

SECTION 1

1.0.0 INTENT OF SPECIFICATION:

- 1.1.0 The purpose of this specification is to specify the requirements of Work contract to execute substation testing & commissioning work.

The contractor is to carryout testing & commissioning of EHV switchyard equipments and bays to the complete satisfaction of end customer. All necessary test equipments are required to be provided by the contractor and test reports of all tests carried out to be submitted. Various supporting documents as required shall also be prepared by the contractor. After bay charging "As Built" Scheme, cable schedule as per site modification shall have to prepared and submitted.

The detailed scope of work is as mentioned in Clause 2.0.0. of the specifications.

- 1.2.0 The Testing Commissioning work for the following types of substations may be required to be performed by the contractor

- a) 765/400/220/132 kV Conventional Transmission / Generating Station Switchyard.
- b) 765/400/220/132 kV Substation Automation System for Transmission / Generating Stations
- c) 765/400/220/132/33 kV GIS System.
- d) FACT Devices
- e) HVDC system

Transmission Business Group, BHEL would execute the substations on turnkey basis.

- 1.3.0 The contract shall be on man day basis from project to project.



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2.0.0 SCOPE:

The agency shall perform the following activities

The scope of works includes complete pre-commissioning tests and commissioning of complete Bays/ switchyard including all electrical equipments, switchgear panels, relay and control panels etc. at our various projects. The commissioning means charging of total system in a substation and interconnected equipment by power flow. The details of testing & commissioning works are as below:

Details of Testing & Commissioning Work

<u>S. No</u>	<u>Work Details</u>	<u>Reference Time Standard for Work Completion in days</u>
1	Review of cable schedules & issue of Cable Termination to ETC contractor.	As per actual
2	Cable continuity testing and termination verification as per corrected cable schedule/scheme.	As per actual
3	Battery Charger commissioning as per TBG ITR.	2 per charger
4	Battery Charging as per TBG ITR.	5 per Battery Bank
5	AC/DC Board commissioning as per TBG ITR.	3
6	CT Testing (One Set i.e. 03 no.) as per TBG ITR.	1
7	CVT Testing (One Set i.e. 03 no.) as per TBG ITR.	1
8	Isolator with Earth Switches testing as per TBG ITR.	1
9	CB testing as per TBG ITR.	2
10	LA Testing (One Set i.e 03 no) as per TBG ITR.	0.5
11	Station earth resistance measurement.	0.5
12	Thermal imaging of Bay & Bus connections	1
13	Control and Relay Panel Wiring/Scheme checking.	2 per panel
14	<u>Relay commissioning</u> *(with CB operation and CT injection)	
	i) <u>Distance Relay</u>	1
	ii) <u>Differential Relay</u>	1
	iii) <u>REF Relay</u>	0.5

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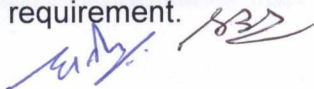
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	iv) <u>Over current Relay</u>	0.5
	v) <u>Breaker Fail Relay</u>	0.5
	vi) <u>Bus differential Relay</u>	1
	vii) <u>Generator Main Relay</u>	2
	viii) <u>100% Stator Earth Fault Relay</u>	1
	ix) <u>Rotor Earth Fault Relay</u>	0.5
	*Relay list is not exhaustive, indicative only.	
15	SCADA input output interfacing per bay.	2
16	PLCC/FOTE panel testing per feeder.	2
17	Energy meter testing & commissioning	1
18	Relay networking inclusive of TSE, Protocol converters, Switches, HMIs etc.	3
19	Bay Commissioning inclusive of Local/Remote operation, interlock, Primary Injection, Secondary injection, stability testing etc as required by TBTS.	5
20	SAS system commissioning per bay.	2
21	Commissioning of PU Panel per Bay	2

3.0.0 CONTRACTOR'S RESPONSIBILITIES:

The contractor need to be qualified for the work and carry out all project work with due responsibilities. The following need be noted and complied with for the same:

- 3.1.0 Contractor has to keep experienced person in the area of EHV switchyard testing and commissioning with clear understanding of EHV switchyard working. They should have skill for EHV switchgear & control gear testing, Scheme checking etc. Also they should be conversant with necessary rules & regulations, standard requirements etc. In case of non conformances or faults, the persons engaged should be able to analyze and help resolve the issues. Contractor shall have valid electrical license, supervisory license holder person and wireman permit holder technician to meet Indian Electricity Act requirement.



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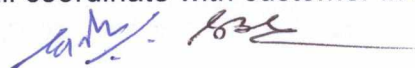
- 3.1.1 Contractor will furnish the details (experience, qualification etc) of all commissioning staffs (As per annexure-A) to be deployed by them and the commissioning tools and instruments available with the contractor for the work. Any addition of manpower should be intimated to TBTS with his experience and qualification before sending to TBTS site.
- 3.1.2 Contractor shall observe applicable safety norms while performing the tests. The latest revision of Indian Electricity Act & Indian Electricity rules shall be binding.

3.2.0 Deputation for Testing:

- 3.2.1 On receipt of intimation of readiness of site and requirement of resources for testing, contractor shall deploy his testing team within one week and submit his plan of action within ten days from receipt of intimation to Site & TBTS Headquarter.
- 3.2.2 Contractor shall arrange experienced testing engineers and his staff along with valid calibrated test instruments (Multi meter, Clamp meter & Megger etc.) and sufficient tool kits in adequate quantity to meet targeted commissioning schedule.
- 3.2.3 Contractor team's working time has to be matched with BHEL working time at site.

3.3.0 Documentation:

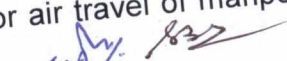
- 3.3.1 Compilation of following documents in a systematic manner to present to Customer to meet the contractual requirements.
- (i) FQP and ITR (3 hard copies).
 - (ii) All the scheme drawing to be "greened" to ensure fault free DC circuit.
 - (iii) Non-conformities reports.
 - (iv) "As Built" scheme and cable schedule (3 hard copy sets).
- 3.3.2 Contractor shall submit one copy of Calibration certificate to BHEL site for each instrument before starting testing.
- 3.3.3 Contractor shall incorporate all corrections / changes (if any) in the scheme and get it approved from BHEL/ customer for release of as built drawing. BHEL shall coordinate with customer in this regard.



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4.0.0 FACILITIES TO BE PROVIDED BY BHEL

- 4.1.0 BHEL shall ensure availability of A.C power for testing at one point.
- 4.2.0 BHEL shall issue one copy of ITR booklet (soft copy and hard copy) for recording, storing and approval of test conducted. These will be project specific containing ITR form for all types of equipment. Contractor shall multiply according to requirement.
- 4.3.0 BHEL shall arrange necessary scheme drawing, cable schedule, Instruction manuals & Factory test reports for facilitating testing and commissioning.
- 4.4.0 BHEL shall arrange gate pass / permit to work / necessary permission for Contractor's manpower & material.
- 4.5.0 BHEL shall reimburse to & fro train fare for engineers of testing & commissioning agency. Reimbursement of travel fare shall be limited to fare of AC 3-tier.
- 4.6.0 Luggage & porter expenses for transportation of testing equipment and instruments from vendor office and at Railway station to site/port (in case of overseas project) shall be reimbursed by BHEL against submission of documentary proof.
- 4.7.0 To & Fro local transportation for engineer / team of engineers shall be provided by BHEL. In case BHEL unable to provide the same, the rate offered by the contractor in the BOQ shall be payable.
- 4.8.0 BHEL shall provide free bachelor accommodation near the site of work for the stay of team of engineers. In case contractor is advised by BHEL to arrange their own accommodation, the change for the same shall be reimbursed as per the rate offered by the contractor in the BOQ.
- 4.9.0 BHEL shall reimburse to & fro fare for engineers of testing & commissioning agency. Reimbursement of travel fare shall be limited to fare of AC 3 tier for travel in India from vendor office to nearest railway station of the airport and economy class of low cost airlines for travel in abroad. Contractor will take prior approval along with their travel program from BHEL TBG.
- 4.10.0 BHEL shall reimburse travel charges or transportation charges only from Vendor HQ to site and vice versa upon producing travel documents. Any travel or transportation of Engineer or test instruments from another place other than HQ to site must be intimated and approved by BHEL TBG.
- 4.11.0 For North Eastern States or high altitude areas where rail or surface transport system is not readily available, prior approval from BHEL, TBG must be obtained for air travel of manpower and instruments through low
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cost airlines. The amount will be reimbursed after submission of valid travel documents. For hilly areas or in case of emergency (as intimated by BHEL TBG) man and material can be transported through hiring taxis or private vehicle. The amount will be reimbursed after submission of valid documents.

- 4.12.0 Inland transport in foreign location from airport to site will be arranged by BHEL.
- 4.13.0 BHEL shall provide free lodging, boarding (transit flat) and local transport.
- 4.14.0 Visa charges shall be reimbursed by BHEL at actual on submission of documentary proof.
- 4.15.0 All payments shall be made in Indian rupees only.
- 4.16.0 Security arrangement which is available for BHEL staff at site shall be provided to contractor's engineers also.
- 4.17.0 Insurance of their team and testing instruments and medical insurance of their team shall be in the scope of the contractor. BHEL will not be responsible for any consequences arise at any stage of execution of the job.
- 4.18.0 Vendor will full responsible for carriage, dispatch, safety, insurance, custom clearance (if involved), carriage of documents etc. Any penalty charges (if levied) will be on vendor account. BHEL will pay custom duty if any (with prior approval of BHEL) for instruments etc. only if non-refundable.

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