

# Standard

Extra High Voltage (EHV) Post Insulators Standard

R574184

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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 Substation Asset Strategy Team, Tasmanian Networks Pty Ltd, ABN 24 167 357 299 (hereafter referred to as "TasNetworks").

Please contact the Substation Asset Strategy Team 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Entire document	Copied over verbatim from superseded Transend to TasNetworks template. Updated Transend to TasNetworks document reference numbers where known including Australian Standards.
1.7.1, 9, 10 and 11	Updated 'R' numbers to ensure they are referencing the correct documents.

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# 1 General

## 1.1 Purpose

To define the requirements from extra high voltage post insulators (hereafter referred to as “post insulators”) under the responsibility of Tasmanian Networks Pty Ltd (hereafter referred to as “TasNetworks”).

## 1.2 Scope

This standard contains requirements for design, construction, testing at manufacturer’s works, secured packaging, supply, transportation, and delivery to site with complete documentation of post insulators.

## 1.3 Objective

TasNetworks requires works as covered under this standard to ensure:

- (a) that relevant Australian legal requirements are met;
- (b) that the requirements of the Tasmanian Electricity Code and National Electricity Code are met;
- (c) personnel and public safety;
- (d) safety of TasNetworks’ assets;
- (e) ease in operation and maintenance;
- (f) reliability and continuity of power supply to power transmission network;
- (g) minimum disruption to the extra high voltage supply system following a fault;
- (h) alignment with TasNetworks’ network management strategies and TasNetworks’ established maintenance practices;
- (i) that the requirements of TasNetworks business plan are met; and
- (j) that the exposure of TasNetworks’ business to risk is minimised.

## 1.4 Certificate of conformance

- (a) Before any new and/or modified post insulator is put into service in TasNetworks’ system, certificate of conformance with this standard must be submitted to TasNetworks. The certificate of conformance must be duly supported with documents, drawings, test results, test reports, test certificates, completed check lists and other documents as applicable. Where TasNetworks has approved deviation to specific requirements of this standard, all such approvals must be included with the certificate of conformance.
- (b) TasNetworks will supply blank proforma for certificate of conformance, to be completed by the Contractor.
- (c) The post insulator will be put in service only after TasNetworks has accepted the certificate of conformance.

## 1.5 Precedence

Any conflict between the requirements of the codes, specifications, drawings, rules, regulations and statutory requirements or various sections of this standard and other associated documents must be brought to the attention of TasNetworks for resolution.

## 1.6 Deviation

Special approval for a deviation to this standard may only be accorded if it does not reduce the quality of workmanship, does not deviate from the objective of this document or from the intent of the standard. A request for a deviation must follow a designated procedure that involves approval from TasNetworks. Deviations, if any, must be specifically requested and requires approval in writing by TasNetworks prior to award of Contract.

## 1.7 References

As a component of the complete specification for a system, this standard is to be read in conjunction with other standards and documents as applicable. In particular this includes the project specifications and the following:

### 1.7.1 TasNetworks standards

R579285	Extra High Voltage Post Insulator Information to be provided with Tender
R579286	Extra High Voltage Post Insulator Deliverables

### 1.7.2 Other standards

Insulators – Ceramic or glass – Station post for indoor and outdoor use – Voltages greater than 1000 V a.c. – Characteristics	AS 4398.1
Insulators – Ceramic or glass – Station post for indoor and outdoor use – Voltages greater than 1000 V a.c. – Tests	AS 4398.2
Guide for the selection of insulators in respect of polluted conditions	AS 4436

## 2 Service conditions

- (a) Environmental conditions and any specific design criteria for particular works will be stated in the project specifications. Minimum service conditions for post insulators are shown in Table 1.

Table 1 Service conditions for post insulators

Sr. No.	Parameter	Unit	Value	
1.	Nominal system voltage ( $V_n$ )	kV	110	220
2.	Rated voltage	kV	123	245
3.	Power frequency withstand voltage, wet	$kV_{rms}$	230	460
4.	Lightning impulse withstand voltage	$kV_{peak}$	550	1050
5.	Post insulator designation (Table IV – AS 4398.1)	-	C8-550	C8-1050

Sr. No.	Parameter	Unit	Value	
6.	Minimum overall height of post insulators	mm	1220	2300
7.	Minimum creepage distance	mm	3075	6125
8.	Normal voltage variation (criteria for equipment design)	%V <sub>n</sub>	±10	
9.	Rated frequency	Hz	50	
10.	Neutral earthing	-	Effectively earthed	
11.	Installation	-	Outdoor	
12.	Design maximum continuous ambient temperature	°C	40	
13.	Design minimum continuous ambient temperature	°C	-10	
14.	Altitude	m	≤ 1000	
15.	Maximum relative humidity	%	95	
16.	Pollution level (as per AS 4436)	-	III – Heavy	

### 3 Post insulator design requirements

Post insulators must:

- (a) comply with this standard and requirements detailed in AS 4398.1 and AS 4398.2 and other applicable Australian Standards;
- (b) be porcelain or composite. If composite insulators are offered, the supplier must demonstrate to TasNetworks' satisfaction that the composite post insulators are capable of withstanding all environmental conditions, including those imposed by fauna.
- (c) be suitable for upright or inverted mounting;
- (d) have electrical characteristics equal to those listed for equivalent insulation in AS 4398.1 and AS 4398.2;
- (e) have a minimum failing load (for the complete post) of 8 kN for both bending upright and bending inverted mounting arrangements;
- (f) be one piece construction for 110 kV post insulators, or two piece construction for 220 kV post insulators. For post insulators of two piece construction, any accessories (such as bolts) required for installation must be provided;
- (g) be grey in colour; and
- (h) have the following fixing arrangements:
  - (i) a top metal fitting pitch circle diameter of 127mm;
  - (ii) a bottom metal fitting pitch circle diameter of 127mm;
  - (iii) four tapped bolt holes of M16, as per Table IVA; and
  - (iv) nominal maximum diameter of mounting faceplate of 165mm, as per Table IVA.



## 4 Maintenance and routine test plans

- (a) A detailed maintenance plan, procedures and task guides covering the entire life of the post insulator must be provided.
- (b) A routine test plan must be recommended.
- (c) Blank schedules and forms for maintenance and routine testing, for use by TasNetworks' maintenance personnel, must be provided.

## 5 Packaging

- (a) The supplier is responsible for ensuring that adequate packaging is provided to minimise the risk of damage to equipment during delivery. The packaging must be suited to the particular methods of delivery and provide protection against damage from all foreseen hazards.
- (b) Details of packaging methods must be submitted to TasNetworks for approval.

## 6 Testing

- (a) Post insulators must be duly tested in accordance with AS 4398.2. Where tests are optional in the standards, it will be considered that these tests are required by TasNetworks, unless otherwise requested by Contractor and agreed in writing by TasNetworks before the award of Contract.
- (b) All test reports must be forwarded to TasNetworks for approval and acceptance. The tests will be considered as completed only after approval and acceptance in writing of test results by TasNetworks is confirmed. A list of the tests to be conducted on the post insulators is given below.

### 6.1 Type tests

- (a) Type tests are intended to verify the main characteristics of the post insulator and to prove their suitability for operation under the conditions detailed in the specifications. Type tests must be carried out prior to delivery. A certified test report, detailing the results of such tests along with the procedures followed, must be provided to TasNetworks. These tests must have been applied to a post insulator of identical design with that offered, or on a post insulator of a design which does not differ from that offered in any way which might influence the properties to be confirmed by the type test.
- (b) Where such tests have already been performed, a copy of type test reports that qualifies for the exemption from conducting these tests must be provided with the tender.
- (c) Type tests must be performed to relevant Australian Standards, in particular AS 4398.2. Where the manufacturer's type tests differ from the requirements under the relevant Australian Standards, a list of non-conformances must be submitted to TasNetworks for consideration.
- (d) Type tests detailed in Section 6.1 of AS 4398.2 must be performed, including all special tests: deflection under load, radio interference test and artificial pollution.

### 6.2 Sample tests

- (a) Sample tests are intended to verify the characteristics of a post insulator, which can vary with the manufacturing process and quality of material. The tests are used as acceptance tests on a sample of post insulators, taken at random from a lot that has met the requirements of the relevant routine tests. The number of sample tests required will be stipulated in the project specifications.
- (b) Sample tests detailed in Section 6.2 of AS 4398.2 must be performed.

## 6.3 Routine tests

- (a) Routine tests must be conducted on every post insulator supplied to prove quality of manufacture and conformance with the relevant performance requirements of the applicable standards. Routine testing must be performed at the manufacturer's works prior to delivery.
- (b) Routine tests detailed in Clause 6.3 of AS 4398.2 must be performed.
- (c) Routine tests must follow the procedures outlined in Section 4 of AS 4398.2 for electrical tests and Section 5 of AS 4398.2 for mechanical and other tests. Supporting documentation to confirm routine test procedures must be submitted to TasNetworks for approval and acceptance. Routine tests must not be conducted unless the routine test procedures have been accepted and approved by TasNetworks.
- (d) Routine test results and certificates must be submitted to TasNetworks for approval and acceptance. Routine tests will not be considered as completed until TasNetworks approves and accepts the test results.
- (e) Routine factory test results must be approved and accepted by TasNetworks prior to dispatch of post insulators to site.

## 7 Other requirements

### 7.1 Post insulator marking

- (a) Each post insulator must be supplied with a permanent marking detailing:
  - (i) manufacturer's name;
  - (ii) post insulator designation;
  - (iii) manufacturer's drawing number; and
  - (iv) year of manufacture.
- (b) The marking must be on the insulation material, on top of the bottom shed.

### 7.2 General documentation requirements

- (a) All documents and drawings must be clear, legible and free from errors or omissions.
- (b) All documents and drawings must be in the English language ONLY.
- (c) Only SI system of units can be used. Units must be stated for all values.
- (d) Scales, wherever used, must be as per the applicable Australian Standards.
- (e) All drawings that are made to the scale must include a scale block.
- (f) Only information relevant to the particular type of post insulator supplied must be shown in the documentation and drawings.

### 7.3 Drawings and information

The supplier must submit for approval all drawings and information before manufacture commences. Sufficient time to allow modifications to be made without delaying the work must be provided. Where drawings and information are not approved, the supplier must modify and resubmit them for approval. This process will continue until all drawings and information are approved.

Design information, consisting of fully dimensioned assembly/arrangement drawings and guaranteed electrical, chemical and mechanical characteristics, must be submitted before manufacture commences.

## 7.4 Installation information

Copies of comprehensive installation instructions must be supplied no later than two (2) weeks before shipping of the equipment from the manufacturer's works.

## 8 Data for Asset Management Information System

- (a) TasNetworks maintains a comprehensive "Asset Management Information System" (AMIS) that contains all design, test results and the condition of all TasNetworks assets. The AMIS also contains maintenance regimes for all assets.
- (b) The supplier must provide information required to maintain the currency of AMIS for each asset in standard proformas. TasNetworks will provide the proformas to the selected supplier. Proformas are required to be filled for new assets and for decommissioned assets.
- (c) The filled up proformas must be filled in and submitted to TasNetworks as below:
  - (i) Design information and maintenance regime information for all assets must be submitted to TasNetworks before commencing installation on site.
  - (ii) Information on test results for all assets must be submitted prior to commissioning.

## 9 Information to be provided with tender

Requirements for information to be submitted as part of the tender are outlined in document R579285.

## 10 Deliverables

Requirements for post insulator deliverables are outlined in document R579286.

## 11 Hold points

Documentation requirements are listed in the deliverable schedule in document R579286.

The hold points for post insulators include:

- (a) "Detailed design documentation" must be submitted prior to manufacturing or procurement of equipment, for TasNetworks' review, comments and approval.
- (b) "Inspection and Test Plan" must be submitted prior to any testing of equipment, for TasNetworks' review, comments and approval.
- (c) Complete updated design documentation must be submitted prior to sample tests.
- (d) Sample and routine test results must be submitted to TasNetworks for approval with any non-conformances identified rectified prior to shipment.
- (e) All as-built documentation, operation and maintenance manuals, test results and test certificates must be submitted to TasNetworks and be accepted by TasNetworks prior to acceptance.
- (f) Inspection of the equipment on site is required by TasNetworks prior to acceptance.