



Equipment Strategy For Transmission Line Surge Arresters - Plan

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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.

Equipment strategy documents are intended to be shared with potential suppliers and therefore consideration has been given to the principles outlined in the Procurement Standard in the development of the documents. The four guiding principles of the Procurement standard are:

The equipment strategy for high voltage surge arresters has been developed with input from relevant teams in Powerlink.

1.2 Scope

This equipment strategy covers high voltage surge arresters for the application on the HV and EHV transmission line network.

It is intended that the equipment strategy will be reviewed on a regular basis so that changes can be incorporated at the most opportune time. The Equipment Strategy for surge arresters will have a life of five (5) years, with a significant review in the third (3rd) year reviewing service experience and if there are new alternative technology solutions.

1.3 References

Document code	Document title
IEC 60099-8	Surge arresters - Part 8: Metal-oxide surge arresters with external series gap (EGLA) for overhead transmission and distribution lines of a.c. systems above 1kV

1.4 Defined Terms

Terms	Definition
EGLA	Externally Gapped Line Arrester
MOV	Metal-Oxide Varistor
LCCA	Life Cycle Cost Analysis
SID	Safety In Design

1.5 Monitoring and Compliance

This equipment strategy will guide development of the technical specification. The success of this strategy is measured by monitoring life cycle costs as well as availability and service history associated with this equipment.

The minimum records required are:

- Technical specification
- Tender evaluation report
- Period contract
- Purchase orders
- SAP equipment records

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- Operation and Manufacturer Manual
- Nameplate details

2. Strategy

This Equipment Strategy intends to cover all Transmission Line Surge Arresters purchased over the next five years for use on Powerlink and Customer networks. The function of Transmission Line Surge Arrester is to protect the transmission line insulation primarily from lightning over-voltages, but may also be used to manage switching over-voltages.

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 cost experience over the expected service life. The main features of Powerlink’s vision for high voltage surge arresters for transmission lines are as follows:

General

- Evaluation and Assessment through life cycle cost analysis (LCCA).
- High cantilever strength suitable to withstand the dynamic pressure in cyclonic conditions.
- Suitable for both lightning and switching over-voltages (made with metal oxide varistors with adequate non-linear characteristic).
- Installation costs are kept to minimal
- Easily replaceable (standard dimensions).
- EGLA type to reduce maintenance, long term reliability and successful reclosing of overvoltage avoiding the need for a disconnect and ground lead.
- Compact and lightweight.
- Supports live-line and bare-hand maintenance.
- Structural integrity to maintain a consistent air gap distance.
- Vertically mounted to minimise the risk of bird attack.
- Compliance with all relevant international standards, including IEC 60099-8.
- High availability, reliability and cost competitive on a whole of life basis.
- Minimum service life of 40 years in Queensland climatic conditions.
- Control of high electrical field gradients, where applicable

Safety and Environmental

- Failure modes shall be such to minimise the risk of major injury or fatality to works performing maintenance operations on or in close vicinity to the devices as well as general public in the vicinity.
- Failure mode shall not present an unacceptable environmental risk e.g. bushfire start.
- The design of the unit must comply with all required electrical safety and maintenance requirements including adequate electrical clearances.

Maintenance Level

Powerlink's preference is to procure equipment which has:

- No or minimal maintenance requirements.

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- Simple, reliable and proven design.

2.1 Projected Use of Equipment

All surge arresters unless otherwise specified, are to be externally gapped metal-oxide varistor blocks mounted in parallel with transmission line insulator assemblies serving primarily to shunt fast front lightning switching surges to ground to improve lightning performance outage rates. Applications may also extend to shunting of slow-front switching surge over-voltages for the safe maintenance of the network or to improve network performance.

2.2 Technologies Available Now

Current Externally Gapped Line Arrester (EGLA) technologies includes an external spark gap in series with MOV blocks. Since the use of metal oxide (MO), predominantly zinc oxide (ZnO) varistors in surge arrester technology, the use of gapped silicon carbide surge arresters almost ceased. The main progress since moving to MO varistors is the use of polymer housing for surge arresters and improvement in the test of surge arresters. These have resulted in consistent improvements in terms of increasing the safety and compactness of the surge arresters.

2.3 Equipment Strategy Elements

Surge arresters should include the following main features:

- Operating service life of 40 years in Queensland climatic conditions.
- Polymer housing with high cantilever strength.
- Gapped with use of MOV.
- Simple, safe, easy, reliable and proven operation.
- Live line compatible.
- Tested compliant with all relevant international standards.
- Designed to have no maintenance requirements.
- Not equipped and not relying on operation of surge counters.
- Easy handling and replacement.
- Able to withstand fault level and clearing times applicable to the Powerlink network.

2.4 Concurrent Investigations

In view of continuous technological improvement, it is important that close examination of the available technologies be made to ensure that they meet Powerlink's requirements and adopt the most appropriate technology. Prior to the commencement of adopting new technology, either a trial project or a review of the surge arresters fleet performance and maintenance costs within the industry be performed.

2.5 Summary

The equipment strategy detailed in this document will be applied to all future requirements of transmission line surge arresters, unless otherwise specified for reasons not identified in this document.