



**Ergon Energy Corporation Limited**

# **Technical Specification for LV ABC Fuse Switch Disconnectors**

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# Technical Specification for LV ABC Fuse Switch Disconnectors

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# Technical Specification for LV ABC Fuse Switch Disconnectors

## 1. Purpose and Scope

This Specification sets out the technical requirements for ganged three phase, fully enclosed fuse-switch disconnectors for use on overhead electricity distribution systems in a totally exposed environment. The units are primarily used for the protection and on-load switching of low voltage aerial bundled cable (LV ABC) distribution networks.

Items covered by this specification are listed below:

ITEM No	DESCRIPTION	STOCK CODE
1	SWITCH FUSED 415V,400A, 3 pole LV ABC	0675123
2	Solid link 400A to suit item 1	2404944

## 2. References

### 2.1 Applicable Standards

The fuse switch disconnectors shall be designed, manufactured and tested in accordance with the following Australian Standards and all amendments issued from time to time except where varied by this specification.

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

STANDARD	TITLE
AS 1125	Conductors in insulated electric cables and flexible cords
AS 1154	Insulator and conductor fittings for overhead power lines
AS 1192	Electroplated coatings - Nickel and chromium
AS 1463	Polyethylene pipe extrusion compounds
AS 1531	Conductors - Bare overhead - Aluminium and aluminium alloy
AS 1856	Electroplated coatings - Silver
AS 60529	Degree of protection provided by enclosures for electrical equipment (IP Code)
AS 60269	Low voltage fuses - Fuses with enclosed fuse-links
AS 2837	Wrought alloy steels - Stainless steel bars and semi-finished products
AS 3100	Approval and test specification-General requirements for electrical equipment
AS 3560	Electric cables- XLPE insulated - Aerial bundled - For working voltages up to and including 0.6.1kV
<b>AS 3947</b> <b>AS 3947.3</b> <b>Supplement 1</b>	<b>Low voltage switchgear and control gear</b> <b>Switches, disconnectors, switch-disconnectors and fuse-combination units</b> <b>Fuse-switch-disconnectors and switch-disconnectors for use with low-voltage aerial bundled cables</b>

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AS 4169	Electroplated coatings - Tin and tin alloys
AS 4680	Hot-dipped galvanised (zinc) coatings on fabricated ferrous articles
AS 5000	Electric cables polymeric insulated
AS/NZS ISO: 9001	Quality management systems - Requirements

## 3. Drawings

### 3.1 Drawings by the Purchaser

There are no drawings attached to this technical specification.

### 3.2 Drawings by the Tenderer

The Tenderer shall supply with the tender, detailed drawings or pamphlets of the items tendered.

## 4. Service Conditions

The fuse switch disconnectors will be exposed to the following environmental conditions:

<b>Ambient Temperatures</b>	45° summer day time -5° winter night time
<b>Solar Radiation Level</b>	1000 watts per square metre with high ultraviolet content
<b>Precipitation</b>	Tropical summer storms with gust wind speeds above 160km/h, and an annual rainfall in excess of 1500 mm
<b>Humidity</b>	Extended periods of relative humidity in excess of 90% R.H.
<b>Atmospheric Classifications</b>	Areas of coastal salt spray and/or industrial pollution with equivalent salt deposit densities in the range 2.0 - 3.0 g/m <sup>2</sup> .

## 5. Design and Construction

Design and construction performance parameters are detailed in this section.

### 5.1 General

The fuse-switch-disconnector shall consist of an upper housing holding the conductor terminals and the contacts and a hinged lower housing holding the fuse links.

The lower housing of the fuse-switch-disconnector shall be provided with a nominal 20mm diameter eye or other suitable means to enable the unit to be operated using a standard operating stick. Special provision shall be made on the lower housing to enable it to be lowered to the ground on the end of an operating stick.

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The switches may be used as fuse-switch disconnectors or isolating switches fitted with DIN size 1 or 2 in fuse link sizes 160A to 400A and 250A or 400A solid links.

The fuse switch disconnector shall be able to accept fuse links having a minimum power dissipation value of 34 watts.

## 5.2 Maximum Power Dissipation

The Tenderers are requested to nominate the maximum power dissipation (watt loss) of the fuse links that the items tendered can accommodate safely in the service environment.

**The switches shall incorporate arc quenching chambers. Details of the arc quenching arrangement shall be submitted with the tender documents.**

## 5.3 Ratings

The fuse-switch-disconnectors shall have the following ratings:

Rated operational voltage	450 volts
Rated insulation voltage	1000 volts
Rated impulse voltage	12 kV
Rated frequency	50 Hz
Rated short time withstand current	10kA
Degree of protection	IP23
Duty	Uninterrupted
Utilisation category	In accordance with AC 22B (refer Table II of AS 3947.3)
Making and breaking capacity	1.5 times rated operational current.

**The tenderer shall state the maximum rating of each switch when used with solid links or fuse links as stated in clause 5.1 under the ambient conditions specified in clause 4.**

## 5.4 Mounting

A suitable mounting bracket shall be provided with each unit to allow the disconnector to be fixed to a timber or concrete pole using two M12 coach screws or bolts at 230mm centres. Provision shall also be made to enable the units to be attached to concrete poles using "bandit" straps.

**Full details of the mounting bracket shall be supplied with the offer.**

## 5.5 Housing

All exposed surfaces of the upper and lower housing of the unit shall be manufactured from weather and UV resistant, glass fibre reinforced polymer or similar material. The housing material shall contain carbon black filling to AS1463. It shall be impact resistant and have a flammability rating of not less than HB 0.

The enclosure shall provide a degree of protection IP23 to the electrical components when switch is in closed position.

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## 5.6 Contacts

All electrical contact surfaces are to be nickel or silver plated in accordance with AS 1192 or AS 1856. The manufacturer must ensure that the thickness of plating provides durability of the contact surfaces over a service life of 25 years.

All contacts shall be self-aligning and shall have a wiping action to remove oxide or other contamination on the contact surfaces and constructed to eliminate arcing to the main contacts.

**Full details of jaw and hinge contacts shall be submitted with the offer.**

## 5.7 Terminal Connections

- 5.7.1 The fuse-switch shall be fitted with terminal palms suitable for bolted lug connections on both the supply and load sides of the unit and shall satisfy the temperature rise limits in accordance with sub-clauses 7.2.2 and 8.3.3.1 of AS 3947.3 and AS 3947.3. (Supplement 1).
- 5.7.2 The connections shall be designed for use with tinned copper or aluminium lugs suitable for aluminium or copper conductors (cross sectional area 25-240 mm<sup>2</sup>) and to minimise the effects of electrolytic corrosion of dissimilar metals
- 5.7.3 Each terminal palm shall be provided with a 12mm stainless steel bolt/stud complete with a stainless steel spring washer, flat washer and a nut for securing the cable lugs to the terminal palm. Preference will be given to fuse-switch units having terminal palms which provide for the parallel connection of two cables.
- 5.7.4 Cable entry points and cable securing bolts are to be located on top of the switch for ease of cable installation.
- 5.7.5 Each cable entry point to be covered by individually hinged terminal covers for maximum safety.
- 5.7.6 The lower housing is to fitted with a yellow indicator to show if a fuse link/solid link is installed

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## 5.8 Corrosion Protection

- 5.8.1 The latch mechanisms of the unit shall be constructed of corrosion resistant metals and shall include no ferrous parts less than 4mm thick, other than stainless steel.
- 5.8.2 All current carrying parts shall be of a high electrical conductivity, corrosion resistant metal. All copper and associated alloys shall be either nickel, electrolytically bright tin or silver-plated. The thickness of plating should be sufficient to ensure long term durability of the current carrying parts. Full details of plating offered to be provided.
- 5.8.3 Additional corrosion protection shall be provided by the application of grease to the current carrying parts prior to assembly. Acceptable greases are Shell Alvania R3 or equivalent.
- 5.8.4 Tenderers are required to state the type of grease used.
- 5.8.5 All nuts, bolts and washers other than those associated with the mounting bracket shall be stainless steel in accordance with AS 2837. The bolts and washers shall be Grade 316 and to avoid binding, the nuts shall be Grade 304 and a suitable lubricant shall be applied to the threads of all stainless steel bolts before tightening. The lubricant shall not contain graphite.
- 5.8.6 Mounting bracket and other ferrous parts of the units other than stainless steel shall be galvanised in accordance with AS 4680.

## 5.9 Vibration

When the fuse link or switch blade is intact and correctly inserted the carrier shall latch securely when closed and shall not be dislodged from the fuse contacts by severe vibration or wind pressure.

## 5.10 Marking

Switches shall be clearly and durably marked in accordance with Section 5.2 of AS 3947.3 and the year of manufacture.

Link shall be clearly and durably marked with the current rating.

## 6. Performance and Testing

### 6.1 Type Tests

- 6.1.1 Electrical and Mechanical Type Tests shall be carried out on each fuse-switch disconnector and submitted with the tender.
- 6.1.2 The test certificates shall include the tests carried out in accordance with the requirements of Clause 8 of AS 3947.3, Supplement 1.
- 6.1.3 Type test certificates shall be written in ENGLISH.
- 6.1.4 Where test reports to AS 3947 are not available, tests carried out to other International Standards may be considered acceptable provided that the Tenderer provides a detailed comparison of the test results so obtained with the requirements of AS 3947.
- 6.1.5 Testing shall have been undertaken at a NATA registered testing authority and must have been carried out within the last two- (2) years.

**Note:** Should tenderers be unable to provide Type Test reports from a NATA registered testing authority, then that the testing authority shall be:

- INDEPENDENT of the MANUFACTURER; and
- NATIONALLY ACCREDITED to carry out the relevant tests.



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Tenderers shall state the credentials of the Testing Authority used to complete the Type Tests.

## 6.2 Batch Tests

Tenderers are requested to advise the availability of Batch Tests for the products offered.

## 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

Documentary evidence shall be provided concerning the level of quality system certification associated with the supplier and/or manufacturer. This documentation shall include the Capability Statement associated with the Quality System Certification.

### 8.3 Quality Certification Program

Tenderers shall provide details of their program to upgrade their Quality Certification to meet the requirements of ISO 9001.

## 9. Samples

### 9.1 Production Samples

When requested, production samples of each item offered shall be submitted to assist in the evaluation of the offer.

### 9.2 Sample Delivery

Each sample shall be delivered freight free, suitably crated and packaged and labelled with the following information:

<b>Name of Tenderer and this Contract No.</b>
<b>Contract Item Numbers</b>
<b>Any supporting data on features or characteristics</b>

### 9.3 Sample Purchase

Ergon Energy may, at its discretion, either purchase the items at the tendered price or return the samples to the respective tenderer after the contract has been awarded.

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## 10. Packaging and Marking

### 10.1 Packaged Lots

All items are to be supplied in packaged lots in accordance with the quantities agreed between the successful tenderer and the purchaser.

Each packaged lot shall be marked with the following information:

<b>Item Description</b>
<b>Ergon Stock Code</b>
<b>Purchase Order Number</b>
<b>Contract No</b>
<b>Manufacturers Name</b>
<b>Pack Size</b>
<b>Pack Weight</b>

### 10.2 Recommended Installation Procedure

Each packaged shall include the manufacturers recommended installation procedure document.

## 11. Service Performance

The tenderer shall provide the following information with respect to the items offerer.

- (a) The period of service achieved by the items offered within Australian service conditions;
- (b) Australian electricity supply authorities who have a service history of the items offered; **AND**
- (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

Suppliers are required to comment on the reliability of the equipment and the performance of the materials offered for a service life of 25 years under the specified system/duty (see Clause 1) and environmental conditions (see Clause 4).

### 12.2 Evidence in Support of Reliability

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

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## 13. Training

### 13.1 Training Material

Training material in the form of drawings, instructions and/or audiovisuals shall be provided for the items accepted under the offer unless the items have been supplied previously. Tenderers shall state the availability of training materials which should include but is not limited to the following topics:

- Handling
- Storage
- Application (particularity in areas of heavy coastal pollution)
- Installation
- Maintenance
- Environmental 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 tendered. In particular, comments should address such issues as recycling and disposal at the end of service life.

## 15. Information to be Provided

### 15.1 Specific Technical Requirements

The specific technical requirements for the items offered shall be as stated in **Attachment 1** of this specification. The supplier shall provide all details requested by **Attachment 1** and shall guarantee such data.

### 15.2 Checklist of Supporting Documentation

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

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## 16. Attachment 1 – Technical Details

**NOTE:** A separate schedule is to be provided for each item offered except where information common to all items only needs to be provided once.

PARTICULARS	UNITS	DETAILS
Specification Item Number		
Stock Code		
Manufacturer's Name & Address		
Place of Manufacture		
Manufacturer's Product Catalogue Number		
Manufacturer's Drawing Number		
Will Batch Test Certificate be Supplied?	Yes/No	
Type Test Report/Certificate No.		
<b>Electrical Characteristics:</b>		
Rated Voltage <span style="float: right;"><math>U_e</math></span>	KV	
Rated Current with Fuse Links <span style="float: right;"><math>I_e</math></span>	Amps	
Rated Current with Solid Links <span style="float: right;"><math>I_e</math></span>	Amps	
Rated Frequency	Hz	
Load-break Current <span style="float: right;"><math>I_o/I_e</math></span>		
Rated Breaking Capacity	Amps	
Maximum rated power acceptance of the switch fuse in the service environment. (minimum value 34watts)	Watts	
Rated Short Current making Capacity with Solid Links <span style="float: right;"><math>I_{cm}</math></span>	Amps	
Rated Impulse Withstand Voltage	16kV	
Power Factor		
<b>Physical Characteristics:</b>		
<b>Material Details:</b>		
Body		

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## 17. Attachment 1 – Technical Details...(Cont'd)

PARTICULARS		UNITS	DETAILS
Fixed Contact			
Quenching Chamber			
Blade Base plate			
Terminals			
Blade Securing Tabs			
<b>Fixed Contact:</b>			
(a)	Plating Material		
(b)	Plating Thickness	µm	
<b>Terminals:</b>			
(a)	Plating Material		
(b)	Plating Thickness	µm	
(c)	Type of Grease		
<b>Conductor Capacity:</b>			
(a)	Material		
(b)	Minimum Conductor OD	mm	
(c)	Minimum Conductor Sectional Area	25mm <sup>2</sup>	
(d)	Maximum Conductor OD	mm	
(e)	Maximum Conductor Sectional Area	240mm <sup>2</sup>	
(f)	Maximum number of circuits per phase		
<b>Degree of Protection:</b>		IP23	
<b>Utilisation Category:</b>		AC22B	
<b>Grease:</b>			
Copper	Type		
	Minimum Drop Point Temperature	°C	
Aluminium	Type		
	Minimum Drop Point Temperature	°C	
<b>Packaging:</b>			
Pack Size			
Pack Weight		kg	

**SIGNATURE OF TENDERER:** \_\_\_\_\_

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## 18. Attachment 2 – Technical Document Checklist

The Tenderer shall complete the relevant items (as applicable):

Clause Ref.	Particulars	Tenderer's Response
Have full and comprehensive details been submitted <b>WITH</b> the tender documents associated with each of the following items?		
5.3	Switch Rating with Link & Fuse	Yes/No
5.4	Full details of the mounting bracket	Yes/No
5.6	Contact details	Yes/No
5.8.4	Type of Grease	Yes/No
6.1	Electrical & Mechanical Type test certificates	Yes/No
6.1	Alternative Testing Standards	Yes/No
6.1	Testing Authority credentials	Yes/No
6.2	Availability of Batch Certificates	Yes/No
8.2 & 8.3	Quality systems certification of <b>BOTH</b> the <b>SUPPLIER</b> and the <b>MANUFACTURER</b>	Yes/No
11	Service Performance	Yes/No
12	Reliability	Yes/No
13	Training Materials Availability	Yes/No
14	Environment Consideration	Yes/No
15	Completed Attachments of Technical Details	Yes/No

NAME OF TENDERER:

ADDRESS OF TENDERER: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ FOR AND ON BEHALF OF TENDERER

DATE: \_\_\_\_\_