



Ergon Energy Corporation Limited

**Technical Specification for 12kV
Powder Filled Current Limiting
Fuse-Links for Use in Switchgear
(In Oil)**

ETS12-01-03



Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

Contents

1. Purpose and Scope	1
2. References	1
2.1 Applicable Standards	1
3. Drawings	1
3.1 Drawings by the Purchaser	1
4. Service Conditions	1
5. Design and Construction	2
5.1 Requirements.....	2
5.2 Ratings.....	2
5.3 Fuse-link Applications	2
5.4 Fuse-Link Dimension	3
5.5 Striker	3
6. Performance and Testing	3
6.1 Testing	3
7. Risk Assessment	4
8. Quality Assurance	4
8.1 Purchasers Policy	4
8.2 Documentary Evidence.....	4
9. Samples	4
9.1 Production Samples.....	4
10. Packaging and Marking	4
10.1 General.....	4
10.2 Marking.....	4
11. Service History	4
12. Reliability	5
12.1 Service Life	5
12.2 Evidence in Support of Reliability.....	5
13. Training	5



Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

14. Environmental Considerations	5
15. Information to be Provided	6
15.1 Specific Technical Requirements.....	6
15.2 Checklist of Supporting Documentation	6
15.3 Documentation to be Supplied During the Course of the Contract.....	6
16. Appendix A.1 – Items List	7
17. Attachment 1 – Technical Details	8
18. Attachment 2 – Technical Document Checklist	9

Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

1. Purpose and Scope

This specification sets out the technical requirements for 12kV powder filled fuses suitable for use in oil insulated switchgear. The fuses are primarily used for the protection of distribution transformers.

Items covered under this specification is given in **Appendix A.1**

2. References

2.1 Applicable Standards

The fuses 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
AS1033.2	High voltage fuses (for rated voltages exceeding 1000V) Part 2 – Current-limiting (Powder-filled) type
IEC 60282-1	High-voltage fuses- Part 1: Current-limiting fuses
AS1856	Electroplated coatings - silver
AS2650	High voltage a.c. switchgear and controlgear – common requirements
AS4169	Electroplated coatings – tin and tin alloys
AS/NZS ISO9001	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 switchgear using the fuses to be purchased under this specification 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

Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

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 .

The fuses will be used under oil in switchgear.

5. Design and Construction

Design, construction and performance parameters are detailed in this section.

5.1 Requirements

The fuse-links shall have 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 three phase distribution transformer.

5.2 Ratings

Rated voltage	12kV
Rated Current	Refer Table Below
Rated breaking current	40kA (minimum)
Rated frequency	50Hz
Fuse classification	Full Range
Rated insulation level of fuse-holder	95kV BIL

Full range fuses are specified above but fuses of other classification will be considered.

5.3 Fuse-link Applications

The HV fuse sizes currently used by the Purchaser for the protection of distribution transformers (with delta connected primary) are listed below.

Transformer three phase kVA	Fuse Rating(A) for 12kV Transformers	Typical Fuse Rating for LV.
100	16	125
200	25	200 per circuit
315	31.5	200 per circuit
500	50	200 per circuit
750	63	200 per circuit
1000	80	200 per circuit

Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

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 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 in (MS Office) Excel format. These shall include the minimum melting time-current curves, maximum clearing time-current curves and current limiting data showing the extent of current limiting. A table of (current -time) data defining the above curves should also be included with the tender in (MS Office) Excel format.

Fuse links shall be suitable for mounting in any orientation.

5.4 Fuse-Link Dimension

Fuse-links shall have dimensions in accordance with Reference II 10 of Figure D2, Appendix D of AS1033.2.

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

5.5 Striker

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 heavy duty type in Table 6.3 of AS1003.2. The energy rating of the striker shall be $2J \pm 1J$.

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 (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 shall 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.

Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

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:

Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

- The period of service achieved by items offered within Australian service conditions;
- Australian electricity supply authorities who have a service history of the items offered;
- 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
- Application guide
- 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.

Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

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 documents 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.

Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

16. Appendix A.1 – Items List

Item No	II No	Description
1	0621091	FUSE LINK 10 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
2	2404921	FUSE LINK 16 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
3	2406262	FUSE LINK 20 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
4	2400615	FUSE LINK 30 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
5	2403620	FUSE LINK 31.5 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
6	0621032	FUSE LINK 50 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
7	2400619	FUSE LINK 63 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
8	0621059	FUSE LINK 80 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
9	2403627	FUSE LINK 125 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
10	2400625	FUSE LINK, 90 Amp 12kV HRC Ring Main Unit Oil Immersed Type suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 359mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin
11	2406263	FUSE LINK, CARTRIDGE, 12kV, HRC, Oil Immersed Type, 40 Amp, suits Andelect SDAF3 and L&C GF3 Fuse Switches Barrel 254mm Lg 68mm Dia including End Caps 40mm Lg 63.5mm Dia with Striker Pin, used with 300kVA Transformers. Full Range Fuse. For Use in Ring Main Units.



Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

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		II No	
Name of Manufacturer:			
Address of Manufacturer:			
Place of Manufacturer:			
Manufacturer's Catalogue Number and Drawing Numbers			
Material of Fuse			
Weight of Each 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)	
Details of Fuse End caps:			
End cap Material			
Type of Plating			
Thickness of plating		(micron)	

SIGNATURE OF TENDERER: _____

DATE: _____



Technical Specification for 12kV Powder Filled Current Limiting Fuse-Links For Use in Switchgear (In Oil)

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 of the fuse links	Yes/No
5.4	Drawings showing critical dimensions	Yes/No
6	Type Test certificates	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	Comments on Reliability	Yes/No
13	Training Materials (availability)	Yes/No
14	Environmental Considerations (availability)	Yes/No
15	Completed Attachment 1 and 2 including other information requested therein	Yes/No

NAME OF TENDERER:

ADDRESS OF TENDERER: _____

SIGNATURE: _____ FOR AND ON BEHALF OF TENDERER

DATE: _____