



Ergon Energy Corporation Limited

**Technical Specification for 12kV
and 24kV Powder Filled Fuse-Links
and Fuse Holders**

ETS12-01-01

Technical Specification for 12kV and 24kV Powder Filled Fuse-Links and Fuse Holders

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Technical Specification for 12kV and 24kV Powder Filled Fuse-Links and Fuse Holders

1. Purpose and Scope

This specification sets out the technical requirements for 12kV and 24kV powder filled fuses and fuse-end fittings suitable for use on overhead electricity distribution systems in a totally exposed environment. The fuses are primarily used for the protection of distribution transformers. The items covered by this specification are given in the **Appendix A.1**.

2. References

2.1 Applicable Standards

The fuses and fuse-holders (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 Tenderer shall immediately refer such inconsistencies to the Purchaser for resolution.

STANDARD	TITLE
AS 1033.1	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
DIN 43625	High-voltage fuses, rated voltages 3.6 to 36kV; fuse-links
IEC60282	High voltage fuses
AS/NZS ISO: 9001	Quality 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 fuse-links and end fittings will be exposed to the following environmental conditions:

Ambient Temperatures	45° summer day time -5° 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.

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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 .
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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/cable circuits.

5.2 Ratings

Rated voltage	12kV	24kV
Rated current of fuse-holder	200A	200 amp
Rated current of fuse-links	63 and 80A as required	10, 20 and 40 as required
Rated breaking current & power frequency of fuse-holder	40kA(minimum)	20KA (minimum)
Rated frequency	50Hz	
Fuse classification	General Purpose (Full range preferred)	
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 fuse 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.
100		10	160
200		16	355 & 2x200
315		16	500 & 2x200
500		20	710
750	63	31.5	
1000	80	40	

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.

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The fuse links shall be able to clear a phase to neutral 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.

Fuse links shall be suitable for mounting in any orientation.

5.4 Fuse-Link Dimension – Type II (Refer Figure D2 Appendix D of AS1033.2)

Rated Voltage(kV)	Rated Current(A)	Fuse -Link Dimensions (mm)		
		Overall Length (excluding striker)	End Cap	
			Diameter meter	Length(min)
24	10	567.0 + 0, - 4.0	50.8 ±0.5	38.0
	20	567.0 + 0, - 4.0	50.8 ±0.5	38.0
	50	567.0 + 0, - 4.0	76.2 ±0.5	38.0
12	63	361.0 + 0, - 4.0	76.2 ±0.5	38.0
	80	361.0 + 0, - 4.0	76.2 ±0.5	38.0

Fuses shall be ferrule ended type II suitable for outdoor use in air.

The ferrule ends shall be suitable for the fitting of fuse top and base contact attachments which would allow the fuse link to be mounted on an EDO unit.

Limitations on the tightening of the attachments to the ferrules shall be detailed.

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

5.5 Striker (refer Table 6.3 AS1033.2)

The fuse-links shall be fitted with a striker for indication purposes and to initiate three phase tripping of the circuit being protected. The mechanical characteristics of the striker shall be in accordance with the medium duty type in Table 6.3 of AS1003.2. The energy rating of the striker shall be 1J±0.5J

5.6 Fuse Top and Base Attachment

The fuse link with the end fittings attached shall be suitable for use with the 12kV/24kV EDO fuse mounts complying with AS1033.1 as applicable.

The attachments shall be easily fitted to the fuse ends and shall have stops that ensure the correct spacing between the top and base when fitted to the fuse ferrule ends.

The top attachment shall be designed to latch into the fuse-holder and unlatch on operation of the fuse.

The base 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.

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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 fuse-link 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.

5.7 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 specified in the Section 4 of AS1033.2, 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. A table of (current -time) data defining the above curves should also be included with the tender in (MS Office) Excel format

Current limiting data showing the extent of current limiting should be included.

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

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

Tenderers are required to documentary evidence of the Quality System Certification of **BOTH** the **SUPPLIER** and the **MANUFACTURER** (including **Capability Statement**) such 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.

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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

11. Service Performance

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

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- 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**.

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16. Appendix A.1 – Items List

Item No	IINo	Description
1	2404141	FUSE LINK, 24kV, HRC, 20 Amp, Barrel 565mm Long 50.8mm Diameter including End Caps 44mm Long 50.8 mm Diameter, with Striker Pin to DIN Standard 43625.
2	2404143	FUSE LINK, 24kV, HRC, 50 Amp, Barrel 565mm Long 76.2mm Diameter including End Caps 44mm Long 76.2mm Diameter, with Striker Pin to DIN Standard 43625.
3	2400622	FUSE LINK, 12kV, 63 A, HRC, Air Insulated, Barrel 359mm Long 76.2mm Diameter including End Caps 44mm Long 76.2mm Diameter, with Striker Pin, to DIN Standard 43625.
4	2400626	FUSE LINK, 12kV 80 Amp 12kV HRC, Air Insulated, Barrel 359mm Long, 76.2mm Diameter, including End Caps 44mm Long 76.2mm Diameter, with Striker. to DIN Standard 43625.
5	2400623	FUSE LINK, 12kV, 90 A, HRC, Air Insulated, Barrel 359mm Long 76.2mm Diameter including End Caps 44mm Long 76.2mm Diameter, with Striker Pin, to DIN Standard 43625.

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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 #	Units	II Number (Stock Code)
Name of Manufacturer		
Address of Manufacturer		
Country 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 ² t 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)	
Energy rating of the striker pin	(J)	
Class of Fuse (Full Range or General Purpose)		
Fuse End Cap Details:		
• Fuse End Cap Material		
• Plating Material		
• Thickness of plating		
Fuse End Fittings Details:		
• Material of Castings		
• Plating Material		
• Thickness of Plating		

SIGNATURE OF TENDERER: _____

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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 and limitations on the tightening torque on end fittings/fuse-links	
5.7	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	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: _____