

10.1 GENERAL

- 10.1.1** All technical description, specifications, literature, correspondence, prints, drawings, instruction manuals, test reports (both factory and site), progress photographs, booklets, schedules and all supplementary data or documents furnished in compliance with the requirements of the Contract, shall become the property of the Employer and the costs shall be considered as included in the Contract price.
- 10.1.2** The Contractor shall be responsible for any time delay, misinterpretation, error and conflict during design, manufacturing, testing and erection of the Works resulting from non-compliance with the requirements of this Specification.
- 10.1.3** The Employer shall have the right to make copies of any documents, data, reports, information etc. supplied by the Contractor in connection with the Works. The Employer shall not impart the information of these documents to any other manufacturer or competitor but he shall be free to use these for preparation of technical papers, reports etc.
- 10.1.4** The Contractor shall submit consolidated list of all symbols used in any drawing, data and information under three separate headings namely Civil, Mechanical & Electrical. If symbols other than IS or IEC are used, the Contractor shall submit consolidated list of these symbols and their significance under a separate section.
- 10.1.5** The Contractor is not required to supply detailed drawings whose purpose is manufacture only but in case such information is specifically asked for by the Employer during evaluation of Bid, finalisation of Contract, design review by Employer / his appointed Consultant or during execution of the Contract, the Bidder/Contractor shall comply with the same.
- 10.1.6** All drawings, documents manual etc. as specified in this section shall have to be provided for the station.
- 10.1.7** All documentation shall be in English language.

10.2 Requirements or Submission Of Documents, Information and data by the Contractor

10.2.1 GENERAL

- 10.2.1.1** The Contractor shall submit to the Employer all documents in accordance with an approved schedule of submissions and shall submit any further information (in the form of drawings, documents, manuals, literature, reports etc.) when asked by the Employer while commenting/approving any drawings/documents etc.
- 10.2.1.2** The documents which are subject to the approval of the Employer shall be identified by the Contractor with the stamp "FOR APPROVAL". All other documents shall be submitted to the Employer for information and shall be identified by the Contractor with the stamp "FOR INFORMATION".

10.2.1.3 The sequence of submission of the documents shall be subject to the approval of the Employer. The sequence of submissions of all documents shall be such that the necessary information is available to enable the Employer to approve or comment the document.

10.2.1.4 The contractor shall submit all engineering Documents (Drawings / Design documents /data/detailed bill of quantity/ type test reports) through online Document Review and Engineering Approval Management System (herein after DREAMS) for the approval of the employer. The bidder / contractor shall be provided with login credentials for submission of drawings and documents. The DREAMS portal shall be used for collecting the approved / commented drawings by POWERGRID. After approval in Cat- I/Cat-II/Cat-IV, two sets hard copies of Construction drawings shall be made available to POWERGRID Site-in-charge at each site in A0/A1/A2/A3 formats (as applicable) for supervision and execution

The final documentation for the project shall be supplied in 02 sets of Hard-disks to the Employer (01 set at site and 1 set at CC, Engg- HVDC). Further, one (01) set of hard copies of all final/as built documents in binders shall be supplied at site

The entire plant documentation shall include all construction drawings, equipment specifications, design/study reports, O&M documents, factory test reports, etc. All the final/as built drawings shall be submitted in CAD format (if CAD format used for the drawing) with the complete final documentation. Except the layout drawings, all other final / as-built drawings shall be submitted in PDF format.

10.2.1.5 In case a "SUBSEQUENT" revision of any document is made due to any reason whatsoever, a revision of the same, highlighting the changes shall be resubmitted for the Employer's specific approval/ information.

10.2.2 DOCUMENTS FOR APPROVAL

10.2.2.1 The Employer shall be allowed twenty-one (21) calendar days to approve the Contractor's submissions. The submissions for approval, shall be returned to the Contractor marked in one of the following ways:

Category I:	Approved
Category II:	Approved with Comments.
Category III:	Returned for correction.
Category IV:	For information

10.2.2.2 The first notations "I" or "II" shall be deemed to permit the Contractor to proceed with the work shown on the document, except in the case of notation "II" the work shall be done subject to the corrections indicated thereon and/or described in the letter of transmittal. The Contractor shall bear the full responsibility for proceeding with the Works prior to

receipt of the release in notation "I" from the Employer.

- 10.2.2.3** In case of notation "II", the Contractor shall include the alterations required & resubmit the document within twenty-one (21) days from date of Employer's letter of transmittal.
- 10.2.2.4** In case of notation "III", the Contractor shall include the alterations required and resubmit the document to the Employer, within twenty-one (21) days, from date of letter of transmittal, so that such document can be returned with the notation "I" or "II".
- 10.2.2.5** It may also be noted that the approval/commenting by the Employer does not relieve the Contractor of any of his contractual obligations and his responsibilities for correctness of dimensions, materials, weights quantities or any other information contained therein, as well as the conformity of designs with INDIAN Statutory Laws and the IS/ IEC Technical Specifications as may be applicable. The approval also does not limit the Employer's rights under the Contract.
- 10.2.2.6** All drawings to be used at site shall bear Employer's "APPROVED" stamp.
- 10.2.2.7** When a drawing/document is approved/commented and as such stamped in soft copy, a marked soft copy shall be sent back to the Contractor. The Contractor shall then include the required alterations and resubmit to the Employer.
- 10.2.2.8** The following is a tentative list of the documents and drawings which shall require the approval of the Employer:
1. Schedule of drawings and data
 2. System Engineering studies including studies to finalize design criteria as well as equipment and station design
 3. Drawings and details for interfaces
 4. Equipment specifications and drawings
 5. Nameplates
 6. Quality/Inspection plans & Quality control programs
 7. Equipment test procedures
 8. Control panel's, cubicle's and cabinet's master legend list
 9. Panel/cubicle layout
 10. Station location plan drawings
 11. Station general layout drawings
 12. Simplified one-line (electrical & flow) diagrams
 13. Detailed one-line diagrams
 14. Station service ac and dc one-line diagram
 15. Converter building/equipment layout
 16. Other building/equipment layout

17. Converter building general arrangement
18. AC/DC schematic drawings
19. Civil work general layouts & other detailed drawings
20. Transient fault recorders input signals
21. Civil works and structural design
22. Outline general arrangement of equipments
23. Commissioning Test results of all equipment
24. Sub-system testing, System testing & complete commissioning procedures

10.2.2.9 These approved documents shall be considered as the working documents. However the Technical Specification and connected documents shall prevail over these documents in case a decision is required on interpretation.

10.2.3 DOCUMENTS FOR INFORMATION

The Contractor shall not delay the Works pending the receipt by the Contractor of the comments on documents submitted to the Employer for information. However, the Employer shall have the right to comment on all the documents submitted by the Contractor, when, in the opinion of the Employer the document does not comply with the Contract or otherwise. The Contractor shall satisfactorily demonstrate that the information contained in the aforesaid document does meet the requirements of the Contract or revise the document in order that the information shall comply with the requirements of the Contract.

10.3 Engineering Studies Requirements

10.3.1 General

The Contractor shall submit all reports on the system studies, engineering and the design of the Works and shall satisfy the Employer as to the adequacy of the studies to be carried out in accordance with the Contract. The details of the studies to be carried out are given in Section 4

The Contractor shall have his database approved by the Employer prior to commencement of studies during post award detailed engineering. The Contractor shall make available to the Employer all his data files on external hard discs. He shall also furnish base case data file(s) for the studies carried out and other files as and when requested by the Employer. The Employer shall be able to open these files or files on external hard drive on their own PC.

The results of the preliminary design performed for the preparation of the proposal shall be included in the Contractor's bid. However, all studies would be repeated during the detailed engineering of the project conforming to the technical specification requirements and all equipment would be provided and rated as per final study result. Some of the studies to be performed during the progress of the Works shall be

performed by the Contractor in consultation and/or with the participation of the Employer and/or his Consultants. Regarding participation of Employer or his representative or his Consultant in various studies, a firm schedule for every such study shall be agreed prior to start of the engineering work.

The study reports shall include, but not be limited to the following:

- a) study objectives
- b) initial conditions, data and assumptions
- c) codes, standards and criteria used in the studies
- d) description of means and methods used in the studies
- e) computer models and data used in the studies to represent the Contractor's HVDC equipment and the Employer's equipment. Digital models for stability tool (PSS/E) and EMT software (PSCAD/EMTDC) shall be delivered to the customer as preliminary versions 1 month prior to the dynamic performance tests. Final models are provided after the dynamic performance test. These models can be used by the Employer, however detailed controllers might be encrypted to protect proprietary know-how.
- f) summary of study results
- g) conclusions

Items a) through e) above shall be submitted to the Employer for review and comment before the studies start.

10.4 Drawings and Data

10.4.1 GENERAL

- 1.** The Contractor shall submit to the Employer all assembly and detail drawings of equipment, station design, civil work, building, controls, protection, etc., as well as the corresponding computation where necessary in order to establish to the satisfaction of the Employer the Contractor's compliance with the requirements of the Contract.
- 2.** The Contractor shall submit to the Employer for approval a "Station Design Report" including all the special requirements of the HVDC station and systems being supported by technical reports based on the results of the studies carried out by Contractor.
- 3.** Drawings, as set forth below shall be submitted to the Employer and shall be complete with all information necessary for complete interpretation of the drawings by the Employer. All drawings shall show the materials, dimensions, finish, fits, clearances, tolerances, bolting and such other information as is necessary to demonstrate to the Employer that all items covered by the drawings are in compliance with the requirements of the Contract.
- 4.** Drawings may consist of several sheets as required in order to provide for the degree of detail required by the Employer, so that he may clearly understand such drawings.

5. Not later than 90 (ninety) days after completion of successful trial operation of the HVDC station, the Contractor shall supply copies of the last revision of all drawings produced for this project, stamped as "AS BUILT".
6. The Contractor shall provide separate sets of drawings for each control cubicle. Typical drawings for similar cubicles shall not be accepted. If there are several cubicles per system, then one common bill of material and one system schematic diagram may be provided. Such system schematic diagram shall show the control scheme for the particular system in its entirety and shall be laid out on the minimum number of drawings sheets consistent with clarity and legibility.
7. The Employer shall not accept typical drawings for control, protection and three-phase schematics, power circuits and single line diagrams. The Contractor shall supply complete set of such drawings for each system, even when drawings are duplicates.
8. The Contractor shall submit to the Employer layout and detailed drawings covering all the items of the Works under present scope, but not limited to, the following:
 - (a) HVAC and HVDC equipment such as circuit breakers, disconnects, surge arresters, shunt capacitors, current transformers, voltage transformers, transducers, valve groups etc.
 - (b) Control panels/cubicles.
 - (c) AC and DC switchyards/Equipment including layout and sections, grounding, lightning and the like (as applicable for present scope of works).
 - (d) Civil and mechanical works, including earthwork, foundations, buildings, roads, fences, cable trenches, drainage, steel and concrete structures, water supply, oil system, fire protection system, cooling system, hoist, air conditioning, etc. (as applicable for present scope of works).
 - (e) Electrical station service equipment including, battery chargers, diesel-generator sets etc.

10.4.2 SYMBOLOGY AND DEVICE FUNCTION NUMBER DRAWING

The contractor shall furnish the scheme of numbering and identification of various equipments for the information of the Employer.

10.4.3 REQUIREMENTS FOR EQUIPMENT DRAWING AND DATA (UNDER PRESENT SCOPE)

10.4.3.1 Electrical/Mechanical

1. Control Panels, Cubicles and Control Cabinets

- a) Layout drawing (for approval)
 - b) General arrangement drawings (for approval)
 - c) Floor plan drawing (for approval)
 - d) AC and DC schematics (for information).
 - e) Functional block diagram and logic diagram (for approval)
 - f) Master legend list (for approval)
2. Equipment Outline and Detailed Assembly Drawings (for approval)
 3. Wiring Diagram (for information)
 4. Final Bills of Material (for information)
 5. Nameplates (for approval)

10.4.3.2 Steel Structures

1. Steel Structures Calculation Sheet (for approval)
2. Steel Structures Erection Drawings (for information)
3. Steel Structures Details Drawings (for information)
4. Steel Structures Assembly Drawings (for information)

10.4.4 STATION DESIGN DRAWINGS AND DATA

10.4.4.1 Electrical

1. Electrical equipment Location Plan Drawing (for approval)
2. General Electrical Layout Drawings (for approval)
3. Simplified One Line Diagrams (for approval)
4. Detailed One Line Diagrams and Three Line Schematics (for approval)
5. Station Service ac and dc One Line and detailed schematic drawings (for approval)
6. Switchyards General Plans and Sections (for approval)
7. Erection Key Diagrams (for information)
8. Cable and Trenches Layout and Sections (for approval)
9. Grounding and Lightning Protection Systems.
10. Station Services Layout (for approval)
11. Buildings - Equipment Layout (for approval)
12. Building Grounding and Lightning Protection Systems (for approval)
13. Building - Lighting and Outlets (for approval)
14. Building - Cable System (for approval)

15. Cable Diagrams (for information)

16. Calculation Sheets (for approval)

17. Bill of Material (for information)

10.4.4.2 Civil Works

1. General Layout (for approval)

2. Soil Investigation (for approval)

3. Equipment and Structure Foundation (for approval)

4. Concrete Trenches (for approval)

5. Drainage (for approval)

6. Service and Access Rail/Roads (for approval)

7. Buildings (for approval)

8. Reinforcement Steel List (for information)

9. Landscaping (for approval)

10. Fire Protection Walls (for approval)

11. Water Supply Reservoirs or Tanks (for approval)

12. Oil Tanks (for approval)

13. Design Calculation Sheets (for approval)

14. Wall Cladding (for approval)

15. Finishing schedule (for approval)

10.4.4.3 Mechanical Works (for approval)

1. Water Storage and Distribution System

2. Fire Protection System

3. Other Fire Protection Systems

4. Sewage and Drainage Oil Systems

5. Air Conditioning, Ventilation and Exhaust system

6. Valve Cooling System

10.4.5 PLANT CIRCUIT DIAGRAM (FOR INFORMATION)

10.4.6 OTHER DOCUMENTS

The following documents, in addition to others, shall be sent to the Employer for his specific approval:

1. Alarm monitoring and reporting systems, Software Computer programs and flow diagrams. Detailed logic diagram/flow diagrams shall be furnished by the Contractor for software implemented functions.

2. Alarm monitoring and reporting systems, Program Copies

3. Transient fault recorders input signals
4. Internal communication system, detailed system design
5. VPS Layout
6. Colour scheme
7. Testing & Commissioning documentation

10.5 INSPECTIONS PLANS AND DOCUMENTATION (For Approval)

- 10.5.1** The Contractor shall submit for the Employer's approval an inspection plan (quality plan) describing the inspection system, indicating the inspections to be carried out and their sequence in the manufacturing stages.
- 10.5.2** The inspection plan shall be such that it can be related to the manufacturing program. The plan shall also include a description of the inspection methods employed with reference to the Contractor's written inspection procedures.
- 10.5.3** Separate inspection plans describing the inspection systems for equipment supplied by each sub-Contractor, in the same form as that of the Contractor, shall be submitted for the approval of the Employer.
- 10.5.4** In addition to the inspection plans referred to above, the Contractor shall submit complete and satisfactory evidence of possessing a working scheme assuring the control of all critical activities pertinent to the assurance of quality, and objective evidence (by means of quality manuals and appropriate forms, etc.) of this capability to employ and maintain quality control to meet the required quality level of the manufacture and construction of the Works.
- 10.5.5** Contractor's Quality Control Program in the context of this Clause means the implementation of a quality assurance program by means of which full conformance of material and workmanship to best quality standards can be achieved effectively and economically by the Contractor's control and surveillance of all essential inspection operations, and periodic verification of the results of the manufacture of equipment and the assembly, erection and installation of equipment at the sites.
- 10.5.6** Required number of copies of all test reports, including those supplied by Sub-Contractors, shall be submitted to the Employer for approval. The Contractor shall include in the report all additional data required by the Employer to permit a clear understanding of the reports.
- 10.5.7** All test reports shall be certified and shall contain the signature of the Inspector as having witnessed the test, unless such witnessing has been specifically waived by the Employer. A certified test report shall be issued for each test.

10.6 INSTRUCTION MANUALS AND OPERATING MANUALS (for information)

- 10.6.1** The Contractor shall provide Instruction & Maintenance Manuals for each

part of the Plant and Equipment included in the Works and Operating Manuals for the Station.

10.6.2 The Instruction Manuals and Operating Manuals shall be arranged in an organized library adequately cross referenced to facilitate issuing sections of the manuals as required by the work i.e. erection instructions shall be required before operating & maintenance instructions.

10.6.3 All Manuals provided by the Contractor shall be fully detailed and specifically prepared for the Works and equipment provided. General manuals not specifically prepared for the Works shall not be acceptable.

10.6.4 The instruction manuals shall at least contain:

- a)** A general description of all components
- b)** Storage instruction
- c)** Erection instructions
- d)** Pre-commissioning Instruction:
- e)** Material and part list.
- f)** Design clearances and settings
- g)** Complete sets of drawings as finally issued
- h)** Operating Instructions:
- i)** routine and preventive Maintenance instructions with material requirement for each case
- j)** Preventive Maintenance Schedule.
- k)** Replacement instruction for all equipment

10.6.5 The operation manuals shall at least contain:

- a)** Operator oriented functional descriptions of the equipment.
- b)** Operator oriented description of the protection and control systems
- c)** Description of the equipment auxiliary systems
- d)** Fault findings and diagnostic tools
- e)** User Software interface tools for modification/augmentation etc