



Standard

Installation and Repair of Substation Earth Mats Standard

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Authorisations

Action	Name and title	Date
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Review cycle	30 months	

Responsibilities

This document is the responsibility of the Asset Strategy Team, Tasmanian Networks Pty Ltd, ABN 24 167 357 299 (hereafter referred to as "TasNetworks").

Please contact the Asset Strategy Leader with any queries or suggestions.

- Implementation All TasNetworks staff and contractors.
- Compliance All group managers.

Minimum Requirements

The requirements set out in TasNetworks' documents are minimum requirements that must be complied with by all TasNetworks team members, contractors, and other consultants.

The end user is expected to implement any practices which may not be stated but which can be reasonably regarded as good practices relevant to the objective of this document.

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Record of revisions

Section number	Details
Entire doc	Copied over verbatim from superseded Transend to TasNetworks template. Updated Transend to TasNetworks document reference numbers where known including Australian Standards.

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1 General

1.1 Purpose

To provide information and uniform technical standards to be adopted for the installation and repair of earth grids in the construction and maintenance of TasNetworks' substation assets.

1.2 Scope

This document applies to all TasNetworks substations, switching stations and Tee structures.

1.3 Objective

This document replaces Transend Standard TAM-805 Installation and Repair of Substation Earth Grids.

1.4 References

Provide a list of documents used in the production of this document or those that may provide further information.

Standard Switchyard Earthing and Connections – Assembly and Details

TSD-SD-809-0002-001

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2.1 Installation of earthing conductor

The earthing cable is to be laid directly into the substrate material prior to pouring of concrete, laying of pipes or cables.

The earthing conductor must not be laid in bedding sand or cable pits.

The earthing conductor is to be run as far as possible in one continuous length without sharp bends or under tension.

2.2 Conductor burial depth

The conductor must be buried at a depth at which soil moisture levels will stay relatively constant. This is to be at a minimum of 500 mm.

2.3 Joints

All earth connections must consist of continuous copper conductor with any joints being bonded by brazing or use of approved compression fittings. As per drawing TSD-SD-809-0002-001.

Where earth grid conductors meet or cross they must be bonded.

2.4 Extension of an earth grid

Extension of an existing earth grid or connection of a new section of earth grid is the most dangerous type of earthing work.

All metallic objects are to be connected to the earth grid as soon as possible.

When connecting a new section of grid, a person must never position themselves between the old grid and the new grid. Temporary connections are to be made with approved jumper leads supplied by TasNetworks before making the permanent connections.

Where new sections of earth grid are to be added, they should be completed as far as possible without metallic contact to the existing grid.

All connections between the grids must be made first to the existing grid and then to the new grid.

If the earth grid is damaged, particularly during excavations, temporary repairs using approved jumper leads are to be made immediately before undertaking permanent repairs.

The approved leads will be supplied by TasNetworks.

Earthing connections between physically separated earth grids must comprise of at least two conductors connected to separate locations at each earth grid.

2.5 Earth grid installation and repair procedure

Arrange an appropriate sized bare conductor to be buried at correct spacing and depth as deemed by the particular design for the substation.

For the purposes of jointing, old and oxidised conductor must be vigorously scrubbed with a clean wire brush until bright metal shows through. Inspection of the internal cores is to be made by separating the outer cores and viewing. Some scrubbing of the internal cores is also to be done if they are in bad condition.

At points where the conductors are to be jointed they should be arranged so as to enable easy access to top and bottom of the joint. This joint can then be made by use of fault rated compression fittings or brazing, as per drawing TSD-SD-809-0002-001.

Detailed Brazing Procedure;

After cleaning, the joint is to be bound together utilising heavy gauge copper tie wire giving approximately 100 mm of conductor in parallel. This will allow for a 60-80 mm braze length to be achieved.

The entire length is to be preheated to remove any stresses while being cautious not to melt the restraining tie wires. At this point the tie wires are to be brazed to the conductors to avoid inadvertent melting and thus losing the binding. Care should be taken when brazing in the vicinity of flammable or heat sensitive materials and equipment.

Heating of the main joint is to continue while periodically checking sufficient temperature is being applied by prodding the joint conductors with the end of the brazing stick until the stick begins to melt.

Good amalgamation is required between the two conductors to be jointed. This is achieved by at least 1 to 1.5 brazing sticks being applied over a length of 60-80 mm and covering the full width of the joint as well as the top and bottom.

Allow the joint to cool before locating it to the final resting position.

2.6 Conductor backfill material

The conductor backfill material should not be of such soil that can cause corrosion due to chemical reaction with the conductor. The conductor must be surrounded by 150 mm of fine soil such as neutral clay,

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bentonite, or loams to minimise the risk of damage to the earth conductor. High resistivity gravel, sand and pumice must be avoided around the conductors.

A standard piece of earthing conductor together with a digital photo of earth grid joint is to be kept for each new installation.