

Testing and commissioning for distribution systems

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Revision History

This amendment replaces the following specifications:

Amendment	Amendment Details
4.0	Full Revision.
4.1	Removal of reference to CCEW in table Q1 and Q2 as not required.
4.2	• Revision to clause 4.7.8 to provide CT installation guidance. • Revision to Table L to include visual checks of CT installation during commissioning. • Revision to Authorities & Responsibilities to align with GAM0001. • Revision of Table Q1 to provide a consolidated battery commissioning form. • Revision to Table S in Annexure 2 to include anti islanding checks on batteries as a part of post commissioning.
4.3	• Clause 4.7.6.1 has been revised to require mandatory end-to-end testing of cables, eliminating the previous option to omit this test. • Revision to Table “L” • Administrative changes

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1 Documentation Scope

To set out in detail the tests and checks required for on-site commissioning of distribution equipment.

Commissioning includes a process of pre-commissioning checks, the act of energising or commissioning the equipment and a post-commissioning process.

This instruction describes the testing of distribution equipment for commissioning against minimum threshold criteria. It provides details only for on-site testing of equipment. Type tests and routine factory tests are not a part of this Standard but may be used for comparison.

This Standard must be followed for all new installations. However, any distribution equipment or system to be energised after corrective or preventive maintenance, or after refurbishment, may make use of this document with appropriate adjustments and care.

This document does not cover testing of:

- Distribution cables exiting from a zone substation to the first termination, which is covered in MMI 0025 - Tests for transmission/sub-transmission underground cables
- Testing of street light assets, this is given in LDI 0003 – Commissioning of public lighting assets.

2 References

External Regulations

NSW Work Health and Safety Act 2011

NSW Work Health and Safety Regulation 2017

External Standards

Standard No.	Year	Title
ENA Doc 01	2019	ENA National Electricity Network Safety Code
AS 60270	2001	High-voltage test techniques - Partial discharge measurements
AS 62271.1	2012	High voltage switchgear and controlgear standards – Part 1: Common specifications
AS/NZS 1026	2004	Electric cables – impregnated paper insulated
AS/NZS 1429.2	2009 (R2020)	Electric cables – polymeric insulated

Company Policies and Procedures

Company Policy (Network) 9.1.7	Commissioning Network Electrical Assets
Company Policy (Network) 9.2.5	Network Asset Design

Company Policy (Network) 9.7.1	Network Asset Construction
Company Policy (Network) 9.8.3	Network Operations
Company Policy (Network) 9.9.1	Network Asset Maintenance
Company Procedure (Network) GAM 0114	Granting Dispensations for Engineering Documents
Company Procedure (Health & Safety) GSY 1088	Access authority for high voltage work and/or test
Division Procedure GNV 1026	Equipment Register
Division Procedure GNV 1039	Acceptance of new distribution transformers
Division Procedure GNV 1044	Commissioning Network Electrical Assets
Division Procedure GNV 1094.5	Testing of network equipment: Withstand testing
Division Procedure GNV 1094.7	Testing of network equipment: cables
Division Procedure GNV 1094.12	Testing of network equipment: insulation resistance testing
Division Procedure GNV 1094.13	Testing of network equipment: partial discharge testing
Division Procedure GNV 1094.14	Testing of network equipment: Dielectric Dissipation factor (DDF) testing
Company Workplace Instruction (Health & Safety) WSY 0037	Polarity Testing and Phasing of Low Voltage Mains, Services and Apparatus

Company Standards

Earthing Design Instruction EDI 100	Distribution earthing design
Lightning Design Instruction LDI 0003	Commissioning of public lighting assets
Mains Construction Instruction MCI 0005	Overhead construction standards manual
Mains Construction Instruction MCI 0006	Underground distribution: Construction standards manual
Mains Design Instruction MDI 0028	Underground distribution network design
Mains Design Instruction MDI 0031	Overhead line design
Main Maintenance Instruction MMI 0025	Tests for transmission/sub-transmission underground cables
Substation Maintenance Instruction SMI 113	Distribution and field transmission data asset structure and name plate details

Protection Maintenance Instruction PMI 1000	Protection commissioning & maintenance
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3 Definitions and Abbreviations

Term	Definition
ABC	aerial bundled cable
AUP	A person with technical knowledge or sufficient experience who has been approved and authorised in writing by the company to perform the duty concerned.
buzzer	Typical continuity tester. A buzzer emits an audible tone when the leads are shorted together.
CAMS	Customer Application Management system
CB	circuit breaker
CCEW	Certificate Compliance Electrical Work
CCT	covered conductor thick
Distribution network	Collection of assets (distribution lines, cables, substation and associated equipment) whose purpose is to distribute power from zone substation to distribution substations, which feed the low voltage network.
GΩ	giga ohms
HV	high voltage
LV	low voltage
Megger	Typical insulation resistance tester. A megger can produce a high voltage to bridge gaps in insulation and detect flaws.
MEN	multiple earthed neutral
NATA	National Association of Testing Authorities
NMSHVABC	non-metallic screened high voltage aerial bundled cable
Phase identification	A = Red phase, B = White or Yellow phase, C = Blue phase, N = Neutral or Black, E = Green with a Yellow strip or Black for outdoor applications.
Polarity check	Identification of the active and neutral in an LV system.
Qualified assessor	The person responsible for certifying that the subjective/objective results of a pre-commissioning test or check required under this procedure satisfy the nominated threshold safety and performance criteria. The Qualified Assessor may be a company employee, a contractor to the company or an employee of an Accredited Service Provider (ASP) and must have the relevant experience and competence to certify that the tests that have been carried out meet

	the nominated threshold, safety and performance criteria. The qualified assessor must hold the equivalent of an Electrical Certificate III qualification.
Responsible officer	The company employee responsible for delivering the agreed business outcomes from a network project
RMU	Ring Main Unit
RTU	Remote Terminal Unit
SAP	Software package used by the company to capture and record data, including financial data
SCADA	Supervisory control and data acquisition
Strategic cable	A cable is considered to be strategic if it is in a situation where continuity of cable supply has a very high priority. Some of the examples are inter-connectors and supplies to high voltage (HV) customers, such as hospitals.
USL	Under slung link
UG	Underground
SWMS	Safe Work Method Statement
XLPE	cross-linked polyethylene

4 Actions

4.1 General requirements

4.1.1 Responsible officer

The Responsible Officer, as defined in GNV1044 - Commissioning network electrical assets, shall check that all equipment to be installed in a project has Endeavour Energy's product approval, and that tests/checks specified in this Standard are carried out.

Note: Endeavour Energy's Responsible Officer must be provided with the test reports and the qualified assessors must satisfy themselves of the authenticity and adequacy of tests to make an informed assessment. This may necessitate that they witness the tests. The test reports must have the actual tester's signature and the qualified assessor's signature indicating the tests are true and correct.

The Responsible Officer shall be responsible for checking that the equipment is safe to energise, pre-commissioning tests and checks are carried out immediately prior to energisation of the newly installed equipment or system, the relevant forms are completed, and the test results are satisfactory for the newly installed assets to be energised or made available for service.

For internal distribution works, the Worksite Coordinator on site at the time of commission must assume or assign the role of Responsible Officer as specified in Division Procedure GNV 1044. In addition, the Worksite Coordinator must nominate one of their crew (or themselves), with the necessary experience and competency, to assume the role of the Qualified Assessor.

(Noting that for internal distribution works as according to GNV 1044 the Responsible Officer, Qualified Assessor and Commissioning Officer must not be the same person so that there is a once removed principle in place for testing and checking. The Responsible Officer and Commissioning Officer can be the same person or the Qualified Assessor and Commissioning Officer can be the same person as these combinations ensure at least 2 individuals on site and involved in test and check process.)

For external work performed by ASPs, the Construction Coordinator must assume the role of Responsible Officer.

4.2 General information

Pre-commissioning tests and checks are designed to confirm that newly installed distribution equipment or a newly constructed distribution system of components is safe and fit for energisation.

Post-commissioning checks are generally carried out to confirm that equipment once energised, is operating as expected.

Depending on the scope of work of the project, any distribution system could be broadly subdivided into three subsystems: the HV subsystem; the LV subsystem; and, the distribution substation subsystem.

The HV subsystem shall comprise of all newly installed HV equipment, lines, cables, and associated fittings up to the distribution substation. Similarly, LV subsystems comprise all LV equipment, lines, cables and associated fittings up to the distribution substation.

The distribution substation subsystem comprises of a transformer, HV and LV switchgear, protection and metering equipment, and associated fittings.

Preliminary works for the purpose of pre-commissioning tests, if required, HV and LV switchgear in the distribution substation could be taken as a part of the HV subsystem or LV subsystem respectively and could be isolated from the transformer for testing purposes.

Essentially, the subsystems shall be subjected to the tests and checks specified in clause 4.4 to pass the pre-commissioning phase of the project.

If equipment is not to be commissioned within four weeks of completion of these tests, then the tests shall be repeated, immediately prior to the commissioning of the equipment.

Also, if the equipment is to be commissioned after the day of installation but before the four weeks is completed, a visual inspection of the equipment or cable route shall be carried out. If any work has been carried out on the equipment, or if there has been any excavation, under boring, pot-holing and the like that is evident in the area of the cable trench, the tests shall be repeated.

AUPs are responsible for confirming that any commissioning tests or checks specified throughout this document are carried out in accordance with Endeavour Energy's requirements and supplied to the responsible officer.

Where required, AUPs must arrange, were necessary, an Access Authority for Test in accordance with the requirements specified in Endeavour Energy's Electrical Safety Rules prior to commencement of the tests.

All test equipment and instrumentation used for commissioning must have been calibrated and traceable to a NATA approved laboratory; and shall have a current test sticker affixed. AUPs are responsible for checking that test equipment and instrumentation used is correctly calibrated and traceable.

4.3 Records

In addition to the normal asset information, as required in Substation Maintenance Instruction SMI 113 - Distribution data entry – asset structure and nameplate details, AUPs must record at least the following information:

- a) Testing organisation name, testing officer and any witnesses.
- b) Test date, time, location, temperature and humidity.
- c) All ratings for current, voltage, power, vars, and the like.
- d) Accurate description of cable or equipment tested.
- e) Cable or equipment passed or failed tests.

- f) Details of test completed and result expressed as a value at a reference temperature.
- g) Instrument numbers and calibration dates.
- h) Test equipment numbers and calibration dates.

Within one week of the tests, AUPs must provide Endeavour Energy's Responsible Officer with a test report covering items (a) to (h) inclusive.

The Responsible Officer shall check that the test results are retained in Endeavour Energy's project file for future review. For contestable projects this will be held in the CAMS system.

Caution: When carrying out insulation tests on HV equipment carrying electronic/control/telecommunication sub-systems, care shall be taken to follow the manufacturer's instructions and check whether these sub-systems could be affected by test voltages.

4.4 Pre-commissioning checks and tests - overview

Pre-commissioning checks and tests shall be performed on each piece of significant distribution equipment, UG cable, OH mains, switchgear, transformer and the like.

These tests shall be performed after installation of the equipment, where possible, to check all forms of transit to site and installation damage is covered. Where the tests cannot practically be carried out after installation, such as in the case of live line work, **the tests may be carried out after transit to site and just prior to installation.**

These tests not only provide a smooth passage through commissioning but help prevent undue delays and costs in the event of failures once the whole system is installed.

The tests are described below and checklists are provided in Annexure 1 - Pre-commissioning inspections and tests checklist. AUPs shall have documentary evidence to indicate that the tests have been carried out for individual items of equipment mentioned above. As required by GNV 1044 - Commissioning network electrical assets, at the start of any project an inspection and test plan is to be developed by the Responsible Officer of the project to provide and manage the process effectively.

Checks and tests that need to be performed as pre-commissioning tests can be broadly categorised into three stages. While the tests set out below are not necessarily in strict order, nevertheless all checks and tests shall be performed.

4.5 Stage 1 – Compliance with Standards

1. Check that the installation meets the approved design and that the construction complies with Endeavour Energy's construction Standards.
2. Check that the earthing of the installation meets the approved design, and that the construction complies with Endeavour Energy's construction Standards and Earthing Design Instruction EDI 100 - Distribution earthing design. For all assets especially substations, verify the common or separate earthing status.
3. Check the connection of the neutral to the MEN network and other LV connections recommended by the earthing design.
4. Check that all equipment and material used in the project is new and approved, or approval to utilise used equipment has been given by Engineering Delivery Manager. Significant network assets are listed in Endeavour Energy's Approved Material List.
5. Check all equipment and material used, but not covered by point 4 above, still comply with the relevant Australian or IEC standards.

4.6 Stage 2 – Visual inspection

1. Inspection of all equipment for any damage, corrosion, leaks, abnormal uncleanness or any other visible abnormalities.
2. Visual check and, if necessary, measurements to confirm safety clearances, creepage distances, flashover clearances, setback from properties and the like meet relevant standards and equipment specifications.
3. Check for any workmanship issues, such as leaning poles, backfilling, and twisted or misaligned cable terminations.
4. Check that the installation complies with relevant environmental standards and has no visible environmental issues, for example, piles of dirt, excavations, or potholes.
5. Check right of way clearances, operation and maintenance clearance and access, and any likely impact on safe motor vehicle operation.
6. Carry out earthing system visual checks.
7. Check that asset numbers are affixed as required by Endeavour Energy Standards.
8. Check all equipment fitted with a manufacturer's nameplate for compliance against the project design drawing specification.
9. In addition to the previous points, for indoor substations, it is necessary to carry out general risk checks, including:
 - Assess fire risks, and check that fire extinguishers are installed, alarms fitted and operational.
 - Ventilation is installed and operating according to design standard.
 - Check there are no access issues due to stairs or doors not installed according to the building code.
 - Emergency exit signs or lighting installed and working.
 - All cable penetrations are sealed.

4.7 Stage 3 - Tests

The following tests shall be carried out on all distribution HV, LV and substation systems.

4.7.1 Continuity checks

Continuity of circuits, switches and transformers shall be checked.

For continuity tests, where it is indicated that zero (0) ohms shall be achieved, check there is a good contact with the probes. There should be no problems achieving this with switches. Where cables are concerned the length will add some resistance, but these values should still be less than 0.5 ohm and for transformers the values shall be as indicated below.

Generally, this would be achieved by the following steps:

For cables:

- a) Bonding all phases and neutral together at one end of cable.
- b) Using an insulation resistance tester on Ohms scale, from the other end of the cable checking between phases: A-B, A-C, B-C, A-N, B-N, and C-N.
- c) For cables the readings should all be zero (0) Ohms or, if using a buzzer, a tone should be heard.

For switches:

- a) Check the switch is in the closed position.
- b) Using an insulation resistance tester on Ohms scale, check that each phase is closed: A-A, B-B, C-C. (On multiple feeder switch units this check can be made by measuring through the adjacent feeder of the same phase).
- c) For switches the readings should all be zero (0) Ohms or, if using a buzzer, a tone should be heard.
- d) Then check that each phase is isolated from each other. Refer to clause 4.7.2.

For transformers:

- a) Place the transformer on the nominal (neutral for regulators) tap.
- b) Using an insulation resistance tester on Ohms scale, from the transformer terminals check between phases: A-B, A-C, B-C, A-N, B-N, and C-N. (Or SL-S and SL-L for single phase regulators).
- c) For LV transformer windings the readings should all be zero (0) Ohms or, if using a buzzer, a tone should be heard.
- d) For the transformer's HV phase to phase windings, the readings may not be zero (0) Ohms but shall be less than 25 Ohms. As the winding is a delta configuration, all the readings taken shall be approximately equal. If a winding is approximately double that of the other HV phase to phase readings, this would indicate an open circuit between the phases being tested.

Where screened elbows are used on transformer HV connections, a check of continuity once the elbow is fitted is required where access permits. This can be achieved by measuring from the end of the HV transformer cables, the HV fuse chamber contacts or a spare HV switch terminals.

4.7.2 Insulation resistance test

In most cases, equipment being supplied will have already been tested to comply with the required insulation values for their voltage levels. However, during transit from the manufacturer to site, and after installation, there may be damage caused to equipment. This test will help identify this damage prior to commissioning and therefore insulation resistance tests shall be carried out on all equipment as described below:

- In all tests, use an insulation resistance tester (megger) – set to 1000 volts. Only in special cases, where indicated, will higher test voltages be required.
- The insulation resistance tester (megger) must be used with a measurable range of at least 100 GΩ marked in numbers on the graduated scale.
- Test (in turn) from each phase (and HV screen, and neutral in the case of LV) to earth (for example, A-E, B-E, C-E, N-E), and between phases (for example, A-B, A-C, B-C, A-N, B-N, C-N).
- Test value readings shall be taken after one minute of test voltage being applied.
- For switches, also test across the open switch (for example, A-A, B-B, C-C).
- Surge arrestors fitted to equipment need not be disconnected for this test unless a low reading is experienced and the arrestor is suspected as the source of the low value in which case investigate the surge arrestors.
- **Note:** Even in wet/raining conditions, HV megger insulation values will not be affected by moisture, but LV megger values may be lower than indicated due to tracking over wet LV insulation (refer to section 4.7.7).

The insulation resistance tester used shall be able to maintain its terminal voltage within +20% and -10% of the nominal open circuit terminal voltage, when measuring a resistance of 10 MΩ on the 1000 V range.

Refer to Annexure 1 checklists for acceptable results for different equipment.

Where no specific values have been provided in the test requirements for a specific item or configuration then a minimum value should be obtained from the Engineering Delivery Manager.

4.7.3 Polarity check

A polarity check will be carried out on all LV electrical equipment. Where LV supply is available the process as indicated in Company Workplace Instruction WSY0037 -

Polarity Testing and Phasing of Low Voltage Mains, Services and Apparatus, should be followed. In most cases for commissioning of new works the process should be as described below:

- Check that an earth connection is available at each remote end of the mains/cable run. If not, install a temporary earth stake, making sure to stay well clear of any underground cables.
- Earth the neutral block at the remote end (for example last pole, column or pillar).
- Using an insulation resistance tester (on the Ohms range) or a buzzer, check between A-E, B-E, C-E, and N-E.

Correct polarity is indicated by a short circuit between neutral and earth. All other phase to earth should be open circuit (clear).

- Repeat the check at all intermediate locations.

In situations where a good earth is difficult to obtain it may be necessary to use the megger on the 1000V range or alternatively it may be necessary to run a long bonding lead to the nearest good known earthing point (for example, the MEN network or a local earth grid).

4.7.4 Phasing

Phasing will be carried out on all circuits as described below:

- Earth phase A at the beginning of the mains/cable run.
- Use an insulation resistance tester on Ohms range, or buzzer, to confirm that the phasing (cable marking or colour coding) is correct on each tee off to the end of the run.

If phasing is correct, A-E should be zero (0) Ohms (or audible tone), B-E, and C-E should be open circuit (or no audible tone).

Repeat for B and C phases.

Where mains/cables are not marked or coded, apply a suitable identifying marker to the core.

In situations where a good earth is difficult to obtain it may be necessary to use the megger on the 1000V range or alternatively it may be necessary to run a long bonding lead to the nearest good known earthing point (for example, the MEN network or a local earth grid).

When a new switch has been installed in an electrical network, a final check for correct phasing is required before the switch is closed to join two live circuits. The test shall be carried out in accordance with Company Workplace Instruction WSY0037 - Polarity Testing and Phasing of Low Voltage Mains, Services and Apparatus.

This check shall test that each phase is at the same potential by use of suitably rated approved testing device between the same phases directly or at capacitive test points, that is, A-A, B-B, C-C should read 0 Volts. Phase volts shall be obtained on all other connections, that is, A-B, and the like.

4.7.5 Functional checks

Functional checks shall include but not be limited to the following:

- Switching equipment into the open, closed and earthed positions where appropriate using the operating handles or mechanisms provided.
- Check doors and covers fit and all interlocks operating correctly
- Check all handles/mechanisms can be locked as required to prevent operation
- Check ganged equipment operates as specified
- Raising and lowering taps on regulators
- Control and protection equipment operates within design parameters

4.7.6 Underground mains cable

All cables shall be tested before and after joining and/or terminating to confirm that the cables meet the minimum requirements as indicated in Annexure 1 checklists.

Results shall be recorded at the end of the tests.

Because of capacitance effects, the insulation resistance tester (megger) must be applied until the reading is stabilised - usually for a minimum period of one minute before recording each resistance reading.

Note: At the design stage, the Endeavour Energy officer in charge of the design project approval shall identify any newly proposed underground cable/s whether they are strategic/special. If in doubt, clarification must be sought from the Engineering Delivery Manager.

4.7.6.1 Standard test

- 1) After installation and prior to jointing or termination of underground distribution cables the following checks shall be performed:
 - Phasing (before jointing).
 - Insulation resistance test for main insulation – as in clause 4.7.2 (for acceptable values of insulation resistance, refer to Annexure 1 - Pre-commissioning inspections and tests checklist).
 - Cable serving insulation resistance test for XLPE insulated HV cables – as in clause 4.7.2 (for acceptable values of insulation resistance, refer to Annexure 1 - Pre-commissioning inspections and tests checklist).
- 2) After completion of jointing and/or termination and prior to connection to the system, check that the phasing is correct and that the main insulation resistance and serving insulation resistance of the entire cable is measured – as in clause 4.7.2 (for acceptable values of insulation resistance, refer to Annexure 1 - Pre-commissioning inspections and tests checklist).

Note: All attempts shall be made to test the entire cable including all terminations and joints prior to connecting either end to the network.

If one end of the cable is already connected and earthed, approved cable identification methods are to be used to positively identify both ends of the cable. Where the cable cannot be positively identified, then removal of earths is required to complete testing. Proper planning is essential to arrange the necessary Access Authority to enable earth removal and facilitate testing of the full cable length.

Once the cable is joined to the existing cable, it shall have normal operating voltage of the system (soak test) applied continuously for a minimum of 10 minutes before being disconnected for any non-fault related reason.

The Responsible Officer shall check that test values are retained as set out in clause 4.3.

4.7.6.2 Strategic / special cable tests

In addition to the tests described above, further special tests will be required if one or more of the following applies:

- A request from Asset Engineering Manager.
- Strategic cables (refer definition).
- Special request from System Control.
- Previous history of the condition of the cable.
- Request from external customers.

Strategic/special cable tests shall comprise one or all of the following, which shall be defined in the design brief for new installations:

- High voltage withstand test (AC/DC) as in GNV 1094.5 - Testing of network equipment: Withstand testing.
- Serving DC withstand test as in GNV 1094.7 - Testing of network equipment: Cables.
- Partial discharge tests as in GNV 1094.13 - Testing of network equipment: Partial Discharge Testing.
- DLA tests as in GNV 1094.14 - Testing of network equipment: Dielectric Dissipation factor (DDF) testing.
- Any special tests to suit local conditions, cable type or customer requirements.

Notes on strategic/special cable tests:

- High voltage DC shall not be applied to XLPE insulated cables (or other cables joined to XLPE insulated cable) due to possible degradation of insulation.
- High voltage DC testing of LV cables is not required.
- HV DC test voltage is suitable only for testing the (main) insulation of paper/oil/gas cables and shall be applied in accordance with Annexure 1 - Pre-commissioning inspections and tests checklist.
- A HV DC withstand test on serving of XLPE insulated cables may be required to determine the soundness of the outer sheath against water ingress, mechanical damage and termite attack, in accordance with Annexure 1 - Pre-commissioning inspections and tests checklist.
- HV AC is preferred to test XLPE cables. However, if there are practical issues with using HV AC, then AC voltage at power frequency shall be applied for 24 hours with normal operating voltage of the system (soak test), as agreed between the Endeavour Energy Responsible Officer and the AUP.
- High voltage tests shall be performed only by appropriately authorised people. Tests should be conducted in accordance with Endeavour Energy's Electrical Safety Rules and statutory requirements. During tests, public safety shall not be compromised in any way.

4.7.7 Substation and transformer

The transformer must have an insulation resistance test as set out in clause 4.7.2 and below.

There are two configurations of substation transformers and they shall be tested as set out below:

- a) Transformers that are a stand-alone unit (not pre-connected to other equipment):
 - First, check HV and LV phase continuity, as set out in clause 4.7.1.
 - Megger from any HV A, B or C phase terminal to earth.
 - Megger from any LV A, B or C phase terminal to earth.

- Megger from HV to LV.
- b) Transformers supplied as part of a package substation (connected to switchgear):
 - Test as indicated in a) above, but with transformer HV and LV switches open.

For acceptable values of insulation resistance, refer to Annexure 1 – Pre-commissioning inspections and tests checklist.

Note: In wet conditions, the HV megger readings will be as indicated in Annexure 1 – Pre-commissioning inspections and tests checklist, but the LV megger readings may be as low as 5MW due to moisture on the bushings.

4.7.8 HV substation switchgear

The HV switchgear must have an insulation resistance test as per clause 4.7.2.

There are two configurations of HV substation switchgears and they shall be tested as detailed below:

- a) Switchgear that is a stand-alone unit (not pre-connected to other equipment):
 - Switchgear open – test line side to load side for each phase.
 - Switchgear closed – test between phases and each phase to earth.
- b) Switchgear supplied as part of a package substation (connected to transformer):
 - Test as indicated in a) above but with transformer HV switch open.

For acceptable values of insulation resistance, refer to Annexure 1 - Pre-commissioning inspections and tests checklist.

The HV switchgear must also have a continuity check between all phases and earth when in the earthed position.

Readings should all be zero (0) Ohms or, if using a buzzer, a tone should be heard.

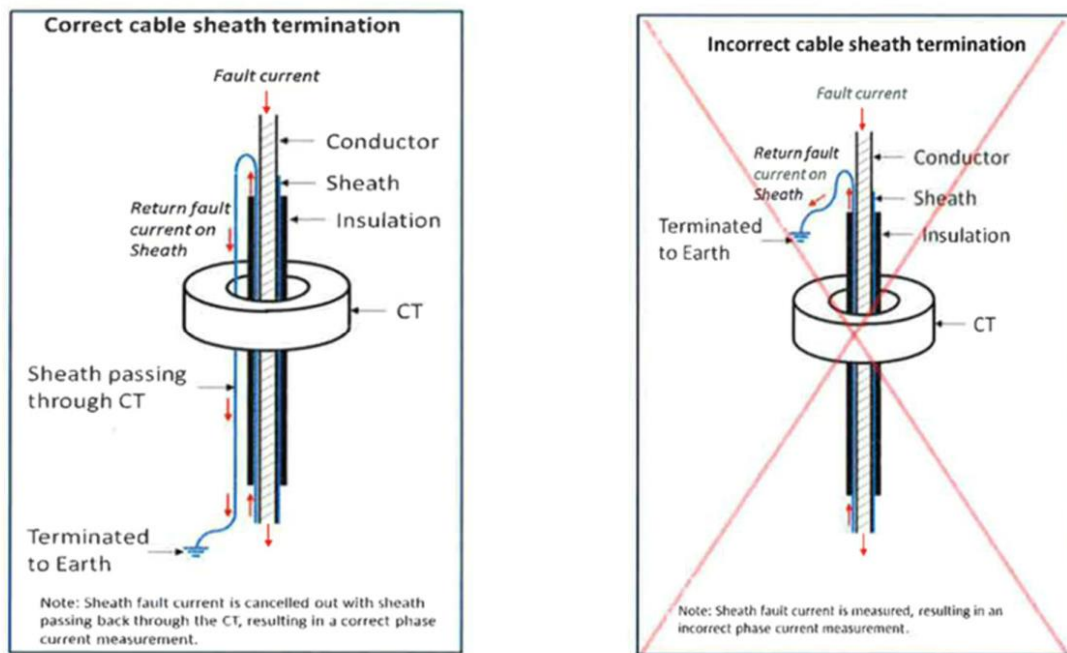
Where HV switchgear is assembled on site (such as extendable modules joined together by busbars), it shall be tested in accordance with AS 62271.1 Clause 10 which includes the manufacturers recommended on site tests.

For automated RMUs, refer to section 4.7.16 and 4.7.17 for SCADA and Protection requirements.

For cable terminations in automated RMUs, the installation of CTs must be inspected to ensure as follows: (Refer to Figure 1 below)

- Cable screens pass through CTs
- CTs are mounted concentric and perpendicular to the cable

Figure 1: CT Installation Diagram



All HV protection calibration and settings shall be carried out by Endeavour Energy employees as set out in clause 4.7.17. These tests may be conducted prior to delivery of the switchgear to site.

4.7.9 LV substation switchgear

The LV switchgear must have an insulation resistance test as set out in clause 4.7.2.

There are two configurations of LV substation switchgear and they shall be tested as set out below:

- a) Switchgear that is a stand-alone unit (not pre-connected to other equipment):
 - Switchgear open – test line side to load side for each phase.
 - Switchgear closed – test between phases and each phase to earth.
- b) Switchgear supplied as part of a package substation (connected to transformer):
 - Test as indicated in a) above but with transformer LV switch open

For acceptable values of insulation resistance, refer to Annexure 1 - Pre-commissioning inspections and tests checklist.

LV switchgear protective devices are to be set on the correct setting for the application. Refer to section 7 of MCI 0006 for LVCB settings.

The following characteristics shall be proven by routine test sheets from the manufacturer, or by a primary injection test (test required for each phase):

- 1) Non trip: the switchgear is not to trip at 100% of the pick-up setting in one minute, and the pick-up indication/flag, (if applicable) is not to operate.
- 2) Pickup: if the switchgear has a pick-up indication, it must operate between 105% and 125% of the pick-up setting.
- 3) Long time: the switchgear is to trip on its long-time setting within 15% of the manufacturer's published figure, or within the manufacturer's specified tolerance band.

- 4) Short time: the switchgear is to trip on short-time within 50ms of the short-time delay setting, or within the manufacturer's tolerance.

4.7.10 Voltage regulator/autotransformers

There are two different types of regulators currently in use, new single phase units and older style three phase units.

The single phase units are the current standard and can be connected as a single unit to regulate a two wire supply or connected in groups of up to three to regulate 3 phase supplies.

Each single phase unit will have 3 bushings SL, S and L. Older regulators will generally have six bushings, three for the source and three for the load side.

The voltage regulator must have an insulation resistance test as set out in clause 4.7.2.

This equipment shall be tested as a stand alone unit isolated from the main line.

For acceptable values of insulation resistance, refer to Annexure 1 - Pre-commissioning inspections and tests checklist.

Functional tests shall be carried out for correct operation of the equipment and all control equipment, as set out in the manufacturer's specification.

Tests for correct operation of all protection equipment shall be carried out as in Protection Maintenance Instruction PMI 1000 – Protection commissioning & maintenance.

4.7.11 Recloser, and enclosed load break switch/sectionaliser

The equipment must have an insulation resistance test as set out in clause 4.7.2.

This equipment shall be tested as a stand alone unit isolated from the main line.

For acceptable values of insulation resistance, refer to Annexure 1 – Pre-commissioning inspections and tests checklist.

Functional tests shall be carried out for correct operation of the equipment and all control equipment, as set out in the manufacturer's specification. For controllers in reclosers and auto LBS, refer to section 4.7.16 and 4.7.17 for SCADA and Protection requirements.

Tests for correct operation of all protection equipment shall be carried out as in Protection Maintenance Instruction PMI 1000 – Protection commissioning & maintenance.

4.7.12 Air break switch, USL/Fuse, drop out fuse, surge arrestor and the like

The equipment must have an insulation resistance test as set out in clause 4.7.2.

The equipment shall be tested in the closed and open position and tested from the phase terminals to the mounting frame or bracket.

Note: Where surge arrestors are fitted to equipment, they need not be disconnected for the test unless a low reading is experienced.

For acceptable values of insulation resistance, refer to Annexure 1 – Pre-commissioning inspections and tests checklist.

4.7.13 Overhead items

Endeavour Energy's preference is to electrically test HV and LV overhead mains as detailed below:

New HV and LV overhead mains shall be tested before the addition or connection of any other services or transformers.

- The equipment must have an insulation resistance test as set out in clause 4.7.2.

For acceptable values of insulation resistance, refer to Annexure 1 - Pre-commissioning inspections and tests checklist.

Existing HV mains that cannot be tested because they are earthed as part of the isolation or LV mains that are earthed, or have services already attached, shall:

- Be patrolled for visual damage prior to energising.
- Be energised, where practical, for at least 10 minutes before load is applied.

However, the Responsible Officer may decide to energise the overhead line, excluding HVABC which shall be always tested, without carrying out the required electrical tests if he/she is satisfied that there are no risks associated with energising the assets. In this instance the Responsible Officer will be responsible to check, before energising, that there are no potential hazards and that it is safe to energise the line. The means by which the determination has been made shall be recorded prior to energisation of the asset.

4.7.14 LV battery equipment

Prior to installing a LV network or community battery on the network, a factory acceptance test (FAT) report should be reviewed by the relevant sections.

The following electrical components shall be referenced to checks and tests as follows:

- Low voltage network augmentation to isolation point (underground switch pillar or overhead LV links) – Table C and K.
- Isolation Point (underground switch pillar or overhead LV links) – Table O.
- LV switchboard – Tables C and P.
- Battery system – Table Q.
- 230V/400V inter-wiring between the isolation point, LV switchboard and battery system – Table K.

Note: The connection of the LV service and LV switchboard is to adhere to WSY 0037 - Polarity Testing and Phasing of Low Voltage Mains, Services and Apparatus.

4.7.15 Earthing

Substation earth grids and individual earthing of other equipment shall be tested and checked as described below:

- Comply with Earthing Design Instruction EDI 100 – Distribution earthing design
- Check for any physical damage.
- Circuit continuity from equipment to earth grid (or as close to grid as possible) to be checked.
- Check correct separation from other equipment such as Telstra, fences, special, frequented, or remote areas.
- Check if network system is CMEN, common or separate earthed.
- Check MEN bond is installed, where required.
- Soil resistivity value to be obtained from design data.
- Earth grid resistance to be tested to check compliance with design.

For acceptable values refer to Annexure 1 - Pre-commissioning inspections and tests checklist.

4.7.16 SCADA equipment

All SCADA equipment (for auto LBS, recloser, automated RMU, etc.) shall undergo a bench testing process. Relevant Project Manager or Construction Coordinator must coordinate with the Regional Protection & Control section and SCADA team for the bench testing and SCADA configuration. Where a radio installation is required, coordination must be with the Telecommunications Team. A minimum of 3 weeks' notice is required.

4.7.17 Protection equipment

Where HV switchgear is fitted with VTs, CTs or other current monitoring devices, and/or protection relays/devices, they shall be tested to check they comply with the relevant Endeavour Energy, Australian Standards and manufacturer's specifications. The manufacturer's test results shall not be sufficient for this purpose.

Primary and secondary injection tests shall be carried out to check correct operation of the protective device at all relevant settings.

All HV circuit breaker settings are to be calculated, or as a minimum checked and approved by Protection section. Relevant Project Manager or Construction Coordinator must request as a minimum of 3 weeks prior to bench testing.

Protection systems are tested and commissioned in accordance with Protection Maintenance Instruction PMI 1000 – Protection commissioning & maintenance.

5 Responsibilities

General Manager Future Grid & Asset Management has the authority and responsibility for:

- approving major changes to this standard in accordance with Table 4 of GAM 0001;
- making all decisions concerning compliance with this standard;
- delegating any of these authorities and responsibilities to the Head of Asset Management and Digital.

Head of Asset Management and Digital has the authority and responsibility for:

- approving minor changes to this standard in accordance with Table 4 of GAM 0001;
- making recommendations to the General Manager Future Grid & Asset Management for major changes in respect to this standard.

Asset Engineering Manager has the authority and responsibility for:

- Reviewing and updating this standard in accordance with Company Policy and Procedures.

Secondary Systems Manager has the authority and responsibility for:

- Providing settings for relevant Protection equipment and support for SCADA equipment.

Head of Field Operations has the responsibility for:

- Appointing a Responsible Officer to any project when required by this procedure; and,
- Developing a process for implementing the requirements of this instruction.

Head of Customer Network Solutions has the responsibility for:

- Confirming that the network installations made by external staff or organisations are checked and tested in accordance with this Standard.

Responsible Officer has the authority and responsibility for:

- Checking that the equipment is safe to energise; pre-commissioning tests and checks are carried out immediately prior to energisation of the newly installed equipment or system;
- Checking that the relevant forms are completed; and
- Checking that the test results are satisfactory for the newly installed assets to be energised or made available for service.

Accredited Service Providers have the responsibility for:

- Confirming that their staff have available and use the latest issue of this instruction and other related Standards

Annexure 1: Pre-commissioning inspections and tests checklist

Annexure 1 of this document contains all the necessary checklists that summarise the high level requirements of the detailed test and inspection schedules, and which must be signed. Field test reports may be used instead of the check lists, provided that they incorporate the detailed requirements of the checklists.

The following checklists set down the minimum requirements for acceptance of equipment to be connected to Endeavour Energy's Network.

If an item is considered to be not applicable or outside of the criteria given then supporting documented evidence of the reasons shall be provided for examination and approval by the Engineering Delivery Manager.

Description: Date:

Sub no.:

Table A: Substation and transformer							
Substation	Actions			Acceptable criteria	Results	Signature	Name
1. Visual inspection							
Transformer	Equipment approved for use by Endeavour Energy and accepted as in GNV 1039			Approval no.			
				Mandatory			
	Installed to Endeavour Energy Standards			Mandatory			
	External damage during transportation			None			
	Signs of corrosion			None			
	Check voltage level and ratings of all equipment is appropriate			Yes			
	Vermin guards installed HV (+ LV pads)			Yes			
	Transformer support bracket and other overhead line hardware in good condition			Yes			
	Oil leaks/wetness on the transformer tank			None			
	Cracks or chips on bushings			None			
	Bushings insulated			Yes			
	Oil level above minimum (if applicable)			Yes			
	All cables/conductors terminated properly			Yes			
	Substation pole, indoor or padmount	Installed to Endeavour Energy Standards			Mandatory		
Substation and equipment secure			Mandatory				
Check doors fit, locks operating correctly			Mandatory				
Labels fitted (warning signs, ratings, switching, operational and plant no's)			Mandatory				
Pole correct size for equipment and project or culvert installed to correct ground level			Yes				
Access, easements and restriction zones			Mandatory				
Ventilation design to standard (ID sub)			Mandatory				
Fire extinguishers and alarms to std (ID sub)			Mandatory				
2. Earthing tests and checks – refer to Table P: Earthing							
3. Continuity test (Ω) (Test as detailed in clause 4.7.1)							
Trf. Winding	HV AØ to BØ	HV AØ to CØ	HV CØ to BØ	LV AØ to N	LV BØ to N	LV CØ to N	
3. Insulation resistance (1000V) test							
Transformer winding incl. bushings	Test HV and LV winding as detailed in clause 4.7.2. The test must be conducted with the HV and LV switchgear transformer isolators open			Greater than 100M Ω on HV and LV	Note: In wet conditions the acceptable LV readings may be as low as 5MΩ		
	HV to E		LV to E		HV to LV		
4. Polarity test (LV circuits)							
Polarity	Check as detailed in clause 4.7.3						

Description: Date:

Sub no.:

Table B: HV substation switchgear/switchboard									
HV switchgear	Actions				Acceptable criteria	Results	Signature	Name	
1. Visual inspection									
Complete switchgear	Equipment approved for use by				Approval no.				
					Mandatory				
	Installed to Endeavour Energy Standards				Mandatory				
	External damage during transportation				None				
	Signs of corrosion				None				
	Labels fitted (warning signs, ratings, switching, operational and plant no's)				Mandatory				
	Switchboard earth bar securely connected to substation HV earth grid				Mandatory				
	Power cabling and terminations complete. Cable sheaths earthed as required				Mandatory				
	Cable clamps fitted (in switchgear and floating clamp in culvert)				Yes				
	Fuse sizes checked (if applicable) or CB protection relay sealed by IE test section				Yes				
	Cable box barriers and barriers preventing access to busbar chambers in place				Mandatory				
	Cables correctly labelled				Mandatory				
	Fault indicators fitted and operational				To manuf. manual				
	Gas pressure level in switchgear to manufacturer's specification (if applicable)				Yes				
2. Functional checks									
Complete switchgear	Switchgear operations – mechanical close and open				To manuf. manual				
	Switchgear spring charging – electrical and manual operations (if applicable)				To manuf. manual				
	Check doors/covers fit and interlocks operating correctly				Mandatory				
	Earth switch operates in accordance with manufacturers manual				Mandatory				
	Functionality of all control devices and associated electrical circuits				To manuf. manual				
	Protection devices and assoc. circuits comply with PMI 1000				To manuf. manual				
3. Continuity test (Ω) (Tick if correct - test as detailed in clause 4.7.1)									
Switch closed	All AØs	All BØs	All CØs	Switch closed	Feeder 1	Feeder 2	Feeder 3	Feeder 4	
Main switch				Earth switch					
4. Insulation resistance (1000V) test									
Complete switchgear	Test as detailed in clause 4.7.8. Stand alone or package substation switch				Greater than 100M Ω				
Switch closed	AØ to E	BØ to E	CØ to E	AØ to BØ	AØ to CØ	CØ to BØ			
Switch open	AØ to AØ	BØ to BØ	CØ to CØ						
Switch 1									
Switch 2									
Switch 3									
Switch 4									

Description: Date:

Sub no.:

Table C: LV substation switchgear/switchboard							
LV switchgear	Actions			Acceptable criteria	Results	Signature	Name
1. Visual inspection							
Complete switchgear	Equipment approved for use by			Approval no.			
				Mandatory			
	Installed to Endeavour Energy Standards			Mandatory			
	External damage during transportation			None			
	Signs of corrosion			None			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)			Mandatory			
	Switchboard earth bar securely connected to substation LV earth grid			Mandatory			
	Power cabling and terminations complete.			Mandatory			
	Cable clamps fitted (at base of switchgear)			Yes			
	Fuse sizes checked (if applicable)			Yes			
	CB protection set and checked			Yes			
	All cable term. barriers and barriers preventing access to busbar chambers in place			Mandatory			
	Cables correctly labelled			Mandatory			
2. Functional checks							
Complete switchgear	Switchgear operations – mechanical close and open			To manuf. manual			
	Functionality of all control devices and associated electrical circuits			To manuf. manual			
3. Continuity test (Ω) (Tick if correct - test as detailed in clause 4.7.1)							
Switch closed	All AØs	All BØs	All CØs				
4. Insulation resistance (1000V) test							
Complete switchgear	Test as detailed in clause 4.7.9. Stand alone or package substation switch			Greater than 100M Ω			
Switch closed	AØ to E	BØ to E	CØ to E	AØ to BØ	AØ to CØ	CØ to BØ	
Switch open	AØ to AØ	BØ to BØ	CØ to CØ				
Switch 1							
Switch 2							
Switch 3							
Switch 4							

Description: Date:

Voltage regulator no.:

Table D: Voltage regulator										
Voltage regulator	Actions				Acceptable criteria	Results	Signature	Name		
1. Visual inspection										
Voltage regulator	Equipment approved for use by				Approval no.					
					Mandatory					
	Installed to Endeavour Energy Standards				Mandatory					
	External damage during transportation				None					
	Signs of corrosion				None					
	Labels fitted (warning signs, ratings, switching, operational and plant no's)				Mandatory					
	Pole correct size for equipment and project				Yes					
	Check voltage level and ratings of all equipment is appropriate				Yes					
	Vermin guards installed on HV				Yes					
	Oil leaks/wetness on the tank				None					
	Cracks or chips on bushings				None					
	Oil level indicators available (if applicable)				Yes					
	Oil level above minimum (if applicable)				Yes					
	All cables/conductors terminated properly				Mandatory					
Regulator support bracket and other overhead line hardware in good condition				Mandatory						
2. Functional checks										
Control and SCADA	Test for correct operation, as in manufacturer's specification				Mandatory					
Protection equipment	Comply with PMI 1000				Mandatory					
3. Continuity test (Ω) (Tick if correct - test as detailed in clause 4.7.1)										
1Ø Reg. x 3	1	SLØ to LØ	SLØ to SØ	2	SLØ to LØ	SLØ to SØ	3	SLØ to LØ	SLØ to SØ	
Trf Winding										
3Ø Reg.	AØ to BØ	AØ to CØ	CØ to BØ		aØ to bØ	aØ to cØ	cØ to bØ			
Trf Winding										
4. Insulation resistance (1000V) test										
Voltage regulator	Test as detailed in clause 4.7.2. Test with equipment isolated from line				Greater than 100M Ω					
1Ø Reg. x 3	1	SLØ to E	2	SLØ to E	3	SLØ to E				
Trf winding										
3Ø Reg.	HV to E		LV to E							
Trf winding										

Description: Date:

Recloser no.:

Table E: Recloser						
Recloser	Actions		Acceptable criteria	Results	Signature	Name
1. Visual inspection						
Recloser	Equipment approved for use by	Approval no.				
		Mandatory				
	Installed to Endeavour Energy Standards	Mandatory				
	External damage during transportation	None				
	Signs of corrosion	None				
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Mandatory				
	Pole correct size for equipment and project	Yes				
	Check voltage level and ratings of all equipment is appropriate	Yes				
	Vermin guards installed on HV	Yes				
	Oil leaks/wetness on the tank (if applicable)	None				
	Cracks or chips on bushings	None				
	Oil level indicators available (if applicable)	Yes				
	Oil level above minimum (if applicable)	Yes				
	Gas pressure within required level (if appl.)	Yes				
	Are all cables are terminated properly	Mandatory				
Recloser support bracket and other overhead line hardware in good condition	Mandatory					
2. Functional checks						
Recloser	Switchgear operations – mechanical close and open	To manuf. manual				
	Test for correct operation, as in manufacturer's specification	Mandatory				
	Comply with PMI 1000	Mandatory				
3. Continuity test (Ω) (Tick if correct - test as detailed in clause 4.7.1)						
Switch closed	All AØs	All BØs	All CØs			
4. Insulation resistance (1000V) test						
Recloser	Test as detailed in clause 4.7.2. Test wit equipment isolated from line		Greater than 100M Ω			
Switch closed	AØ to E	BØ to E	CØ to E	AØ to BØ	AØ to CØ	CØ to BØ
Switch open	AØ to BØ	AØ to CØ	CØ to BØ			

Description: Date:

LBS no.:

Table F: Enclosed load break switch (LBS)						
LBS	Actions		Acceptable criteria	Results	Signature	Name
1. Visual inspection						
LBS	Equipment approved for use by	Approval no. Mandatory				
	Installed to Endeavour Energy Standards	Mandatory				
	External damage during transportation	None				
	Signs of corrosion	None				
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Mandatory				
	Pole correct size for equipment and project	Yes				
	Check voltage level and ratings of all equipment is appropriate	Yes				
	Vermin guards installed on HV	Yes				
	Oil leaks/wetness on the tank (if applicable)	None				
	Cracks or chips on bushings	None				
	Gas pressure within required level (if appl.)	Yes				
	If pole mounted support, bracket and cross arm in good condition	Yes				
2. Functional checks						
LBS	Switchgear operations – mechanical close and open	To manuf. manual				
	Test for correct operation, as in manufacturer's specification	Mandatory				
	Comply with PMI 1000	Mandatory				
3. Continuity test (Ω) (Tick if correct - test as detailed in clause 4.7.1)						
Switch closed	AØ to AØ	BØ to BØ	CØ to CØ			
4. Insulation resistance (1000V) test						
Recloser	Test as detailed in clause 4.7.2. Test with equipment isolated from line		Greater than 100MΩ			
Switch closed	AØ to E	BØ to E	CØ to E	AØ to BØ	AØ to CØ	CØ to BØ
Switch open	AØ to AØ	BØ to BØ	CØ to CØ			

Description: Date:

ABS no.:

Table G: Air break switch (ABS)						
ABS	Actions		Acceptable criteria	Results	Signature	Name
1. Visual inspection						
ABS	Equipment approved for use by		Approval no.			
			Mandatory			
	Installed to Endeavour Energy Standards		Mandatory			
	External damage during transportation		None			
	Signs of corrosion		None			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)		Mandatory			
	Pole correct size for equipment and project		Yes			
	Check voltage level and ratings of all equipment is appropriate		Yes			
	Cracks or chips on bushings		None			
Pole mount support bracket correct		Yes				
2. Functional checks						
ABS	ABS operates correctly (incl. flicker blade)		Mandatory			
	Operating handle can be locked in both positions		Mandatory			
3. Continuity test (Ω) (Tick if correct - test as detailed in clause 4.7.1)						
Switch closed	AØ to AØ	BØ to BØ	CØ to CØ			
4. Insulation resistance (1000V) test						
Recloser	Test as detailed in clause 4.7.2. Test with equipment isolated from line		Greater than 100M Ω			
Switch closed	AØ to E	BØ to E	CØ to E	AØ to BØ	AØ to CØ	CØ to BØ
Switch open	AØ to AØ	BØ to BØ	CØ to CØ			

Description: Date:

DOF no.:

Table H: Drop out fuse, USL / Fuse and the like					
DOF	Actions	Acceptable criteria	Results	Signature	Name
1. Visual inspection					
DOF/USL/ Fuse	Equipment approved for use by Endeavour Energy	Approval no. Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Signs of corrosion	None			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Mandatory			
	Pole correct size for equipment and project	Yes			
	Check voltage level and ratings of all equipment is appropriate	Yes			
	Cracks or chips on bushings	None			
	Pole mount support bracket correct	Yes			
	Earth stirrup for portable earths installed	Yes			
2. Functional checks					
DOF/USL/ Fuse	Test for correct operation as in manufacturer's specification.	Yes			
	Check ganged operation, fuse size and sectionaliser settings (if applicable)	Yes			
3. Continuity test (Ω) (Tick if correct - test as detailed in clause 4.7.1)					
Switch closed	AØ to AØ	BØ to BØ	CØ to CØ		
4. Insulation resistance (1000V) test					
DOF/USL/ Fuse	Test as detailed in clause 4.7.2. Test with equipment isolated from line		Greater than 100M Ω		
Switch closed	AØ to E	BØ to E	CØ to E		
Switch open	AØ to AØ	BØ to BØ	CØ to CØ		

Description: Date:

Equip. no.:

Table J: Surge arrestor							
Surge arrestor	Actions			Acceptable criteria	Results	Signature	Name
1. Visual inspection							
Surge arrestor	Equipment approved for use by Endeavour Energy			Approval no.			
				Mandatory			
	Installed to Endeavour Energy Standards			Mandatory			
	External damage during transportation			None			
	Check voltage level and ratings of all equipment is appropriate			Yes			
	Cracks or chips on bushings			None			
	Mounting bracket allows disconnect to operate correctly (if fitted)			Yes			
2. Insulation resistance (1000V) test							
DOF/USL/ Fuse	Test as detailed in clause 4.7.2. Test across arrestor terminals			Greater than 100MΩ			
Arrestor set 1	AØ to E	BØ to E	CØ to E				
Arrestor set 2	AØ to E	BØ to E	CØ to E				

Description: Date:

Sub no.:

Table K: LV(0.6/1kV) Underground mains cable						
LV UG cable	Actions		Acceptable criteria	Results	Signature	Name
1. Visual inspection						
Cable	Equipment is approved by Endeavour Energy		Approval no.			
			Mandatory			
	Installed to Endeavour Energy Standards		Mandatory			
	External damage during transportation		None			
	Check voltage level and ratings of all equipment is appropriate		Yes			
	Cable identification labelled		Yes			
	Non connected cables capped & earthed		Yes			
Cable mech. Prot. installed UG + up pole		Yes				
2. Continuity checks						
Cable	Test as detailed in clause 4.7.1.		Yes			
3. Polarity checks						
Cable	Test as detailed in clause 4.7.3.		Yes			
4. Phasing checks						
Cable	Test as detailed in clause 4.7.4.		Yes			
5. Insulation resistance (1000V) test (Notes: Other = cables repaired or joined to existing old XLPE or Paper cable. All cables to be tested before and after jointing/ terminating)						
0.6/1kV XLPE insulated cable Main insulation test	Test as detailed in clause 4.7.6. Cable only. New installations		Min 200MΩ			
	Test as detailed in clause 4.7.6. Cable only.					
	Other installations XLPE to XLPE →		Min 50MΩ			
	Other installations XLPE to Paper --		Min 20MΩ			
0.6/1kV XLPE insulated cable Main insulation test	Test as detailed in clause 4.7.6. Test after cable only test & connected to other assets. New installations XLPE cables only		Min 50MΩ			
	Test as detailed in clause 4.7.6. Cable only (new paper no longer used) New installations (historic data only)		Min 200MΩ			
	Test as detailed in clause 4.7.6. Test after cable only test when connected to other assets. Other installations XLPE or Paper		Min 20MΩ			
Step 1 Cables only	AØ to E	BØ to E	CØ to E	AØ to E	AØ to E	AØ to E
	AØ to N	BØ to N	CØ to N	N to E		
Step 2 Connected to other assets	AØ to E	BØ to E	CØ to E	AØ to E	AØ to E	AØ to E
	AØ to N	BØ to N	CØ to N	N to E		

Description: Date:

Sub no.: Switch no.....

Sub no.: Switch no.....

Table L: HV (6.35/11kV to 12.7/22kV) Underground mains cable					
HV UG cable	Actions	Acceptable criteria	Results	Signature	Name
1. Visual inspection					
Cable	Equipment is approved by Endeavour Energy	Approval no. Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Voltage ratings of cable and term. correct	Yes			
	For cable terminations in automated RMUs - Ensure cable screens pass through CTs - Ensure CTs are mounted concentric and perpendicular to the cable	Yes			
	Non connected cables capped & earthed as per MCI0006 clause 3.2.3 and 3.2.4	Yes			
	Cable mech. Prot. installed UG + up pole	Yes			
2. Standard tests After installation and prior to jointing or termination					
Cable	Test as detailed in clause 4.7.6.1.	Yes			
3. Standard tests- After completion of jointing and/or termination and prior to connection to the system					
Cable	Test as detailed in clause 4.7.6.1.	Yes			
. Insulation resistance (1000V) test (Notes: Other = cables repaired or joined to existing old XLPE or Paper cable. All cables to be tested before and after jointing/ terminating)					
XLPE insulated cable Main insulation test	Test as detailed in clause 4.7.6. Cable only. New installations	Min 100GΩ			
	Test as detailed in clause 4.7.6. Cable only. Other installations XLPE to XLPE → Other installations XLPE to Paper --	Min 200MΩ Min 100MΩ			
	Test as detailed in clause 4.7.6. Test after cable only test & connected to other assets. New installations XLPE cables only	Min 50MΩ			
	Test as detailed in clause 4.7.6. Cable only (new paper no longer used) New installations (historic data only)	Min 2GΩ			
Paper insulated cable Main insulation test	Test as detailed in clause 4.7.6. Test after cable only test and connected to other assets. Other installations XLPE or Paper	Min 100MΩ			

(Continued following page)

Cable serving Screen to earth	Test as detailed in clause 4.7.6. Cable only with no connections to other cables/assets. New installations			55MΩ			
	Test as detailed in clause 4.7.6. Cable only with no connections to other cables/assets. Other installations			10MΩ			
Step 1 Cables only	AØ to E	BØ to E	CØ to E	Screen to E	AØ to BØ	AØ to CØ	CØ to BØ
Step 2 Connected to other assets	AØ to E	BØ to E	CØ to E	Screen to E	AØ to BØ	AØ to CØ	CØ to BØ

Description: Date:

Sub no.: Switch no..... Switch no.....

Table M: Underground mains cable – Strategic/special cable (Test are to be carried out on request only 0 refer clause 4.7.6.2)							
HV UG cable	Actions			Acceptable criteria	Results	Signature	Name
1. DS withstand test – Belted Paper insulated cable (All cables to be tested before and after jointing/terminating)							
0.6/1kV	Between conductors 3.5kV for 15 minutes			No discharge			
	Between all conductors and sheath 3.5kV for 15 minutes			No discharge			
3.8/6.6kV	Between conductors 20kV for 15 minutes			No discharge			
	Between all conductors and sheath 15kV for 15 minutes			No discharge			
6.35/11kV	Between conductors 34kV for 15 minutes			No discharge			
	Between all conductors and sheath 25kV for 15 minutes			No discharge			
12.7/22kV	Between conductors 50kV for 15 minutes			No discharge			
	Between all conductors and sheath 50kV for 15 minutes			No discharge			
Cable only	AØ to E	BØ to E	CØ to E	Screen to E	AØ to BØ	AØ to CØ	CØ to BØ
2. DC withstand test – Serving of XLPE insulated cable (All cables to be tested before and after jointing/ terminating)							
6.35/11 to 12.7/22kV	Between screen and Earth tested at 5kV for 1 minute			No discharge			
3. Soak test – XLPE insulated cables – (AC voltage at Power frequency)							
6.35/11 to 12.7/22kV	Soak for 24 hours at system voltage			No break down			
4. Partial discharge (PD) – XLPE insulated cables							
6.35/11 to 12.7/22kV	PD test at 1.5 times of U ₀			5pC			
5. Dielectric loss angle (DLA)							
6.35/11 to 12.7/22kV	XLPE cable test at 1.5 times of U ₀			0.0005			
	Paper cable test at 1.5 times of U ₀			0.01			

Description: Date:

Pole no.: Pole no..... Pole no..... Pole no.....

Table N: HV and LV Overhead mains						
OH mains	Actions		Acceptable criteria	Results	Signature	Name
1. Visual inspection						
0.6/1kV 3.8/6.6kV 6.35/11kV 12.7/22kV	Equipment is approved by Endeavour Energy		Approval no.			
			Mandatory			
	Installed to Endeavour Energy Standards		Mandatory			
	External damage during transportation		None			
	Check voltage level and ratings of all equipment is appropriate		Yes			
	Ground and circuit clearances to standard		Yes			
	Surge protection equipment installed as indicated in standards		Yes			
2. Earthing tests and checks – refer to Table P: Earthing						
3. Continuity checks						
New mains	Test as detailed in clause 4.7.1		Yes			
4. Polarity checks – LV only						
New mains	Test as detailed in clause 4.7.3		Yes			
5. Phasing checks						
New mains	Test as detailed in clause 4.7.4		Yes			
6. Insulation resistance (1000V) test						
New mains	Test as detailed in clause 4.7.13		Min 100MΩ			
AØ to E	BØ to E	CØ to E	AØ to BØ	AØ to CØ	CØ to BØ	
AØ to N	BØ to N	CØ to N				
7. Service voltage test – (energise with no load for 10 minutes)						
Existing Mains	Patrol line prior to energisation		Mandatory			
	Test as detailed in clause 4.7.13		Mandatory			

Description: Date:

Pillar no.:

Table O: UG pillars					
UG pillars	Actions	Acceptable criteria	Results	Signature	Name
1. Visual inspection					
UG pillars	Equipment is approved by Endeavour Energy	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Ratings of all equipment is appropriate	Mandatory			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Yes			
	Installed at correct height	Yes			
	Service conduits and if appl. cables installed	Yes			
	Correct service blocks/connection used	Yes			
	Cables terminated and tensioned correctly	Yes			
	Earth cable identified (if applicable)	Yes			

Note: For street lighting columns refer to LDI 0003 (FAE 3506, 3507, 3508, 3509)

Table O: UG pillars					
UG pillars	Actions	Acceptable criteria	Results	Signature	Name
1. Visual inspection					
UG pillars	Equipment is approved by Endeavour Energy	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Ratings of all equipment is appropriate	Mandatory			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Yes			
	Installed at correct height	Yes			
	Service conduits and if appl. cables installed	Yes			
	Correct service blocks/connection used	Yes			
	Cables terminated and tensioned correctly	Yes			
	Earth cable identified (if applicable)	Yes			

Description: Date:

Sub no.: Pole no..... Switch no..... Other no.....

Table P: Earthing		Acceptable criteria	Results	Signature	Name
Earthing	Actions				
1. Visual inspection					
Earthing	Equipment is approved by Endeavour Energy	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	Any visible damage	None			
	LV neutral earthed as in EDI 100	Yes			
	HV equipment earthed as req. in EDI 100	Yes			
	Earth grid installed to the correct depth	Yes			
	Earth cable double insulated as req.	Yes			
	Req. Separation from other equip. such as Telstra, fences, special, frequented, remote	Yes			
2. Functional checks					
Earthing	Earth circuit continuity confirmed (from equipment to closest connection to earth grid)	Yes			
	Common or separately earthed	To design			
	CMEN system on first asset from TS or ZS	To design			
	MEN bond installed (if applicable)	To design			
	Soil resistivity values (from design data Ωm)	Mandatory			
	Earth grid resistance measured (Ω)	Mandatory design values			

Description: Date:

Battery No.....

(Refer to the video illustration produced by Technical Training for further information)

Table Q1: Consolidated Battery Commissioning Form – ‘Battery Installation’							
Element	Actions			Acceptable criteria	Results	Signature / Initials	
1. Visual inspection							
Overall Installation	Equipment is approved by Endeavour Energy			Mandatory			
	Installed as per design and installation manual			Mandatory			
	External damage during transportation			None			
	Ratings of all equipment as per design			Mandatory			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)			Yes			
LV Cable (S/B to Battery)	Cable mechanical protection installed.			Yes			
LV Switch-board	Power cabling and terminations complete.			Mandatory			
	All cable term. barriers and barriers preventing access are in place			Mandatory			
	Cables correctly labelled			Mandatory			
	Check that LV neutral is connected, and LV board is earthed.			Yes			
Battery Enclosure	Firmly mounted to the pole/plinth			Yes			
	Earth cable identified			Yes			
	All cables to battery enclosure are connected securely			Yes			
2. Functional checks							
LV Switchboard	CB – mechanical close and open			As per manuf.			
3. LV Cable Continuity Test – between switchboard and battery (Test as detailed in clause 4.7.1.)							
LV Cable	AØ to BØ	AØ to CØ	BØ to CØ	AØ to N	BØ to N	CØ to N	
4. LV Cable Insulation Resistance (1000V) test							
LV Cable - Test as detailed in clause 4.7.6 (UG) / 4.7.13 (OH) – XLPE min. 200 MΩ LV ABC min. 100MΩ							
Cable Only (switches open)	AØ to E	BØ to E	CØ to E	AØ to BØ	AØ to CØ	CØ to BØ	Signature / Initials
	AØ to N	BØ to N	CØ to N	N to E			
5. LV Switchboard Continuity Test							
LV S/B	Test as detailed in clause 4.7.1.			Signature / Initials			
Switch closed	All AØs	All BØs	All CØs				

Table Q1: Continued														
6. LV Switchboard Insulation Resistance (1000V) (Applicable only if meter not yet installed)														
LV Switchboard - Test as detailed in clause 4.7.9 – minimum result 100MΩ														
Switch Closed	AØ to E	BØ to E	CØ to E	AØ to BØ	AØ to CØ	CØ to BØ								
Switch Open	AØ to AØ	BØ to BØ	CØ to CØ	Signature / Initials										
7. Energise the incoming cable from the LV pillar to the LV switchboard (Remove neutral terminal from CB and CB is in OFF position)														
8. Polarity checks														
Element	Actions	Acceptable criteria	Results	Signature / Initials										
Polarity	Test as per clause 4.7.3.	Pass												
Phasing	Test as per clause 4.7.4.	Pass												
9. Neutral Integrity Test														
				<table border="1"> <thead> <tr> <th colspan="2">Acceptable Criteria</th> </tr> </thead> <tbody> <tr> <td colspan="2">MEASURED NEUTRAL IMPEDANCE (Standard $\leq 0.5 \Omega$) (refer to WSY0037 for values in excess of 0.5Ω)</td> </tr> <tr> <th>Results</th> <th>Signature / Initials</th> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>			Acceptable Criteria		MEASURED NEUTRAL IMPEDANCE (Standard $\leq 0.5 \Omega$) (refer to WSY0037 for values in excess of 0.5Ω)		Results	Signature / Initials		
Acceptable Criteria														
MEASURED NEUTRAL IMPEDANCE (Standard $\leq 0.5 \Omega$) (refer to WSY0037 for values in excess of 0.5Ω)														
Results	Signature / Initials													
10. Energisation of the Battery														
i) Switch OFF the LV supply from LV pillar to LV switchboard. CB in LV switchboard must be in OFF position. ii) Reconnect the neutral terminal to CB. iii) Close battery isolation switch/CB in battery cabinet & close battery enclosure. iv) Close the MCCB to the BESS and Heater switch v) Switch ON the LV supply from LV pillar to LV switchboard vi) Close CB on LV switchboard vii) Energisation of LV Switchboard Successful? Yes / No														
Name:		Signature:		Date:										

(refer to Annexure 2 for Post Commissioning steps)

Description: Date:

Pole no.:

Table Q2: Pole Mount LV Statcom					
Pole mount LV Statcom	Actions	Acceptable criteria	Results	Signature	Name
1. Visual inspection					
LV Statcom	Equipment is approved by Endeavour Energy	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Ratings of all equipment is appropriate	Mandatory			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Yes			
	Installed at correct height	Yes			
	LV Statcom door is securely closed				
	All cables to LV Statcom enclosure are connected securely	Yes			
	LV panel - All wiring terminations are intact. - All switches and fuses are in closed position.	Yes			
	Earth cable identified (if applicable)	Yes			

Description: Date:

Sub no.:

Table Q3: DSub monitors					
DSub monitors	Actions	Acceptable criteria	Results	Signature	Name
1. Visual inspection					
DSub monitors	Equipment is approved by Endeavour Energy	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Ratings of all equipment is appropriate	Mandatory			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Yes			
	Installed at correct location	Yes			
	LV cable connections to auxiliary strip are intact				
	All connections to DSub monitor are intact	Yes			
	Thermal magnetic sensor is on transformer body	Yes			
	Confirm current sensor arrow is towards the load side	Yes			

Description: Date:

Pole no.:

Table Q4: Early Fault Detection					
Early Fault Detection	Actions	Acceptable criteria	Results	Signature	Name
1. Visual inspection					
Early Fault Detection (EFD)	Equipment is approved by Endeavour Energy	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Ratings of all equipment is appropriate	Mandatory			
	Cellular antenna and sensor leads are tightened firmly on the EFD control unit.	Yes			

Description Date.....

Sub no.:

Test instrument model:

Relevant tests to be done prior to connection of HV and LV cables. Please state values.

(Refer to the attached link for the video in YouTube: <https://youtu.be/0MuuCFCuatY>)

Visual & functional test to be repeated prior to commissioning.

Table R: Packaged padmount substation

Substation	Actions	Acceptable criteria	Results	Signature	Name
1. Visual inspection					
Transformer	Equipment approved for use by Endeavour Energy and accepted as in GNV 1039	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Signs of corrosion	None			
	Check voltage level and ratings of all equipment is appropriate	Yes			
	Vermin guards installed on LV bushing	Yes			
	Oil leaks/wetness on the transformer tank	None			
	Cracks or chips on bushings	None			
	Bushings insulated and cables secure	Yes			
	Oil level above minimum (if applicable)	Yes			
	Check correct tap has been selected	Yes			
	All cables terminated properly	Yes			
HV switchgear	Equipment is approved by Endeavour Energy	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation. Check 'Tip & Tell' and shock indicator are not activated	None			
	Signs of corrosion	None			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Mandatory			
	Switchboard earth bar securely connected to substation HV earth grid	Mandatory			
	Power cabling and terminations complete. Cable sheaths earthed as required	Mandatory			
	Cable clamps fitted (in switchgear and floating clamp in culvert)	Yes			
	Fuse sizes checked (if applicable) or CB protection relay sealed by IE test section	Yes			
	Cable box barriers and barriers preventing access to busbar chambers in place	Mandatory			
	Cables correctly labelled	Mandatory			
	Fault indicators fitted and operational	To manuf. manual			
	Gas pressure level in switchgear to manufacturer's specification (if applicable)	Yes			

Table R: Packaged padmount substation

LV switchgear	Equipment is approved by Endeavour Energy	Approval no.			
		Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	External damage during transportation	None			
	Signs of corrosion	None			
	Labels fitted (warning signs, ratings, switching, operational and plant no's)	Mandatory			
	Switchboard earth bar securely connected to substation LV earth grid	Mandatory			
	Power cabling and terminations are complete	Mandatory			
	Cable clamps fitted (at base of switchgear)	Yes			
	Fuse sizes checked (if applicable)	Yes			
	CB protection set and checked	Yes			
	All cable term. barriers and barriers preventing access to busbar chambers in place	Mandatory			
	Cables correctly labelled	Mandatory			
Padmount cubicle	Check doors fit, locks operating correctly	Mandatory			
	Labels fitted (warning and voltage signs and sub no's)	Mandatory			
2. Functional checks					
HV switchgear	Switchgear operations – mechanical close and open	To manuf. manual			
	Switchgear spring charging – electrical and manual operations (if applicable)	To manuf. manual			
	Check doors/covers fit and interlocks operating correctly	Mandatory			
	Earth switch operates in accordance with manufacturers manual	Mandatory			
	Functionality of all control devices and associated electrical circuits	To manuf. manual			
	Protection devices and assoc. circuits comply with PMI 1000	To manuf. manual			
LV switchgear	Switchgear operations – mechanical close and open	To manuf. manual			
	Functionality of all control devices and associated electrical circuits	To manuf. manual			

Table R: Packaged padmount substation**3. Earthing tests and checks (prior to commissioning)****3a. Visual inspection**

Earthing	Equipment is approved by Endeavour Energy	Approval no. Mandatory			
	Installed to Endeavour Energy Standards	Mandatory			
	Any visible damage	None			
	LV neutral earthed as in EDI 100	Yes			
	HV equipment earthed as req. in EDI 100	Yes			
	Earth grid installed to the correct depth	Yes			
	Earth cable double insulated as req.	Yes			
	Req. Separation from other equip. such as Telstra, fences, special, frequented, remote	Yes			

3b. Functional checks

Earthing	Earth circuit continuity confirmed (from equipment to closest connection to earth grid)	0Ω			
	Common or separately earthed	To design			
	CMEN system on first asset from TS or ZS	To design			
	MEN bond installed (if applicable)	To design			
	Soil resistivity values (from design data Ωm)	Mandatory			
	Earth grid resistance measured (Ω)	Mandatory designed values			

4a. Test between HV switchgear and Transformer (Ω)**Prior to testing:**

- **Confirm that the packaged substation is NOT connected to EE's network**
- **Place all HV switches in the EARTH position**
- **Remove all HV switchgear covers**
- **Place all HV switches in the CLOSED position (incl. of Fuse switch or CB)**

Continuity test (Tx windings Ohms scale)	SW 1 (<25 Ohms)					
	A-B	A-C	B-C			
Insulation resistance (1000V) test	SW 1 to SW 2 (0Ω)			SW 1 to SW 3 (0Ω)		
	A-A	B-B	C-C	A-A	B-B	C-C
	Phase to E (>100MΩ)			Phase to Phase (0Ω)		
	A-E	B-E	C-E	A-B	A-C	B-C
• Place Fuse switch or CB in OPEN position						
Insulation resistance (1000V) test	SW 1 (>100MΩ)			SW 2 (>100MΩ)		
	A-B	A-C	B-C	A-B	A-C	B-C

Table R: Packaged padmount substation**4b. Test of HV switchgear**

- Place all HV switches in open position (incl. of Fuse switch or CB)

Insulation resistance (1000V) test	SW 1 Phase to Phase (>100MΩ)			SW 2 Phase to Phase (>100MΩ)			SW 3 Phase to Phase (>100MΩ)		
	A-B	A-C	B-C	A-B	A-C	B-C	A-B	A-C	B-C
	• Place SW 1 in OPEN & SW 2 in CLOSED position								
	SW 1 to SW 2 (Phase to Phase (>100MΩ))								
	A-A			B-B			C-C		
	• Place SW 1 in CLOSED & SW 2 in OPEN position								
	SW 1 to SW 2 (Phase to Phase (>100MΩ))								
	A-A			B-B			C-C		
	• Place SW 1 in CLOSED & SW 3 in OPEN position								
	SW 1 to SW 3 (Phase to Phase (>100MΩ))								
	A-A			B-B			C-C		
• Place all HV switches in EARTH position (incl. of Fuse switch or CB)									
Continuity test	SW 1			SW 2			SW 3		
	A-E	B-E	C-E	A-E	B-E	C-E	A-E	B-E	C-E

4c. Test between LV switchgear and transformer**Prior to testing:**

- Tx HV Fuse switch must be in CLOSED position
- For CAT 1 and 2 switchgears, incoming link must be in CLOSED position
- For Type 1,2,3 & 4, isolator and circuit breaker must be in CLOSED position

Insulation resistance (1000V) test	Phase to E (0Ω)			Phase to Phase (0Ω)		
	A-E	B-E	C-E	A-B	A-C	B-C
- For CAT 1 and 2 switchgears, incoming link must be in OPEN position - For Type 1,2,3 & 4, isolator in OPEN and circuit breaker must be in CLOSE position						
Insulation resistance (1000V) test	Phase to E (>100MΩ)			Phase to Phase (>100MΩ)		
	A-E	B-E	C-E	A-B	A-C	B-C

Annexure 2: Post-commissioning inspections and tests checklist

Description: Date:

Sub no.: Pole no..... Switch no..... Other no.....

Table S: Network general					
Network general	Actions	Acceptable criteria	Results	Signature	Name
1. Records – as required in SMI 113					
Asset information	All asset data on individual equipment is entered into SAP	Mandatory			
2. Functional checks					
Switchgear	Operation and phasing of voltage detection system checked	Yes			
Voltage regulator	Manually run regulator off voltage in higher taps and allow to automatically adjust back down. Repeat for lower taps.	Yes			
	Carry out voltage calibration checks	Yes			
Batteries in Controllers	Check charger supplying correct charge	Yes			
Transformers	Phasing and phase rotation correct	Yes			
	Set and check no load voltage is to design	Yes			
Pole & Ground mount batteries	Check unit is communicating. (Confirm with Future Grid Engineer.)	Yes			
	Anti Islanding checks Turn off incoming supply at LV Switchboard and check for voltage at the outgoing MCCB	0 Volts			
LV Statcom	Check unit is communicating. (Confirm with Future Grid Engineer.)	Yes			
DSub monitor	Check LED indicator light is solid green	Yes			
S/L column	Check touch potential after energisation (Refer LDI 0003 for details)	No more than 3 volts			
OH &UG Mains	Correct phasing shall be checked prior to energisation across an open point to join 2 live circuits.	Mandatory			
Line fault indicator	Prior installing check with reset magnet	Yes			
Early Fault Detection	Check Power light is solid green and Communication light is solid red.	Yes			

