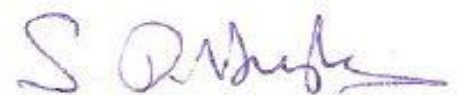


National Grid
Commissioning
Handbook
Procedure 20

Settings Loading Verification Test

CH 20
Issue 3
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Issue 1	Nick Tart	K. Harker	Comments incorporated	Mar 2004
Issue 2	Gary O'Neill	Shaun Hughes	Updates to include recommendations from incident number 371597 on Norwich-Bramford2 circuit	Feb 2014
Issue 3	Gary O'Neill	Shaun Hughes	Updates to clarify FPSM setting load verification MARS sheet and to capture PST10 issue3 changes which reflect thermal ratings of SGTs depending on Serial T number.	June 2015

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1 PURPOSE

The purpose of this procedure is to provide a model process to detail the checks and tests to be performed when undertaking a settings loading verification test. It specifies the minimum requirement and may be added to by the Contractor or NG Commissioning Engineer when devising test programmes. These checks and tests are designed to ensure that:

- The test highlights any incorrectly set relay, any incorrectly enabled functionality (e.g. stages of overcurrent within a multifunction relay) which may impinge on the load carrying capability of the circuit. The test will also highlight any relay rating or interpose CT error, which may be incorrectly limiting the primary circuit's load carry capability.
- The test is also designed to confirm the circuit's secondary loading capability with a view to verifying that there is no conflict with the statements made to Market Operations on the Thermal Rating Schedules submitted prior to energisation.
- The test is not designed to highlight any incorrect functionality that may be present that relates to a fault current condition i.e. an incorrect overcurrent setting that is well above load but operates incorrectly for an 'out of zone' system fault. This should be highlighted during stage 1 relay secondary injection testing as defined by SCT procedures.

2 GENERAL OVERVIEW

The test must be carried as the final stage 1 commissioning test when all normal service relay settings have been applied and signed off.

The test must directly precede commencement of stage 2 testing and will be required to be confirmed as complete in the initial conditions section of the Commissioning Switching Programme.

The test injection point should be as close to the primary CT as possible to include as much of the secondary wiring as possible. It is envisaged that in most instances this will be the circuit's bay Marshalling Kiosk. Depending on the relative secondary circuit's impedance it should not be necessary to make any disconnections, and this is much the preferred option. **(see Appendix 1 Fig A1 & A2)**

The test shall be uniquely identified (i.e. the 'Settings Loading Verification Test') and a relay function setting sheet will be created, in MARS, for each CT secondary to be tested per primary circuit. This sheet will define the test current to be applied in secondary amperes and the duration of the test. (NB each sheet is required to be specific to that CT ratio). The signing/returning of the sheet shall signify successful completion of the test. **(see Appendix 2)**

3 PROCEDURE

3.1. General

Prior to the test the protection equipment should be in its final ready for service condition. At the end of the test observation of a non trip relay operation should be viewed as the required result. To this end all links should be in place to allow trip relay operation.

Circuit breaker tripping, intertrip send, trip relay reset and circuit breaker fail links should be removed prior to the test. A full review of all isolation should be undertaken prior to carrying out the test to ensure no adverse operation resulting from the injection. This should be formally recorded in the form of a Protection Systems Operational Precautions document (see Appendix 3). **It shall be noted that switchgear auxiliary contacts shall not be used to provide secondary isolation to prevent the relay, subject to the load verification test causing CB tripping, intertripping, trip relay reset, circuit breaker fail schemes etc.**

3.2. Details of the Test

The test shall be a balanced 3-phase injection individually on all CT cores, which are connected to relays with a non-unit protection tripping function. It must be carried out for all circuit configurations including:

1. Feeders,
2. Transformer feeders
3. Transformers including Tertiaries
4. Bus sections/ Bus couplers
5. Quad Boosters
6. Compensation Equipment.

The test is not required to be carried out on high impedance unit protection CT secondaries i.e. Busbar/Mesh Corner protections, HV&LV connection protections. Also, the test is not required on single phase neutral CTs driving an earth fault relay only i.e. standby earth or unrestricted earth fault. The test is not required on single function differential relays, ie LFCB/P10 etc as these relays do not have any other inbuilt functionality.

The test should be carried out on low impedance unit protections that have in-built functionality of an overcurrent trip (whether it is required or not). It should be noted that the injection will cause a differential trip condition but the equipment should be examined post injection to check for no other operating function. For example feeder current differential, low impedance transformer protection all CT inputs and other multi CT input low impedance protections should all be subject to this test.

It shall be noted that settings load verification tests are single end CT injections and are not to be done for the purposes of stability or operation checks on unit protections.