

POWER GRID CORPORATION OF INDIA LTD.

(A Government of India Enterprise)

**TECHNICAL SPECIFICATION
FOR TW33B FOR BALANCE WORK OF
TW10 & TW12
VOLUME-II**

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(VOLUME-II)
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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'2024		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'2026		Nineteenth Revision
Rev-20	April'2026		twentieth Revision

TECHNICAL SPECIFICATIONS

SECTION-I A

SCOPE

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TECHNICAL SPECIFICATIONS

SECTION- I A

SCOPE

1.0 Scope

- 1.1 Balance work of the following transmission lines is included in the scope of the Contractor under instant package:

Package – TW33B

132kV S/C on D/C Rilo - Sagalee TL

132kV S/C on D/C Naharlagun – Kolapukar TL

- 1.2 This Specification covers the following scope of works:

- (i) Detailed survey including route alignment, profiling, tower structure spotting, optimization of tower structure 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 (wherever 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) Hardware Fittings and accessories for Conductor
 - b) Conductor
 - c) Insulators
- (vii) Classification of foundations for different type of towers and Casting of Foundations for tower structure footings as per Employer's foundation design/ drawing;
- (viii) Supply & Installation of Tower structure 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 structure 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. (wherever applicable & covered under BPS)
- (xv) Stringing of transmission line through Drones (wherever applicable & covered under BPS).
- (xvi) Painting of towers structures & supply and erection of span markers, obstruction lights (wherever 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).

1.3 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 structure spotting, optimization of tower structure locations, soil resistivity measurement & geotechnical investigation etc. of lines have been indicated in the BPS.

- 1.3.1 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:

CGM Projects (Comprehensive Scheme Arunachal Pradesh)

POWER GRID CORPORATION OF INDIA LTD.
H/O Mr Bidol Tayeng, 4th level Flat,
Senky Veiw Road, Niti Vihar
Itanagar, Arunachal Pradesh-791111

1.4 Location Details and Terminal Points

1.4.1 The transmission line shall emanate from following substation/switchyard in the State of Arunachal Pradesh and terminate at respective substation in the State of Arunachal Pradesh

Sr. No	Line Name	Emanating from	Terminate into
1	132kV S/C on D/C Rilo - Sagalee TL	Arunachal Pradesh	Arunachal Pradesh
2	132kV S/C on D/C Naharlagun – Kolapukar TL	Arunachal Pradesh	Arunachal Pradesh

The transmission lines are passing through Hilly Zone area.

1.4.2 The Contractor shall have to construct the transmission line portions, covered under the tower package, completely up to dead end towers at either/substation end. Stringing shall also be carried out from dead end tower to terminal arrangements/terminal points.

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) Double Circuit

2.2 Classification of Towers

2.2.1 The towers for 132 kV Double Circuit Lines shall be of Vertical Configuration and are classified as given below:

Sl No	Type of Tower	Deviation Limit	Typical Use

1	DA	0 – 2 deg.	To be used as Tangent tower.
2	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	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	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.
5	D/DD/ QD*	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.
		0 deg.	a) For river crossing anchoring with longer wind span

6	SDE/DDE/ QDE*		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

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 Special Towers
4. 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 6100 mm for 132KV 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 -VIIB.

3.4 Special Requirements

Certain line items as mentioned in the installation portion under activity TRANSPORTATION of the BPS are stored at following POWERGRID Designated Store

For 132KV Rilo- Sagalee line TL

Store, C/o Tech Pitchu , Village:- Lower gai,
PO & PS :- Sagalee Papum Pare District,

For 132kV Naharlagun - Kolapukar TL

Hawa Camp store ,
Papumpare district,
Arunachal Pradesh

The contractor scope includes transportation of these line items from POWERGRID Designated Store mentioned above to contractor store/site for further use in the transmission line as per the instruction of the Site-in-charge. The contractor shall sort the usable items at POWERGRID Designated store before transportation. Transportation of the line items shall include packing, safe loading and unloading, proper stacking at site/intermediate storage etc. if any.

As Transmission line covered under the subject packages passes through Hilly area, following requirements shall replace/supplement the requirements in different sections of the Technical Specification: -

- i) **Weight span to be considered in design of the towers in place of weight span specified in Table 1.3.2 of Section-IVA:-**

Sl. No.	Tower Type	Normal Condition		Broken wire condition	
		Maximum (m)	Minimum (m)	Maximum (m)	Minimum (m)
1	DA	488	195	195	104
2	DB	1000	-1000	600	-600
3	DC	1000	-1000	600	-600
4	DD	1500	-1500	900	-900
5	Dead End condition for DD	300	0	60	0
6	Dead End with Slack Span condition for D/DD/QD	450	0	330	-300

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-20(April'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-9 (April'2026)
5	Section-IVA	Tower Design	Rev-7 (Jan'2025)
6	Section-IVB	Tower Testing	Rev-3 (Dec'2023)
7	Section-IVC	Fabrication, Erection and Stringing	Rev-11 (Feb'2026)
8	Section-IVD	Foundation (Contractor Design)	Rev-9 (Sept'2025)
9	Section-IV E	Foundation (Employer Design)	Rev-8 (Sept'2025)
10	Section-IV-F	Pole Structure, Foundation and Erection	Rev-3 (Oct'2025)
11	Section-V	Galvanised Steel Earthwire	Rev-2 (March'26)
12	Section-VIA	Hardware Fittings and Accessories for Conductor & Earthwire	Rev-4 (March'26)
13	Section-VIB	Clamp Fittings and Accessories for HTLS Conductor	Rev-3 (March'26)
14	Section-VIIA	Conductor	Rev-4 (March'26)
15	Section-VII B	HTLS Conductor	Rev-8 (March'26)
16	Section-VIII	Composite Longrod Insulators	Rev-5 (March'26)
17	Section IX-A	Pile foundation	Rev-6 (Oct'2024)
18	Section IX-B	Stone Column	Rev-0 (Dec'2023)
18	Section-X	OPGW	Revision (June'2024)
20	Section-XI	Drawings	Rev-2 (Jan'2025)
21	Section-XII	FAQ	Rev 0 (June'2021)
22	Section-XIII	Tower Schedule of Existing Line (only applicable for Re-conductoring packages)	

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)	3/5
Terrain Category	2
Maximum wind velocity (m/sec.)	44/50
Maximum altitude above mean sea level (Meters)	1000-2000m
Isokeraunic level (days/years)	60

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