



Equipment Strategy for Voltage Transformers

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Current version: 6/11/2023	POWERLINK WEBSITE	Page 1 of 5
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Table of contents

1. Introduction3

 1.1 Purpose3

 1.2 Scope3

 1.3 Monitoring and compliance3

2. Strategy3

 2.1 Projected use of equipment3

 2.2 Strategy Requirements3

 2.3 Technologies available now:4

 2.4 Equipment strategy elements:4

 2.5 Concurrent investigations:5

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Current version: 6/11/2023	POWERLINK WEBSITE	Page 2 of 5
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1. Introduction

1.1 Purpose

Equipment Strategies document Powerlink's vision for equipment technologies, to provide both Powerlink and Suppliers with consistent planning and project management platforms for the life of the Strategy. The document expresses Powerlink's vision in terms of the equipment performance requirements. It is not a detailed contract specification.

The intent of this Voltage Transformers strategy is to specify the Powerlink preference of the equipment type to be used in both regulated and non-regulated applications. This document will direct the development of detailed technical and procurement specifications for Voltage Transformers.

Equipment Strategy for Voltage Transformers has been developed in consultation with the relevant stakeholders within Powerlink.

1.2 Scope

This document covers Voltage Transformers (used for voltage measurement or used for provision of auxiliary substation supply) ranging from 72.5 kV to 550kV for use in new substations and substations requiring partial or full equipment replacement and augmentation.

Voltage transformers suitable for use at different voltages other than the range mentioned above can be purchased on an ad hoc basis as required but following the same strategic principles described in this document.

It is envisaged that the Equipment Strategy for Voltage Transformers will have a life of ten (10) years. Review of this equipment strategy is required in the fifth (5th) and the eighth (8th) years to enable inclusion of new technologies that have matured or a business need that triggers a review whichever comes first.

1.3 Monitoring and compliance

The success is monitored through regulatory information notice, annual reporting and SAP records review of installed equipment. In addition, the success of this strategy is measured by monitoring life cycle costs as well as reliability, availability and service history associated with Voltage Transformers.

The minimum records required are:

- Technical Specification
- Tender evaluation report
- Period contract
- Equipment Drawings
- Operation and maintenance manual
- SAP equipment records

2. Strategy

2.1 Projected use of equipment

Voltage Transformers to be purchased will be used either for control, protection and instrumentation, metering or to provide local power supply for a substation.

2.2 Strategy Requirements

The vision that drives equipment strategy documents is based on historical experience, research and investigations into new products available on the market, reliability centred maintenance analysis and lifecycle

Current version: 6/11/2023	POWERLINK WEBSITE	Page 3 of 5
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cost experience over the expected service life of the equipment (40 years). The main features of the vision for high voltage transformers are as follows:

General:

- Preference is to adopting standardized equipment in accordance with the power industry standards to eliminate the necessity for customization.
- Annual operation and maintenance cost less than 0.5% of the asset value.
- High availability and reliability.
- Appropriate monitoring and remote interrogation facilities to allow maintenance staff to optimize site visits.
- Support during the complete life of the equipment.
 - Minimal routine inspections, no more than once a year.
 - Provisions to allow use of modern accuracy testing methods.
- Evaluation and assessment through Life Cycle Cost Analysis (LCCA)

Safety and Environmental:

- The risk of explosive failure kept as low as possible.
- The design of the unit allows for safe and environmentally appropriate disposal.
- Minimum leakage rates to meet or exceed environment standards and reduce operational costs.
- Meeting standard requirements for noise and radio interference voltage (RIV).
- Only Polymer insulators shall be used for housing.

Maintenance:

- Minimal maintenance requirements.
- No moving parts.
- Simple and reliable design.
- Enables addition of online condition monitoring.

2.3 Technologies available now:

Capacitive Voltage Transformers (CVT) and High Burden Power Voltage Transformers (PVT) are presently used in the transmission network in Queensland. CVTs are used predominately for voltage measurement and PVTs for provision of power supply for substations and in other applications where high burden capability is required. EMVT may be used for medium voltage and certain high voltage applications specific to point on wave switching

Non-Conventional Instrument Transformers (NCITs) and electronic voltage transformers (EVTs) are not yet considered to be a commercially viable solution for Powerlink. However development is ongoing and is expected to become viable during the life of this equipment strategy, especially as implementation of digital substations are progressed. It is likely that implementation of digital substations will use merging units. These are not covered by the scope of this document.

A careful selection of equipment is essential to ensure high reliability and availability, ease of commissioning, simple operation and low maintenance cost.

2.4 Equipment strategy elements:

Voltage Transformers (Instrument and Power) shall include the following main features:

Current version: 6/11/2023	POWERLINK WEBSITE	Page 4 of 5
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- Oil insulated Design/ Operating life of 40 Years.
- Hermitically sealed or access to allow periodic oil or gas samples.
- Voltage transformers have to be tested by NATA certified laboratory or by facilities accredited to ISO/IEC 17025 and have mutual recognition through ILAC or APLAC.
- Composite insulators to maximise safety in the event of failure.
- High reliability and availability.
- Safe operation.
- Inclusion of overpressure protective devices wherever applicable (e.g. rupture disc).

2.5 Concurrent investigations:

The market position for Non-Conventional Instrument Transformers and Electronic Voltage Transformer (EVT) with merging units integrating with fully digital secondary systems will continue to be monitored.

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