

CHAPTER 4

Testing and Commissioning

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1. TESTING

This Chapter describes the testing & commissioning relating to the Auxiliary Substations and 33 kV Auxiliary Network, in conformity with the requirements of international standards and Railway practices. Testing constitutes an essential obligation to satisfy the Railway System.

1.1 TESTING CONDITIONS AND EQUIPMENT ACCEPTANCE

The contractor will have to carry out all the tests and checks required guaranteeing the Employer of the good construction and the satisfactory operation of all power supply installation.

Also the contractor shall co-ordinate & arranges testing equipment etc required for testing facilities.

The various high, medium and low voltage equipment will be subjected to all the tests required under equipment test sheets, (lists are not exhaustive) as per the relevant IEC or other standards mentioned in the technical & performance specification of each equipment or otherwise.

It is reminded that the contractor is totally entrusted with full responsibility of assembly and installation of all pieces of equipment mentioned in this specification, with supplying the maintenance equipment and the special tooling which shall be delivered as soon as equipment installation will be completed and with the various duties he is bound to regarding witnessing of tests at commissioning and supervision after energising.

1.1.1 Documents related to the tests

The contractor shall draft and submit to the Employer approval of "the testing lists", which he will have to supply in their final form one month before in-plant acceptance of the equipment.

These lists shall be extremely detailed and include for each piece of equipment:

- The list of the in-plant tests,
- The operating mode (testing procedure) describing how to proceed to perform properly the test,
- The testing book indicating the expected result of the various tests and provision to indicate the obtained result during the test and to record all observations.

For the on-site tests, the contractor will have to draft a bilingual testing lists which will include, for each testing stage and for each piece of equipment the list of all the operations to be carried out and the precise mentions, for each of these, of the interventions to be executed, of the references required for proper identification of the equipment (testing procedure) and of the results which can be expected from these tests with provision to indicate the obtained result during the test and to record all observations (testing book).

The contractor will have to supply the various certificates and the relevant computation sheets, at the latest one month after the tests.

1.2 TESTING CONDITIONS

The Employer will appoint representative who will be in charge of supervising the design, the manufacturing and the assembling of the equipment in the contractor's workshops.

They will be empowered to halt the proceeding of any assembly work, which would not be in accordance with the stipulations, and to have replaced every part damaged during assembly or transportation.

They will witness the in-plant tests.

All delays which could arise from additional tests from modifications required due to defects will not be able to be used by the contractor to justify price increase or time extensions.

Each piece of equipment will be subjected to two successive tests: in the plant and on the site after assembly.

These tests will be carried out by the contractor, under his responsibility and in the presence of the Employer and of the consulting engineer.

Each of these tests will be subjected to a certificate. Provisional acceptance will be granted only after execution of the both sets of tests.

NOTE: For type tests, the contractor can provide test reports performed according to the corresponding IEC standard, on similar equipment of same capacity and design.

1.2.1 In-plant testing

In plant testing concern type and routine tests

- Type tests are tests performed on one or two of a equipment series
- Routine test are tests performed on each equipment

These tests will enable checking the quality of the equipment and its compliance with the specifications.

Once the Equipment have passed the in-plant acceptance tests, it shall be delivered and installed under the contractor responsibility.

Concerning some type tests, test certificates issued by recognized agencies will be able to be supplied if the contractor cannot carry out these tests himself and if the test certificates are related to a similar equipment of same capacity and design.

However, the tests of checking the operation of isolators and earth isolators will have to be performed as routine test.

The final factory tests will be carried out on the fully assembled equipment as specified. Thereafter, if required and permitted by the technical features of the equipment, the equipment may be dis-assembled for transportation purposes. The dis-assembly should not, however, cause any deterioration of the technical performance of the equipment. In respect of certain routine tests, it may be necessary to repeat the tests at more than one stage, and the Contractor should ensure that this is done, as required by the Employer's representative. The fact that certain tests had to be carried out on the equipment and/or any part, at more than

one stage, cannot be claimed by the Contractor, as reason for any failure/sub-standard technical performances of the equipment.

1.2.2 After shipment and Preliminary tests

1.2.2.1 After shipment

It should be performed at this stage the tests verifying that any damage have taken place during transportation.

They should include, at least, the tests listed in the column "after shipment "of each concerned equipment test sheet

1.2.2.2 Preliminary tests

It should be performed at this stage the tests verifying that equipment have been installed and assembled correctly.

They should include, at least, the following:

- All test listed in the column "on site " of each equipment test sheet
- Conformity of the assembly and wiring with the contractor's drawings and instructions
- Sealing of all pipe junctions, and the tightness of bolts and connections;
- Proper function of each part of equipment, of each equipment and of sections
- Cleanliness of installations

2. COMMISSIONING

2.1 GENERAL

The Commissioning description, based on the following frame, will have to be defined by the contractor and submitted to the Employer.

Once the contractor will have completed the after shipment tests, and the various pieces of equipment installation, the assignment should include:

Station tests

Putting into service tests

After energising

The Employer and the consulting engineer will be empowered to ask for any additional testing they may deem necessary.

The contractor will have to supply the testing installations and measuring apparatuses required to this effect.

In accordance with the stipulations, provisional acceptance will then take place, followed by final acceptance at the end of the guarantee time.

2.2 STATION TESTS

The testing period shall mandatorily be included in the period of the works stated in the contract project

All putting into tests will be carried out in co-operation with the Employer or its representative.

It should be performed at this stage the tests verifying that the different sections are electrically and mechanically compatible.

They should include, at least, the following:

- Tests requiring several sections to operate at once,
- Internal and between sections operational and safety Interlocking tests,

2.3 PUTTING INTO SERVICE TESTS

It should be performed at this stage the tests verifying that the different equipment are acting correctly when energised.

2.4 INTEGRATED TESTING AND COMMISSIONING

The general testing having shown proper operation, an overall integrated test of the installations, should be performed, after the first 15 days of operation, during which the various actuation and operation situation (putting into service, normal actuation, failure tripping) will be simulated.

2.5 SPECIFIC TESTS

Once the installation of the various pieces of equipment will have been completed, and the common test performed, some equipment will require specific tests.

The list of this tests shall be included in the "On site testing" document, which the contractor will have to supply.