



Ergon Energy Corporation Limited

Technical Specification for Switch- Disconnectors and Fuse-Switch- Disconnectors

660 Volts – 630 & 800AMP

ETS-06-02-01

Technical Specification for Switch-Disconnectors and Fuse-Switch-Disconnectors 660 Volts – 630 & 800 AMP

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1. Purpose and Scope

This Specification sets out the technical requirements for single pole, switch-disconnectors and fuse-switch disconnectors for use on overhead electricity distribution systems in a totally exposed environment. The units are primarily used for manually interrupting currents on the low voltage distribution network, by means of an operating stick.

2. References

2.1 Applicable Standards

The switch disconnectors and 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 1154	Insulator and conductor fittings for overhead power lines
IEC 60893	Insulating materials - Industrial rigid laminated sheets based on thermosetting resins for electrical purposes
AS 1856	Electroplated coatings - Silver
AS 60269	Low voltage fuses
AS 2837	Wrought alloy steels - Stainless steel bars and semi-finished products
AS 3608	Insulators - Porcelain and glass, pin and shackle type - Voltages not exceeding 1000 V a.c.
AS 3947	Low voltage switchgear and control gear
AS 4169	Electroplated coatings - Tin and tin alloys
AS 4680	Hot-dipped galvanised (zinc) coatings on fabricated ferrous articles
AS/NZS ISO 9001	Quality management systems - Requirements

3. Drawings

3.1 Drawings by the Purchaser

The following drawings under Attachment 3 form part of this Specification.

DRAWING NUMBER	TITLE
QESI 06-02-01	Switch-Disconnectors and Fuse-Switch-Disconnectors Definition of Parts
QESI 06-02-02	Typical Terminal Palm and Connections

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4. Service Conditions

The switch disconnectors and fuse switch disconnectors 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.
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 Ratings

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

Rated operational voltage	660 volts
Rated frequency	50 Hz
Rated operational current	630 Amps or 800 Amps, as specified
Duty	Uninterrupted
Utilisation category	In accordance with AC 21A (refer Table 2 of AS 3947.3)
Making and breaking capacity	1.5 times rated operational current.
Rated short-time withstand current	20 times rated operational current for one second without damage.

5.2 Operation

5.2.1 Switch-Disconnector

The blade of the switch-disconnector shall be made of high conductivity material with a nominal 20mm diameter pulling eye located at the jaw end to allow for operation with a hook stick. The hinge end of the blade shall incorporate belleville washers to maintain constant contact pressure between the blade and the hinge contact. A stop pin shall be provided to restrict the opening of the blade to 90°.

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5.2.2 Fuse-Switch-Disconnectors

The removable fuse-carrier of the fuse-switch-disconnectors shall be provided with a nominal 20mm diameter eye at each end to allow easy operation with a hook stick and to facilitate its removal for replacement of the fuse-link.

5.3 Mounting

A 21mm x 30mm slot shall be provided in the mounting bracket to allow the disconnector to be fixed to a timber crossarm in the vertical or horizontal position by means of an M16 bolt.

A suitable locking arrangement shall be provided to prevent rotation of the disconnector about the mounting bolt when in service.

5.4 Fixing of Fuse-Link

The fuse-switch-disconnector shall be suitable for use with fuse-links having bolted connections with fixing centres of both 111mm for 2 hole type fuses and 133mm and 184mm for 4 hole type fuses.

5.5 Contacts

All electrical contact surfaces are to be silver plated in accordance with AS 1856. The manufacturer must ensure that the thickness of plating provides durability of the contact surfaces over a service life of 35 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.

5.6 Insulators

Insulators shall be single piece, fully vitrified, non-puncturable porcelain in accordance with AS 3608. The preferred colour is munsell grey.

The fuse-link mounting bridge on the fuse-switch-disconnector shall be of material suitable for the mounting and insulating of live parts in accordance with the IEC publication 893 and it shall be free of any asbestos reinforcement. The moving contact assembly shall be attached to the mounting bridge without over stressing the bridge material.

Alternative type insulators may be accepted if full details of same are submitted, complete with test certificates and details of standards.

5.7 Terminal Connections

A terminal palm of 3mm minimum thickness shall provide for the connection of up to two cables on both the supply and load sides of the unit and shall satisfy the temperature rise limits in accordance with Clause 7.2.2 of AS 3947.3 and the following table. (Refer QESI drawing number 06 02 02):

Connection	Current Rating	
	630 amp	800 amp
Lug	M12	M16

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Clamp	2 Clamps each 2 x M10 @ 30mm centres	N/A
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The connections shall be designed for use with aluminium or copper conductors and to minimise the effects of electrolytic corrosion of dissimilar metals.

The purchaser shall specify the type of connector required.

The stainless steel bolts and nuts securing the terminal palm and clamp or lug shall have a minimum reusable torque strength of 30 Nm and shall be fitted with stainless steel or phosphor bronze belleville or spring washers so as to provide a positive locking pressure at all times when tightened.

Where a clamp using two M10 bolts is specified the clamp shall:

- (a) Consist of material suitable for copper to aluminium connections.
- (b) Be capable of accommodating a conductor range from 5.0mm to 22mm in diameter by means of a grooved section above and below the conductor.
- (c) Have a minimum contact length of 25mm.
- (d) Meet the performance requirements of Section 5 of AS 1154 - Part 1.

Tunnel and U-bolt type clamps are not acceptable.

Where a lug connection is specified, a fully threaded bolt having the diameter stated in the table above and a length of 60mm shall be provided.

5.8 Corrosion Protection

The latch mechanisms of the unit shall be constructed of corrosion resistant metals and shall include no ferrous parts other than stainless steel.

All current carrying parts shall be of a high electrical conductivity, corrosion resistant metal. All copper and associated alloys shall be electrolytically bright tin plated (or silver plated) to ensure that the thickness of plating provides durability of the contact surfaces for a service life of 35 years.

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.

All support brackets and other ferrous parts of the units other than stainless steel shall be galvanised in accordance with AS 4680.

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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 with the year of manufacture and in accordance with Section 5.2 of AS 3947.3.

6. Performance and Testing

6.1 Testing

Testing of the switch-disconnector and fuse-switch disconnector units is required (refer AS 3947.3 Section 8) Testing of insulators is also required.

6.2 Type Testing (refer Section 8.3 of AS 3947.3)

Test reports on the following type tests shall be provided.

Upon written application the requirement that these reports be submitted maybe waived at the purchasers' discretion.

- (a) Type Tests in accordance with Clause 8.3 of AS3947.3 shall be carried out in accordance with the sequence of test listed in the following table. The required type tests for each sequence are indicated in column 2 of Table 10 of AS 3947.3.

Item	Switch Disconnector	Fuse-Switch Disconnector
TEST SEQUENCES	General Performance Characteristics (Sub-Clause 8.3.3 and Table 11)	General Performance Characteristics (Sub-Clause 8.3.3 and Table 11)
	Operational Performance Capability (Sub-Clause 8.3.4 and Table 13)	Operational Performance Capability (Sub-Clause 8.3.4 and Table 13)
	Short Circuit Performance Capability (Sub-Clause 8.3.5 and Table 14)	Conditional short circuit current (Sub Clause 8.3.6 and Table 15)

- (b) Insulator type test required:
Porosity test (in accordance with Clause 2.4 of AS 3608 or equivalent tests)

6.3 Routine Tests (refer Section 8.1.3 of AS 3947.3)

Routine Tests comprise:

- (a) Mechanical operation tests (refer Clause 8.1.3.2 of AS 3947.3)
(b) Dielectric tests (refer Clause 8.1.3.3 of AS 3947.3).

Test certificates shall be supplied to the purchaser on request.

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6.4 Batch Tests on Insulators (refer AS 3608)

Batch Test Certificates for the insulators shall be supplied with each batch delivery.

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.

9. Samples

9.1 Production Samples

Samples of items may be required during the tender assessment period. Samples would normally only be required from tenderers who have previously not supplied the items to the Purchaser.

9.2 Sample Delivery

When samples are required, production samples shall be delivered freight free, suitably packaged and labelled including reference to the Contract Number.

The Purchaser may at its discretion either purchase the samples at the tendered price or return the samples to the respective tenderer after the contract has been awarded. Samples shall be supplied within 7 days of official request.

10. Packaging and Marking

10.1 General

Switch-disconnector and Fuse Switch-disconnector units shall be supplied with accessories in individual cartons.

The cartons shall allow for the unit to be easily removed for necessary testing/checking and then easily repacked and sealed for holding in store.

The cartons must be sufficiently sturdy to allow storage by stacking on a pallet.

Each Switch-disconnector and Fuse Switch-disconnector unit shall be separately packaged.

10.2 Marking of Packages

The following information shall be legibly and indelibly marked on **BOTH** ends of the crate:-

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- (a) Manufacturer's name and catalogue number
- (b) Rated Voltage and Current
- (c) Contract Number and Order Release Authority Number (ORA)
- (d) Description of contents and gross mass
- (e) Handling or lifting instructions where applicable

10.3 Quarantine

Should any timber packaging be supplied from overseas manufactures, then it is mandatory that all conditions and inspections required by the Australian Quarantine Act be met and that all these costs be included in the offered price.

11. Service Performance

Suppliers shall state:

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;
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

The expected minimum average service life of items referred under this specification is 35 years.

12.2 Evidence in Support of Reliability

Suppliers are invited to submit any proposals which may increase the anticipated service life of these items.

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 (particularly in areas of heavy coastal pollution)
- Installation
- Maintenance
- Environmental performance

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- Electrical performance
- Mechanical performance
- Disposal

14. Environmental Considerations

At the time of the Supplier submitting its offer, the Supplier must provide to the Purchaser all information requested regarding the practices, procedures and chemicals used by the Supplier which may affect the environment.

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 disposability at the end of service life.

15. Information to be Provided

15.1 Specific Technical Requirements

At the time of the Supplier submitting its offer, the Supplier shall advise the Purchaser of the Supplier's particulars and its sub-suppliers' particulars as required in **Attachment 1** of this specification.

15.2 Checklist of Supporting Documentation

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

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16. Attachment 1 – Supplier Details

Supplier's Name and Address	
Name and Address of Sub Supplier	
Corrosion Protection Treatment Offered	

SIGNATURE OF TENDERER: _____

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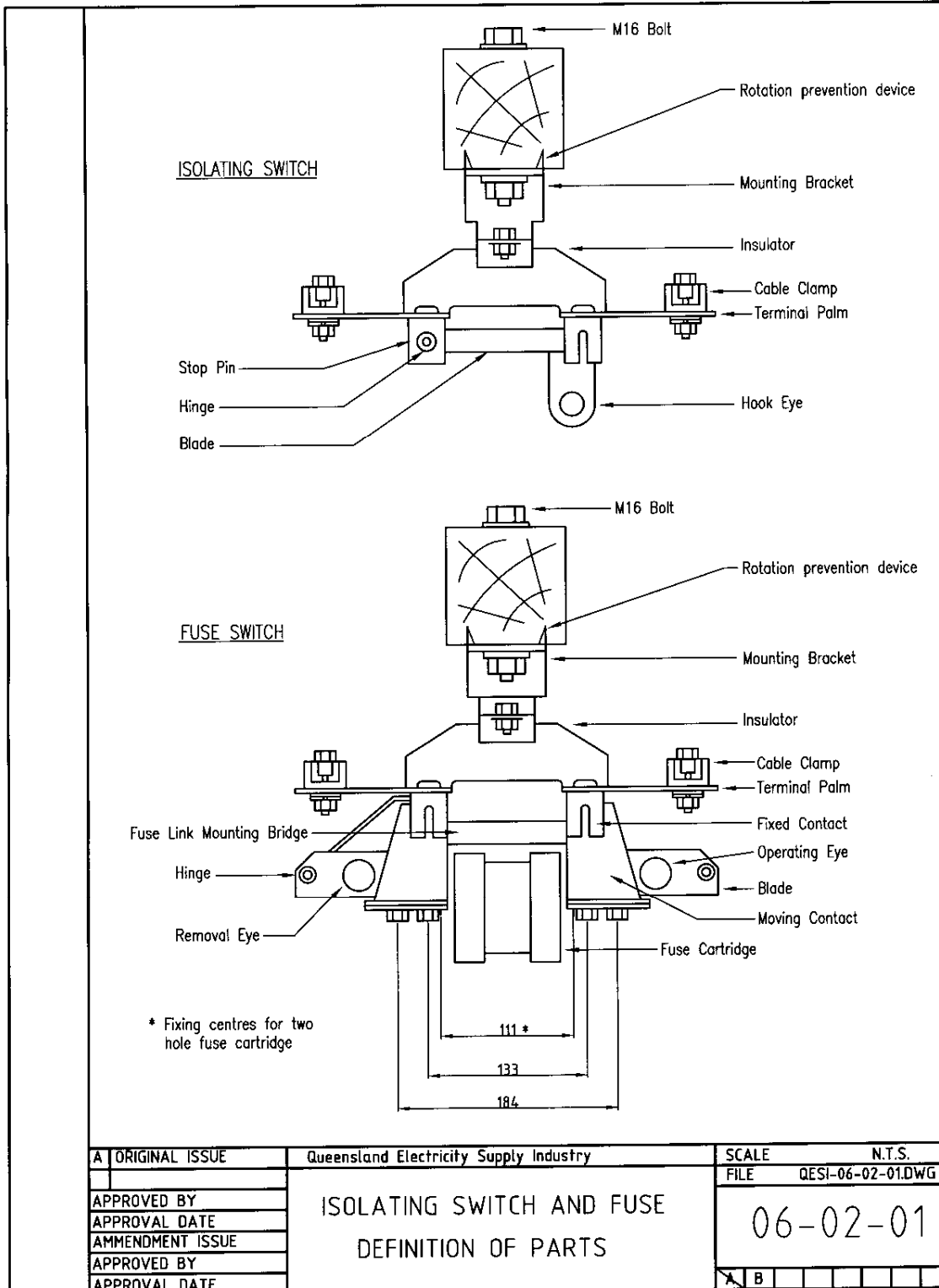
17. Attachment 2 – Technical Document Checklist

CLAUSE Ref.	PARTICULARS	YES/NO
The Supplier must provide to the Purchaser full and comprehensive details of the following items?		
5.1	Ratings	
5.5	Contact surfaces	
5.6	Insulators supplied	
5.7	Design of terminal connections	
5.8	Corrosion protection and galvanisation	
6.1	Can supplier test the switch-disconnector and fuse-switch disconnector units	
6.2	Availability of type test reports and testing of Insulators	
6.3	Availability of routine test certificates when requested	
8.0	Quality system manual to be used in performing this Contract. Evidence that the Supplier satisfies the Quality Certification requirements of ISO 9001	
9.1	Samples supplied	
11.0	Details of service performance	
12.2	Reliability – any proposals which will satisfy the performance specification or increase the service life	
13.0	Availability of training materials	
14.0	Environmental considerations	

SIGNATURE OF TENDERER: _____

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18. Attachment 3 – Drawings



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