Ergon Energy Corporation Limited

Technical Specification for 12kV and 24kV Current Limiting Fuse-Links for Overhead Applications

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Contents

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1. Purpose and Scope

This specification sets out the technical requirements for 12kV and 24kV current-limiting fuse links suitable for use on overhead electricity distribution systems in a totally exposed environment. The fuses will primarily be used for the protection of distribution transformers.

A list of items covered by this technical specification is given in **Appendix A.1**.

2. References

2.1 Applicable Standards

The fuses and the end fittings shall be designed, manufactured and tested in accordance with the relevant parts of the following standards and all amendments issued from time to time except where varied by this specification.

Should inconsistencies be identified between standards and/or this specification, the Supplier shall immediately refer such inconsistencies to the Corporation for resolution.

STANDARD	TITLE
AS1033.1	High voltage fuses (for rated voltages exceeding 1000V) Part 1 – Expulsion type
AS1033.2	High voltage fuses (for rated voltages exceeding 1000V) Part 2 – Current-limiting (Powder-filled) type
AS1856	Electroplated coatings - silver
AS2650	High voltage a.c. switchgear and controlgear – common requirements
AS2837	Wrought alloy steels – stainless steel bars and semi-finished products.
AS2947	Insulators – porcelain and glass overhead power lines – voltages greater than 1000V a.c.
AS4169	Electroplated coatings – tin and tin alloys
AS/NZS ISO: 9001	Quality Management Systems – model for quality assurance in design, development, production, installation and servicing

3. Drawings

3.1 Drawings by the Purchaser

No drawings are included in this specification

4. Service Conditions

The fuses will be exposed to the following environmental conditions:

Ambient Temperatures	45^{o} summer day time -5^{o} winter night time
Solar Radiation Level	1100 watts per square metre with high ultraviolet

	content
Precipitation	Tropical summer storms with gust wind speeds above 160km/h, and an annual rainfall in excess of 1500 mm
Humidity	Extended periods of relative humidity in excess of 90% R.H.
Atmospheric Classifications	Areas of coastal salt spray and/or industrial pollution with equivalent salt deposit densities in the range 2.0 - 3.0 g/m^2.

5. Design and Construction

Design and construction performance parameters are detailed in this section.

5.1 Requirements

The fuse-links and fuse-end fittings shall be of the following ratings and comply with the Australian Standard AS1033.2 or an equivalent international standard. The fuse-links shall be used primarily for protection of delta connected distribution transformer located in areas with high fault currents.

5.2 Ratings

Rated voltage	**12kV**	**24kV**
Rated current of fuse-holder	100A	100 amp
Rated current of fuse-links	Refer table below	
Rated breaking current & power frequency of fuse-holder	20kA(minimum)	16KA (minimum)
Rated frequency	50Hz	
Fuse classification	Full range	
Time/current characteristics	Refer clause 5.3 below	
Rated insulation level of fuse-holder	95kV BIL	125kV BIL

5.3 Fuse-link Applications

The HV sizes currently used by the Purchaser for the protection of distribution transformers are listed below.

Transformer three phase kVA	**Fuse Rating(A) for 12kV Transformers**	**Fuse Rating(A) for 24kV Transformers**	**Typical Fuse Rating for LV.**
25	6 (15kV rating)	6 (23kV rating)	50
63	8 (15kV rating)	6 (23kV rating)	100
100	18 (15kV rating)	8 (23kV rating)	160
200	25 (15kV rating)	12 (23kV rating)	355 & 2x200
315	30 (15kV rating)	20 (23kV rating)	500 & 2x200
500	40 (15kV rating)	25 (23kV rating)	710
750	50 (15kV rating)	30 (23kV rating)	

The fuse links offered shall be capable of withstanding magnetising inrush currents up to 12 times the transformer rated full load current for 0.1 seconds and 25 times the transformer

rated full load current for 0.01 seconds and discriminate with the secondary fuse links specified.

The fuse links shall be capable of withstanding 125% of the transformer rated full load current continuously and periodic over-loads up to 150% of the transformer rated full load current.

The fuse links shall be able to clear a fault on the secondary terminals of the transformer in less than 1.5 seconds, in order to limit damage to the transformer in the event of such fault. (The impedance voltage of the transformer at the rated current may be assumed as 4%)

The current-time characteristics of the fuse-links offered shall be submitted with the tender.

5.4 Fuse-link Attachment

The current-limiting fuse-link with end attachments shall be suitable for use with the 12kV/24kV 125kV BIL EDO fuse mounts complying with AS1033.1 as applicable.

The top attachment shall be designed to latch into the upper contact assembly of the EDO unit and unlatch on operation of the fuse.

The bottom attachment shall be provided with an actuator which causes fuse-link assembly to drop downward when the striker is released during the operation of the fuse link. The fuse shall pivot on the base hinge and shall not hit the pole during opening.

Both attachments shall have lifting rings to enable the operations and removal of the fuse-link. The top end lifting device shall be suitable for the opening of the EDO fuse using a portable load breaking tool.

All current carrying parts shall be of high electrical conductivity and corrosion resistant metal. The contact parts shall be electrolytically bright tin plated (or silver plated) to ensure long term durability of the contact surfaces.

All nuts, bolts and washers shall be stainless steel in accordance with AS2837. The bolts and washers shall be grade 316 and to avoid binding, the nuts should be grade 304.

Drawings showing the critical dimensions of the fuse link assemblies offered shall be submitted with the tender

5.5 Vibration

When the fuse link is intact and correctly assembled it shall latch securely when closed and shall not be dislodged from the EDO fuse contacts by vibration or wind pressure. The carrier shall not dislodge from the bottom hinge in the opening operation, or in the open position during wind or vibration conditions.

The manufacturer shall state the design features and testing undertaken to meet these requirements.

6. Performance and Testing

6.1 Testing

Test certificates of the type tests for the fuse-links as specified in the Section 4 of AS1033.2, and the power dissipation test and the weatherproof test (Section 5, AS1033.2) shall be provided with the tender. The routine and batch test certificates shall be submitted with each delivery.

The test certificate for the time current characteristics provided with the tender shall include the minimum melting time characteristics and the total clearing time characteristics. Current limiting data showing the extent of current limiting should also be included in (MS Office) Excel format.

The testing shall have been carried out by a nationally accredited testing authority.

7. Risk Assessment

There is no requirement for manufacturer provided safety risk assessments for the items covered in this specification.

8. Quality Assurance

8.1 Purchasers Policy

It is the Purchaser's policy to procure goods, equipment and services from sources that demonstrate the ability to supply quality products.

8.2 Documentary Evidence

Tenderers are required to submit documentary evidence that the design and manufacture of the fuses offered is in accordance with AS/NZS/ISO 9001.

This documentation shall include the Capability Statement associated with the Quality System Certification

9. Samples

9.1 Production Samples

When requested, production samples of each item shall be submitted with the offer.

10. Packaging and Marking

10.1 General

Tenderer's attention is specifically drawn to the requirements of the Logistic Specification with regard to the packaging, marking and delivery of palletised goods.

10.2 Marking

Markings shall be provided on the fuse-links in accordance with Clause 6.9.3 of AS 1033.2

The following information shall be legibly and indelibly marked on BOTH sides of the carton:

a) Manufacturer's name and sequential unit identification number
b) Ergon Energy's Purchase Order number
c) Ergon Energy's Item Identification Number
d) Rated voltage and current of fuse links
e) Gross mass of carton and contents
f) Handling or lifting instructions where applicable

11. Service History

Potential first time Suppliers to the Purchaser shall state:

a) The period of service achieved by items offered within Australian service conditions;
b) Australian electricity supply authorities who have a service history of the items offered;
c) Contact names and phone numbers of relevant employees of those supply authorities who can verify the service performance claimed.

12. Reliability

12.1 Service Life

Comments on the reliability and performance of the items offered, for a service life of 35 years under the specified system and environmental conditions, shall be submitted with the offer.

12.2 Evidence in Support of Reliability

Such comments shall include evidence in support of the reliability and performance claimed including information of Failure Mode and Effect Analysis.

13. Training

Training material in the form of drawings, instructions and/or audio visuals shall be provided for the items accepted under the offer.

This material shall include but is not limited to the following topics:

- Handling
- Storage
- Fuse application
- Installation
- Maintenance
- Environmental performance
- Electrical performance
- Mechanical performance
- Disposal

14. Environmental Considerations

Suppliers are required to comment on the environmental soundness of the design and the materials used in the manufacture of the items offered. In particular, comments should address such issues as recyclability and disposal at end of service life and also disposal of packaging material.

15. Information to be Provided

15.1 Specific Technical Requirements

Attachment 1 is a schedule of the technical details that suppliers are required to complete and return with their offer.

15.2 Checklist of Supporting Documentation

Attachment 2 details a checklist of supporting technical documentation which is required to be submitted with the tender.

15.3 Documentation to be Supplied During the Course of the Contract

Test certificates as required in **Clause 6**.

16. Appendix A.1 – Items List

Item No	IINo	Description
1		FUSE LINK, 6 Amp, 11kV, HRC, 20kA Fault Rating, Powder Filled, Current Limiting, (scm)
2		FUSE LINK, 8 Amp, 11kV, HRC, 20kA Fault Rating, Powder Filled Current Limiting, (scm)
3		FUSE LINK, 12 Amp, 11kV, HRC, 20kA Fault Rating, Powder Filled, Current Limiting, (scm)
4		FUSE LINK, 18 Amp, 11kV, HRC, 20kA Fault Rating Powder Filled Current Limiting (scm)
5	621110	FUSE LINK, 20 Amp, 11kV, HRC, 20kA Fault Rating, Powder Filled, Current Limiting, (scm)
6		FUSE LINK, 25 Amp, 11kV, HRC, 20kA Fault Rating Powder Filled Current Limiting (scm)
7		FUSE LINK, 30 Amp, 11kV, HRC, 20kA Fault Rating Powder Filled Current Limiting (scm)
8	0104610	FUSE LINK, 40 Amp, 11kV, HRC, 20kA Fault Rating Powder Filled Current Limiting (scm)
9	2404162	FUSE LINK, 6 Amp, 22kV, HRC, 20kA Fault Rating, Powder Filled, Current Limiting, (scm)
10	0104607	FUSE LINK, 8 Amp, 22kV, HRC, 20kA Fault Rating, Powder Filled Current Limiting (scm)
11	0621109	FUSE LINK, 12 Amp, 22kV, HRC, 20kA Fault Rating, Powder Filled, Current Limiting, (scm)
12	0104606	FUSE LINK, 18 Amp, 22kV, HRC, 20kA Fault Rating Powder Filled Current Limiting (scm)
13	2404163	FUSE LINK, 20 Amp, 22kV, HRC, 20kA Fault Rating, Powder Filled, Current Limiting, (scm)
14	0104608	FUSE LINK, 25 Amp, 22kV, HRC, 20kA Fault Rating Powder Filled Current Limiting (scm)
15	0104609	FUSE LINK, 30 Amp, 22kV, HRC, 20kA Fault Rating Powder Filled Current Limiting (scm)

17. Attachment 1 – Technical Details

The supplier shall complete this schedule for each item offered and shall guarantee the particulars as set out:

Tender Item Number		
Name of Manufacturer		
Address of Manufacturer		
Place of Manufacturer:		
Manufacturer's Catalogue Number		
and Drawing Numbers		
Material of Fuse		
Weight of Fuse	(kg)	
Weight per Crate	(kg)	
Time-Current Characteristics of Fuse Attached?		YES/NO
Cut-off current Characteristics of Fuse Attached?		YES/NO
I^2t Characteristics Attached?		YES/NO
Dimensional details of the fuse Attached?		YES/NO
Prospective Breaking Current	(kA)	
Breaking Capacity	(kA)	
Minimum Breaking Current	(A)	
Power dissipation at rated current	(W)	
Fuse Top End Fitting Details:		
• Fuse End Cap Material		
• Plating Material		
• Thickness of plating		
Fuse Bottom End Fittings Details:		
• Material of Castings		
• Plating Material		
• Thickness of Plating		

SIGNATURE OF TENDERER: _____

18. Attachment 2 – Technical Document Checklist

CLAUSE Ref.	PARTICULARS	UNITS
Have full and comprehensive details been submitted **WITH** the tender documents associated with each of the following items?		
5.3	Time-current characteristics	Yes/No
5.4	Drawings	
5.6	Design features and testing undertaken to prove performance under vibration and wind conditions	Yes/No
6	Test certificates included in tender documentation	Yes/No
8.2	Documentary evidence of the Quality System Certification of **BOTH** the **SUPPLIER** and the **MANUFACTURER** (including **Capability Statement**)	Yes/No
9	Availability of samples	Yes/No
11	Service Performance	Yes/No
12	Reliability	Yes/No
13	Training Materials (availability)	Yes/No
14	Environmental Considerations (availability)	Yes/No
15	Completed **Attachment 1** and fuse characteristics requested therein	Yes/No

NAME OF TENDERER:

ADDRESS OF TENDERER:_____

SIGNATURE: _____ FOR AND ON BEHALF OF TENDERER

DATE: _____