.	Section Number	Name of Section	Rev No.
1	Section-IA	Scope	Rev-19 (March'2026)
2	Section-IB	General Information	Rev-14 (Sept'2025)
3	Section-II	General Technical Conditions	Rev-4 (Jan'2026)
4	Section-III	Survey and Soil Investigation	Rev-8 (Sept'2025)

5	Section-IVC	Fabrication, Erection and Stringing	Rev-11 (Feb'2026)
6	Section-IV E	Foundation (Employer Design)	Rev-8 (Sept'2025)
7	Section-V	Galvanised Steel Earthwire	Rev-2 (March'2026)
8	Section-VIA	Hardware Fittings and Accessories for Conductor & Earthwire	Rev-4 (March'2026)
9	Section-VIIA	Conductor	Rev-4 (March'2026)
10	Section-VIII	Composite Longrod Insulators	Rev-5 (March'2026)
11	Section-X	OPGW	Revision (June'2024)
12	Section-XI	Drawings	Rev-2 (Jan'2025)
13	Section-XII	FAQ	Rev 0 (June'2021)

3.2 In case of any discrepancy between Section-IA (Scope) and Section-IB (General Information) and other technical specifications on scope of works, Section-IA (Scope) shall prevail over all other sections.

3.3 In case of any discrepancy between Section-IB (General Information) and individual sections for various equipment, requirement of individual equipment section shall prevail.

4.0 Service Conditions:

Equipment/material to be supplied against this specification shall be suitable for satisfactory continuous operation under tropical conditions as specified below:

Maximum ambient temperature (°C)	50
Minimum ambient temperature (°C)	0
Relative humidity (% range)	10-100
Wind zone (as per NBC)	2/4
Terrain Category	2
Maximum wind velocity (m/sec.)	39/47
Maximum altitude above mean sea level (Meters)	Below 1000m
Isokeraunic level (days/years)	60

Moderately hot and humid tropical climate conducive to rust and fungus growth.