



Ergon Energy Corporation Limited

**Technical Specification for 12kV,
24kV and 36kV Disconnect
(Isolators)**

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Technical Specification for 12kV, 24kV and 36kV Disconnecter (Isolators)



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1. Purpose and Scope

This specification sets out the technical requirements for single pole, single insulator disconnectors (isolators) for use on overhead distribution systems in a totally exposed environment. Disconnectors are primarily used as mechanical switching devices which provide in the open position, an isolating distance.

2. References

2.1 Applicable Standards

The disconnectors 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 standard and/or this specification, the Supplier shall immediately refer such inconsistencies to the Corporation for resolution.

STANDARD	TITLE
AS/NZS 62271.102	High-voltage switchgear and control gear – Part 102: Alternating current disconnectors and earthing switches
AS 1154	Insulator and conductor fittings for overhead power lines
AS 1214	Hot-dip galvanised coatings on threaded fasteners (I.S.O. metric coarse thread series)
AS/NZS 60625	High voltage switches – Switches for rated voltages above 1kV and less than 52kV
AS 1856	Electroplated coatings - silver
AS 2650	Common Specifications for high voltage a.c. switchgear and controlgear standards
AS 2837	Wrought alloy steels - Stainless steel bars and semi-finished products
AS 2947	Insulators - Porcelain and glass for overhead power lines - Voltages greater than 1000 V a.c.
AS 4169	Electroplated coatings - Tin and tin alloys
AS 4360	Risk Management
AS 4398	Insulators - Ceramic or glass - Station post for indoor and outdoor use - Voltages greater than 1000 V a.c.
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

There are no drawings attached to this Specification.

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4. Service Conditions

The 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	Ranging from negligible to 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 of 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 disconnectors shall have the following ratings:

Rated Voltage	(kV)	12/24	36
Rated Frequency	(Hz)	50	50
Continuous operating current	(A)	630	400
Short time withstand current (1 sec)	(kA)	20	12.5
Rated Peak withstand current	(kA)	50	31
Insulation level (BIL)			
(i) To earth and between poles (peak)	(kV)	150	170
(ii) Across isolating distances (peak)	(kV)	170	230

Note: The Purchaser shall specify the type of disconnector required.

5.2 Operation

A 20mm minimum internal diameter ring shall be provided at the moving end of the disconnector blade to enable the operation of the disconnector switch using a standard operating rod fitted with a hook/link stick. The force required for such operation shall not be greater than 250 N.

The top contact support of the disconnector shall be provided with hooks suitable for attachment of a portable load breaking tool.

The bottom hinge joint assembly of the disconnector shall be provided with a removable stop to restrict the movement of the blade when in open position, to 90° from the closed position.

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5.3 Mounting

The angle of inclination of the disconnector blade shall be sufficient to allow ease of operation with due regard to the safety of the operator. The disconnectors shall be capable of being mounted on either poles or crossarms.

Note: The purchaser shall specify the type of mounting required.

a) Timber Crossarm Mounting

A hole shall be provided in the mounting bracket to allow the disconnector to be fixed to the top of the crossarm by means of a M20 bolt vertically through the crossarm with its centre line located 50mm from the face of the crossarm.

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

b) Pole Mounting

A hole shall be provided in the mounting bracket to allow the disconnector to be fixed to a pole by a M20 bolt.

A further hole shall be provided for a M16 coachscrew connection to the pole to prevent rotation of the disconnector about the mounting bolt when in service.

5.4 Contacts

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

All contacts shall be greased, self-aligning and shall have wiping action to remove oxide or other contamination on the contact surfaces and constructed to eliminate arcing damage to the main contacts. As the hinge and blade may be subject to operation from an off-centre position they shall be of robust construction to align correctly under this condition.

5.5 Insulators

The insulator shall be a single piece, fully vitrified non-puncturable porcelain in accordance with AS 4398. The preferred colour is munsell grey. The minimum electrical characteristics of each insulator shall be:

PARTICULARS	UNITS	12/24kV	36kV
Lightning Impulse Withstand Voltage	kV _{pk}	150	170
Wet Power Frequency Withstand Voltage	kV	50	70
Creepage Distance	mm	430	580

The insulator shall be of adequate mechanical strength to withstand the loads applied during the opening and closing cycles.

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5.6 Terminal Connections

- 5.6.1 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 4.4 of AS 62271.102.
- 5.6.2 The connections shall be designed for use with aluminium, copper or steel conductors and to minimise the effects of electrolytic corrosion of dissimilar metals.
- 5.6.3 The connectors provided shall be a M12 x 40mm fully threaded stainless steel bolt and nut provided on both the supply and load side terminal palm and fitted with two stainless steel round washers and a stainless steel Belleville or spring washer so as to provide a positive locking pressure at all times when tightened.

5.7 Earthing Attachment

The bottom hinge section of the disconnector unit shall be provided with an earth attachment device satisfying the following requirements:

- a) Be capable of supporting the weight of the portable earthing cables (nominally 35kg) and not allow accidental detachment of the portable earths.
- b) Have a 1 second withstand current rating of 6kA (minimum).
- c) Provide a clearance of 500mm (minimum) from the live parts to the earth attachment point.
- d) Be orientated in-line with the disconnector so that the device does not interfere with the operation of the disconnector or reduce the phase to phase clearances.

5.8 Corrosion Protection

The hinge and latch mechanisms of the disconnector switch 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 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 should 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.

5.9 Vibration and Impact

The blades shall be self latching in the closed position or provided with a safety latch to prevent maloperation due to gravity, vibration, wind pressure, electromagnetic forces or shocks caused by minor vehicle impact on the pole.

5.10 Bird/Fauna/Vermin Proofing

The insulator/mounting bracket combination shall be designed in such a manner so as to minimise the risk of flashover due to birds and other animal life, without the use of plastic or rubber coverings.

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5.11 Corona

Corona and Radio Interference Voltages shall be avoided by eliminating sharp edges, points or loose metal fittings on energised parts.

5.12 Marking

The disconnector shall be clearly and durably marked with the year of manufacture and in accordance with AS 62271.102.

6. Performance and Testing

6.1 Type Tests

Test reports on the following type tests shall be provided.

- (a) Dielectric Tests. (Refer Clause 6.2 of AS 62271.102).
- (b) Temperature - Rise Tests. (Refer Clause 6.5 of AS 62271.102)
- (c) Short-time withstand current and peak withstand current tests. (Refer Clause 6.6 of AS 62271.102).
- (d) Mechanical endurance test. (Refer Clause 6.102 of AS 62271.102).

6.2 Routine Testing

Routine Test Certificates shall be supplied with each batch delivery in accordance with Clause 7 of AS 62271.102.

6.3 Batch Test for Insulators (See AS 4398.2)

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

7. Risk Assessment

7.1 Compliance

The Tenderer warrants (without limiting any other warranties or conditions implied by law) that all Goods have been produced, sold and delivered to the Principal in compliance with all applicable laws (including all workplace health and safety and electrical safety legislation, codes of conduct and the Principal's Workplace Health & Safety and Electrical Safety Conditions).

7.2 Formal Risk Assessment

Offered items shall be subjected to a formal risk assessment prior to acceptance. Any documented risk assessment must meet the requirements of AS/NZS 4360:1995 Risk Management as a minimum standard. It is preferred that the risk assessment methodology uses an energy model to identify hazards.

7.3 Hazards

The risk assessment/s must identify hazards to the corporation personnel, public and property associated with:

- The installation of the equipment
- The operation and maintenance of the equipment during life expectancy
- Dismantling/disposal of equipment at end of life.

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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

- (a) Individual cartons shall contain one disconnector unit and accessories.
- (b) The cartons must be sufficiently sturdy to allow storage by stacking on a pallet.

10.2 Marking

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

- (a) Manufacturer's name and catalogue number
- (b) Rated Voltage and Current
- (c) Purchase Order Number
- (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.

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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 lighting poles is 35 years. The design and construction shall be as specified in the relevant sections of this specification.

12.2 Evidence in Support of Reliability

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

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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 2** of this specification.

15.2 Checklist of Supporting Documentation

Attachment 3 details a checklist of supporting technical documentation which is required to be submitted with the offer.

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16. Attachment 1 – Risk Assessment

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

REF.	PARTICULARS	YES/NO
1.	Have Risk Assessments been carried out on equipment tendered which meet the requirements of AS/NZS 62271.102, AS 1154, AS 1214, AS/NZS 60625, AS 1856 and AS 4169	
2.	Have copies of such risk assessments been included with the tender	
3.	What is the weight of the components to be moved	
4.	How often do the components have to be moved	
5.	Are space restrictions associated with:	
5.1	Manual/materials handling tasks	
5.2	Installation/maintenance	
5.3	Operating procedures?	
6.	Is there provision for the use of mechanical lifting devices?	
7.	Is the load stable?	
8.	What is the level of coupling? (poor/fair/good) (e.g. are operating handles fitted with grips)	
9.	What are the push/pull/rotational forces required to operate the equipment:	
9.1	When new?	
9.2	During life expectancy?	
10.	Do "above ground" work surfaces have adequate fall protection (e.g. slip resistant surface, hand rails)?	
11.	Do the work positions require undesirable postures such as:	
11.1	Bending	
11.2	Stretching	
11.3	Twisting	
12.	What postures are required to be sustained over what period of time?	
13.	What movements are repetitive and for what duration?	
14.	What are the sound pressure levels (expressed in dB(A))?	
15.	What hazardous substances are used/produced (including after failure) such as:	
15.1	Dust	
15.2	Gas	
15.3	Fume	

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17. Attachment 1 – Risk Assessment... (Cont'd)

REF.	PARTICULARS	RESPONSE
15.4	Emissions	
15.5	Mist	
15.6	Liquid	
15.7	Solids	
16.	Are the hazardous substances controls compatible with normal operational requirements?	
17.	Is a Safety Data Sheet for all hazardous substances provided?	
18.	What are the expected hazardous changes/by-products associated with the deterioration of a substance?	
19.	Is there any possible contact with energised components?	
20.	What are the levels of radiation emitted?	
21.	When in service, are any normally accessible areas hot/cold enough to be a hazard?	
22.	Are there any biological hazards?	
23.	Are there any mechanical hazards (e.g. nip in points, exposed moving components)?	
24.	Are mechanical hazards appropriately controlled (e.g. guarding, lock-outs)?	
25.	Are load limits established and clearly identified?	
26.	Are gauges clearly visible and easily interpreted?	
27.	Are control movements consistent with established Australian conventions (e.g. switch "UP" position is "OFF")?	
28.	What is the degree of whole body or hand/arm vibration? (Hz)	
29.	Are projectiles generated?	
30.	Are special tools required/identified/supplied?	
29.	What are the hazards associated with equipment failure?	

SIGNATURE OF TENDERER: _____

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18. Attachment 2 – Supplier Details

Supplier's Name and Address	
Name and Address of Sub supplier	
Details of hot dip galvanization	
Corrosion Protection Treatment Offered	

SIGNATURE OF TENDERER: _____

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19. Attachment 3 – 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	
5.2 & 5.3	Operation and mounting details	
5.1.6	Poles with uniform taper and aesthetic looks	
5.8	Corrosion protection	
5.9	Vibration and impact	
5.11	Corona and Radio Interference reduction measures	
6.1	Type test certificates for items already tested	
6.2	Availability of routine test certificates when required	
7.0	Completed risk assessment- Attachment “2”	
8.1	Quality system manual to be used in performing this Contract and Evidence that the Supplier satisfies the Quality Certification requirements of ISO 9001	
9.1 & 9.2	Samples submitted	
11.0	Service performance history	
12.2	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: _____