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# Technical Direction – TD 00043:2024

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## Title: Updates for prefabricated substations, rail-earth contactor and system transformers – Amendment to T HR EL 99002 ST (TS 03882) *Substation Minimum Construction Standard*, version 1.0

This technical direction is issued by the Asset Management Branch (AMB) as an update to T HR EL 99002 ST (TS 03882) *Substation Minimum Construction Standard*, version 1.0.

## 1 Background

This technical direction is issued for the following changes to T HR EL 99002 ST (TS 03882):

- Inclusion of requirements for prefabricated substations and sectioning huts.
- Deletion of requirements for the rail-earth contactor, replaced with a cross reference to TS 03726 (EP 12 10 00 10 SP, EP 12 10 00 11 SP).
- Update to requirements for the system transformers with clarifications and additional information to ensure:
  - correct termination of cable screens of high voltage cables interfacing with system transformers
  - a dedicated cable is used for the connection of the neutral to earth connection for wye (Y) connected windings of system transformers between the neutral and the substation main earth bar

- transformer tanks are earthed in accordance with TS 03726 (EP 12 10 00 10 SP, EP 12 10 00 11 SP).

# 2 Amendment to T HR EL 99002 ST (TS 03882)

The following sections in T HR EL 99002 ST (TS 03882) are amended as follows:

## Section 15.2 Freestanding substations

**Delete the contents of Section 15.2 in their entirety and replace with the following:**

### Section 15.2.1 General

Freestanding substations are those substations that are not attached or directly connected to another building structure.

The whole of Section 15 shall apply to freestanding substations.

### Section 15.2.2 Prefabricated substations

Prefabricated substations are those substations that are constructed offsite (including the installation of equipment) and are shipped to site and connected to the electrical network.

Prefabricated substations shall comply with both of the following:

- the whole of Section 15
- AS 62271.202:2019, excluding clause 2 where TS 03744 (EP 00 00 00 13 SP) shall apply.

## Section 15.3 Sectioning huts

**Delete the contents of Section 15.3 in their entirety and replace with the following:**

### Section 15.3.1 General

The requirements of Section 15 shall apply to sectioning huts with the following exceptions:

- provisions specific to equipment of a type not installed in a sectioning hut do not apply
- the following staff amenities are not required for a sectioning hut:
  - separate administration room
  - toilet
  - hot water
- sectioning huts require one ac auxiliary power supply, which is single phase.

A separate administration room is not required, however, the furniture as detailed in Section 15.20.1 shall be provided and space for wall mounted electrical system, reticulation and operating diagrams.

## Section 15.3.2 Prefabricated sectioning huts

Prefabricated sectioning huts are those sectioning huts that are constructed offsite (including the installation of equipment) and are shipped to site and connected to the electrical network.

Prefabricated sectioning huts shall comply with both of the following:

- Section 15.3.1
- AS 62271.202:2019, excluding clause 2 where TS 03744 (EP 00 00 00 13 SP) shall apply.

# Section 16 Security

**Delete the contents of Section 16 in their entirety and replace with the following:**

Security arrangements for substations and sectioning huts shall be designed to minimise the risk of the following:

- injury to persons who might gain unauthorised access by limiting such access
- vandalism or interference with equipment
- theft of equipment or material.

The safety of workers and the public shall take precedence over operational convenience and asset protection.

The security arrangements shall comply with ENA Doc 015-2006 and with security requirements of TS 04992.

The design of prefabricated substations and prefabricated sectioning huts shall inhibit unauthorised access to the interior of the substation. This not only includes the entry via doors, but also consideration of the buildings external wall construction, materials used and associated attachment of external panels.

The security treatment requirement for a specific location depends on the security category in accordance with TS 04992.

Section 16.2 details the requirements for the general intruder system which is required for all locations.

# Section 20.6 Rail-earth contactor

**Delete the contents of Section 20.6 in their entirety and replace with the following:**

For requirements of voltage limiting devices including RECs for traction substations and sectioning huts, refer to TS 03726 (EP 12 10 00 10 SP, EP 12 10 00 11 SP).

# Section 20.7.1 System transformers

**Delete the contents of Section 20.7.1 in their entirety and replace with the following:**

System transformers shall be installed in accordance with manufacturers' requirements. Refer to Section 15.15 for details on the transformer bay enclosure requirements.

The cable screens of HV cables connected to system transformers, with the exclusion of the electrostatic screens of the cable terminations, shall be single point bonded to prevent circulating currents. The electrostatic screens of the cable terminations shall be earthed at both ends as applicable. Cable screens shall be terminated as follows:

- Switchboard end – Cable screens shall be earthed at the switchboard end and connected to the switchboard earth bar.
- Transformer end – Cable screens shall be left floating at the transformer end and terminated onto a low voltage insulator.

Earthing of a system transformer tank shall be in accordance with Section 13 of TS 03726:1.0 (EP 12 10 00 10 SP, EP 12 10 00 11 SP), specifically the requirement for redundancy of N-1 for the earthing connection between the main earth grid and the transformer tank.

The transformer tank shall have two earth connections at opposite sides, both connected to the same transformer earth bar on the primary side.

For wye (Y) connected windings of transformers with direct earthing of the star point (neutral), the connection to earth shall be made directly to the substation main earth bar.

Typical details of the transformer and HV cable screen earthing requirements are shown in drawing TS 03938 (EL 0494459).

## Authorisation:

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| **Approved by** | Director Energy Networks and Systems<br>Asset Management<br>Safety, Environment and Regulation |