



ODISHA POWER TRANSMISSION CORPORATION LIMITED

TECHNICAL SPECIFICATION

FOR

MANUFACTURERS DRAWING, TEST CERTIFICATES

AND

(O &M) MANUALS

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TECHNICAL SPECIFICATION FOR DRAWINGS, TEST CERTIFICATE & O&M MANUALS

1. DRAWINGS, TEST CERTIFICATES, OPERATING AND MAINTENANCE MANUAL.

2. GENERAL

Separate drawings shall be prepared and submitted for equipment/installation pertaining to each substation/site.

All drawings to be furnished by the Bidder shall be in standard size of sheets with maximum size being A0. Drawings shall contain the following particulars in the title block at lower right hand corner in addition to the Bidder's name, date, scale, drawing number title, etc.

- a) Client : OPTCL
- b) Project Title:- PROJECT for System improvement for (*AS PER PACKAGE DESCRIPTION)

A blank space of size 100 mm x 100 mm shall preferably be provided for the Employer's approval stamp and provision shall also be made by way of a block for details of revisions to be recorded. The drawing number shall be marked with a subsequent revision number every time the drawing is revised. The drawing title shall also identify name of the substation/site.

The equipment/systems which are to be bought out from the sub vendors are also required to be approved by the Employer prior to placement of order. The relevant technical literature/drawings pertaining to such equipment/systems shall be submitted for approval.

Six copies of each of the drawings are to be submitted for approval of Employer. Bidder shall ensure that the contents of copies of drawings are legible and are complete with all details. Drawings that are not legible or are incomplete will not be reviewed.

Two copies of approved drawings will be furnished to the Bidder. Drawings returned "not approved"/ "approved with comments" shall be resubmitted with Revision No. for approved till the final approval is obtained.

Delays caused by submission of incomplete/ incorrect drawings shall be to Bidder account.

Drawings submitted by sub-vendor/sub-contractor shall carry Bidder's approval stamp and the Bidder shall be responsible for their contents, accuracy and completeness. These drawings shall also carry details indicated in this Clause in addition to the Bidder's name.

3. DETAILED DRAWINGS

The bidder shall submit to the Employer all working drawings, equipment data and detailed drawings. These shall include general arrangement, details of equipment, foundations, cable routing, openings in walls and floors, wiring diagrams, cable schedules, interconnection diagrams etc. necessary for the erection of plant. These drawings/data having been corrected or amended as necessary based on the Employer's comments shall become the approved drawings/data to be used for manufacture and erection of plant.

Minimum details required on drawings of different categories are given below:

Type of Drawing.	Minimum details required.
List of Drawing	: A detailed list of drawings which The bidder proposes to prepare for The substation in indicating therein Drawing nos. and titles.
Programme:	1)All activities from the start Date up to commissioning shall Be included. Separate Programme shall be furnished for each of the activities.
2)	Earliest and latest occurrence of each activity.
3)	Constraints, if any.

The activities for each of the items shall essentially cover time-table for activities such as placement of order with sub-vendors, Empowering, submission of drawing, review and approval by the Employer, manufacture, inspection, delivery, erection and commissioning. All events shall be represented in a proper in proper sequence of occurrence with due consideration for inter-dependent activities and all period shall be counted from the start date.

Type of Drawing	Minimum details required
Single line diagrams.	<ol style="list-style-type: none">1. All equipment connection with ratings, polarities, protection and metering details, etc.2. Cable details for all circuits.3. Details of relays, meters and Major components associated with each circuit.4. Busbar details, makes of equipment/ Components etc.

**General Arrangement
(All equipment,
cabling earthing,
lightning protection,
lighting etc.)**

5. Reference Drawings.
 - 1) Dimensional layout drawings covering complete layout of these items/systems.
 - 2) Plans and sections as required to show details, access space/ Clearances etc.
 - 3) Details of foundations, cutouts. Openings, supporting/mounting Details etc. indicating weight on foundation.
 - 4). Bill of material and identification of components/rooms/ areas etc.
 - 5). Reference drawings.

Installation Drawings

Details of installation for equipment, accessories, cabling, lighting, earthing and lightning protection systems. These shall cover cross sectional details, cable trays/cable layouts for cables directly buried/along cable trays/ in conduits/along structures etc. details of marshalling boxes, embedment of conduits at building entry points/between cable trenches and structures, mounting arrangements and wiring for lighting fixtures, installation of earthing conductors directly buried/along structures, jointing/terminations (between conductors and at equipment ends), earth electrodes and pits, lightning shield wire, earth pads to be provided at specific places etc.

a. RECORD DRAWING

Within 6 (six) weeks of successful commissioning tests, the Bidder shall furnish the 'Record' (As Built) drawings. Submission to and approval by the Employer of the 'Record' drawing shall be pre-requisite for the 'Taking Over Certificate.' The drawing shall show the whole sub-station as installed and shall include electrical/mechanical and civil components with schematic and wiring diagrams for all items of electrical equipment included in the works. Six sets of recur drawings shall be furnished in neatly bound volumes. Reduced copies of the relevant drawings shall be included in the operating and maintenance manual.

b. SPECIFIC REQUIREMENT

Following drawings shall be enclosed with the bid :

- a) The programme shall be in the form of a network based on the principles of PERT/CPM. Detailed to cover entire scope of the project showing all activities (separately for each sub-station/site). Their durations start and finish dates and their inter-relationships.
- b) Dimensioned general arrangement drawings showing plan, elevation and sections together with identification of parts/accessories, etc. for the major plant items, viz. 132 KV/33 KV. Outdoor transformer and equipment, 415 V A.C. and 220 V A.C. system

equipment, control, relay and metering panels, communication equipment, lighting equipment along with manufacturer's catalogues/literature, etc.

Following information/drawings shall be submitted after the award of contract for approval of the Employer.

- (a) Updated programme along with the list of drawings.
- (b) Detailed design calculations for electrical, mechanical and civil equipment and systems etc. including design calculation of earthing grid and illumination system.
- (c) 33 KV/433 V transformer.
- (d) General arrangement drawing, showing plan, front and side elevations and all accessories and fittings. Detailed dimensions, net and shipping weights, crane lift for un tanking, size of lifting lugs and eyes, clearances between HV terminals, LV terminals and to ground and between adjacent bushing identification for fittings and accessories, enter lines in both the directions, details of anti-earthquake clamping device, details of HV/LV bushings. LV box foundation details, detailed manufacturer's catalogues/literature of accessories actually being supplied.
- (e) Rating and terminal marking plate, showing polarity vector group and other details.
- (f) GA drawing of OLTC and Marshaling Box.
- (g) Control and wiring diagram for OLTC marshalling box and cooler system.

(1) 400KV,220KV,132KV AND 33KV outdoor type sub-station equipment:

- (i) Detailed dimensional plan and sections for each equipment and for the sub-station indicating therein salient features of equipment, detailed bill of material for equipment, identification of clamps and connectors, etc. including weight of different equipment.
- (ii) Cable trench, lighting, earthing and lightning protection drawings for outdoor areas, control room drawings for equipment layout, cabling, lighting and earthing systems.
- (iii) Detailed drawings for the sub-station structures, equipment and clamps/ connectors.
- (iv) Foundation layout drawings.
- (v) Control and protection schematic diagrams.
- (vi) Detailed one-line diagrams.
- (vii) Block logic diagrams.
- (viii) Cable schedules and inter-connection wiring diagrams in detail including all interlocking schematics.
- (ix) Typical installation detailed drawings.
- (x) Architectural and other civil drawings including that of state quantum.
- (xi) Manufacturer's catalogues/literature etc. of equipment being supplied.

(2) 400KV/220KV/132 KV/33 KV SF6 Circuit Breaker.

- (I) Complete assembly drawing of the Circuit Breaker showing plan, elevation and control cable terminal blocks.
- (ii) Foundation plan showing the location of channel sills, foundation bolts.
- (iii) Schematic diagram (AC and DC) for control protection, indication, alarm and trip circuits, relays, instruments space heaters, etc.
- (iv) Complete wiring diagrams of Marshalling Kiosk including terminal wiring designation.
- (v) Cable terminal details with dimensions.

(vi) Manufacturer's catalogues/literature etc.

(3) Control, relay and metering panels, 415/V AC and 220 V DC distribution boards, lighting panels, etc.

(4) Fully dimensioned general arrangement drawings for each of the above complete with plan, elevation and sectional views and complete bill of material, foundation drawing and cable entry details.

(I) Schematic diagrams for all power, control, protection and indication circuits.

(ii) Alarm annunciation scheme drawings.

(iii) Wiring diagrams.

(iv) Manufacturer's catalogues/literature etc. for all items.

(5) 220 V DC Battery and Battery Chargers.

(i) Dimensioned general arrangement drawings of battery and battery charges comprising plan, elevation and sectional views, foundation details, etc.

(ii) Complete schematic and wiring diagrams for battery chargers.

(iii) Detailed bill of material together with rating makes etc.

(iv) Manufacturer's catalogues/literature.

a) LIGHTING SYSTEM

Lighting layout drawings for indoor and outdoor areas showing layout of lighting fixtures, conduit/cables, lighting circuit distribution scheme, complete bill of materials, locations of control switches, receptacles etc. and mounting details for fixtures, switches and receptacles as well as manufacturer's catalogues/literature.

b) EARTHING AND LIGHTNING PROTECTION SYSTEM

Layout drawings for earthing and lightning protection system showing earthing grid, locations of earth electrode3s, routes of conductor, interconnections, earth leads to various equipments, bill of materials, etc.

c) MISCELLANEOUS SYSTEM

Detailed general arrangement, schematic and other drawings, bill of material and manufacturer's catalogues/literatures.

d) TYPICAL INSTALLATION DRAWING

Cabling, lighting, earthing and lightning protection as well as miscellaneous system drawings showing all, necessary details.

c. SUBMISSION OF DRAWING

The list of drawings and the programme shall be submitted within 30 days from the start date.

All other drawings shall be submitted progressively thereafter within a maximum period of 180 days as per approved sequence of drawings to be submitted with the above period. But in no case the work progress should be hampered due to wrong/unscheduled sequence of drawings submission.

d. TEST CERTIFICATE

Type test certificates for the following items shall be furnished.

- a) 400KV, 220 KV, 132 KV and 33KV equipment like circuit Breaker, isolators, CTs, VTs and CVTs. Line traps, insulators, bushings, LAs, etc.
- b) Cables
- c) Clamps, connectors and hardwires.
- d) Transformers, OLTC etc.

Type test certificates shall be furnished for tests carried out on similar type/design of equipment. Type test to be carried out in presence of employer's representative for transformer.

7.1.1 ROUTINE TEST CERTIFICATES

Routine test certificates for all the plant items and accessories shall be furnished.

Routine test certificates shall be furnished in addition to test reports which will be collected at the time of inspection.

Routine test certificates shall be furnished for review by the Employer within seven (7) days after completion of inspection of relevant item or as instructed by the Employer in case of items for which witnessing of tests is waived.

Test certificates should be approved by the Employer for obtaining dispatch clearance of any material.

Six (6) copies of approved test certificates should be submitted for record.

7.1.2 OTHER DOCUMENTS

Technical catalogues, descriptive literature, characteristic curves, write-up on schemes where required in support of relevant control/annunciation drawings etc. shall be furnished for all the items of plant and accessories/components.

Documents pertaining to cables shall, in addition, include current ratings, de rating factors, physical and electrical data, recommended bending radii etc.

Documents in respect of lighting systems equipment shall include data in respect of each type of lighting fixture/switch, receptacles/miniature circuit breaker and wires to be used in circuit wiring. Data on lighting fixtures shall include dimensional drawings, cable facility, mounting details and weight, light distribution diagrams, light absorption and utilization factors, lamp data etc.

Bidder shall note that the documents mentioned above shall be made available along with relevant drawings (listed in Clause 11.4 above items/ accessories components etc. as supporting documents to facilitate expeditious review of such drawings.

7.1.3 OPERATING AND MAINTENANCE MANUALS

The Contractor shall provide five bound sets of approved manuals written in English language. All descriptive leaflets, instruction sheets, charts, lists, pamphlets and other documents that are used in compiling each manual shall be contained in one or more bundle designed to prevent loss of contents. Each binding shall be titled with a name of the Employer, the name of the project the Contract Number, the name of the Bidder and with information to identify the subject matter and shall include a detailed index to all the literature contained therein.

The manuals shall be initially approved in draft form by the Employer and shall cover all items of the works. For this purpose, three (3) draft copies shall be submitted to the Employer. Final submission of manuals shall be done after satisfactory completion of commissioning tests. A mere collection of manufacturer's descriptive leaflets, will not be acceptable in satisfaction of this clause. The manuals shall comprise both operating instructions and maintenance instructions. The operating manual should also highlight operation of the Plant in conjunction with the system. Thus, a general tie-up between system and equipment shall be available in the manuals.

A separate section of a manual shall be devoted to each size and type of equipment. It shall contain a detailed description of its construction and operation and shall include all relevant pamphlets and a list of parts with procedure for ordering spares. Operation of electrical equipment shall be described step by step giving the complete sequence of operation. The detailed sections of the manual if necessary, shall contain further maintenance instructions and fault location charts.

The manuals shall be printed on A4 size sheets and shall be bound. Reduced copies of record drawings shall also be included in the manuals.

Step to step of the plant to work, listing all adjustment necessary for the correct functioning of the plant alarms giving possible causes for alarm initiation and sequence of remedial actions to be taken.

Instructions on monitoring of plant performance and sample log sheet for each plant item, to be filled by operators on a routine basis.

“Do's and Don'ts” in plant operations. Operations attention shall be drawn to all operations considered to be dangerous to operators or likely to cause damage to the plant.

The maintenance instructions shall include the following.

Checking, testing and replacement procedures to be carried out on all plant items on a daily, weekly and monthly basis or at longer intervals to ensure trouble free operation.

Fault locations and remedy charts to facilitate tracing the cause of malfunctions or breakdown and correcting faults.

A spares schedule which shall consist of a complete list of itemized spares for all plant items with ordering references and part numbers.

Full instructions to cover the complete dismantling and reassembly of all items of plant.

Part list and drawings or exploded diagrams for such items of plant showing manufacturing tolerances, matching clearances between machined components at the time of supply, maximum wear and clearances permitted to facilitate replacement.

Complete list of recommended lubricants and lubricating charts insulating oil and insulation checking/replacement chart.