



Ergon Energy Corporation Limited

**Technical Specification for 12kV,
24kV AND 36kV Unitised Ganged
Airbreak Switches**

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Technical Specification for 12kV, 24kV and 36kV Unitised Ganged Airbreak Switches



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1. Purpose and Scope

This specification sets out the technical requirements for three phase, horizontal side break, pole mounted unitised, ganged air-break switches suitable for both pole top and mid pole mounting on overhead electricity distribution systems in a totally exposed environment. Air-break switches are used for isolation as well as limited or full-load switching of overhead network.

2. References

2.1 Applicable Standards

The air-break switches 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.

STANDARD	TITLE
AS /NZS 60265.1	High-voltage switches - Switches for rated voltages above 1 kV and less than 52 kV
AS 1111	ISO metric hexagon commercial bolts and screws
AS 1112	ISO metric hexagon nuts
AS 1154	Insulator and conductor fittings for overhead power lines
AS 1214	Hot-dip galvanised coatings on threaded fasteners (ISO metric coarse thread series)
AS 1275	Metric screw threads for fasteners
AS 1444	Wrought alloy steels - Standard and hardenability (H) series and hardened and tempered to designated mechanical properties
AS 1824	Insulation co-ordination (phase-to-earth and phase-to phase, above 1kV)
AS 1856	Electroplated coatings - Silver
AS 2650	Common specifications for high-voltage switchgear and controlgear standards
AS 2837	Wrought alloy steels - Stainless steel bars and semi-finished products
AS 4169	Electroplated coatings - Tin and tin alloys
AS 4398	Insulators- Ceramic or glass- Station post for indoor and outdoor use - Voltages greater than 1000V a.c.
AS 4435	Insulators – Composite for overhead power lines – Voltages greater than 1000V a.c.
AS 4680	Hot-dip galvanised (zinc) coatings on fabricated ferrous articles
AS/NZS 4360	Risk Management
AS/NZS ISO 9001	Quality management systems - Requirements

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3. Drawings

3.1 Drawings by the Purchaser

The following drawings are attached to and form part of this specification.

DRAWING NUMBER	TITLE
Figure 1	Pole Mounted ABS - General Arrangement
Figure 2	ABS Operating Mechanism - General Arrangement
Figure 3	Palm Lugs – General Arrangement

4. Service Conditions

The air-break switches 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 of 2.0 - 3.0 g/m ² .

5. Design and Construction

Design and construction performance parameters are detailed in this section.

5.1 General

The switch shall be of “unitised” construction i.e. supplied completely assembled except for the pole bracket, downrod and operating handle assemblies.

The switch shall be designate as class M1 mechanical endurance requiring mechanical operation tests of 1000 operating cycles as per AS 60265.1 Clause 6.102.2.

5.2 Switch Material

All components of the switch (excluding porcelains, pole mounting bracket, downrod and operating handle / mid pole / crossarm mounted actuator), shall be non-corroding materials and shall not include galvanised ferrous metals unless approved by the responsible Engineering Officer.

Timber is **NOT** acceptable for any part of the air-break switch.

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5.3 Electrical Ratings

Air-break switches shall comply with the relevant requirements of AS 2650 and AS 60265.1 and shall have the following ratings under the service conditions detailed in clause 4 above.

PARTICULARS		Limited Purpose		General Purpose	
		1	2	3	4
	ITEM				
Nominal System voltage	(kV)	11	22/33	11	22/33
Rated Voltage of Switch	(kV)	12	24/36	12	24/36
Rated Frequency	(Hz)	50	50	50	50
Continuous Operating Current	(A)	630	24kV 36kV 630 400	630	24kV 36kV 630 400
Short Time (1 sec) Withstand Current	(kA)	20	16	20	16
Peak Withstand Current	(kA)	50	40	50	40
Insulation Level (Outdoor Service)*					
(a) to earth & between phases	(kV)	150	200	150	200
(b) across isolating distances	(kV)	170	230	170	230
Phase Separation	(mm)	As per Figure 2 of Attachment 4			
Phase to Phase Air Clearance	(mm)	280	380	280	380
Minimum (Open Switch, top or mid pole mounting)**					
Insulator Characteristics:					
Minimum Wet Power Frequency Withstand Voltage	kV	50	70	50	70
Minimum Creepage Distance	(mm)	660	950	660	950
Min Rated Switching Capacity (Breaking):					
Mainly Active Load (approx 0.7 p.f.)	(A)	15	10	630	24kV 36kV 630 400
10% System Voltage Closed Loop Breaking Current	(A)	60	60	630	24kV 36kV 630 400
Line Charging Current	(A)	10	10	10	10
No-load Transformer Breaking Current	(A)	12	12	12	12
Min Rated Switching Capacity (Making):					
Mainly Active Load (approx 0.7 p.f.)	(A)	60	60	630	24kV 36kV 630 400
10% System Voltage Closed Loop Making Current	(A)	60	60	630	24kV 36kV 630 400
Line Charging Current	(A)	10	10	10	10
No-load Transformer Making Current	(A)	12	12	12	12

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*B.I.L for the insulators has been increased to compensate for the use of a conductive support arm. Lower values of B.I.L. will be considered for units with a non-conductive support arm.

**Phase to phase air clearances and insulator characteristics are based on the B.I.L. for 22kV and 36kV systems.

5.4 Mounting

- 5.4.1 Each switch shall be suitable for both pole top and mid pole mounting without any adjustments in the field (i.e. adjustment of centre phase).
- 5.4.2 When mounted at the pole top, the switch shall be in the horizontal position using a bracket attached to the side of the pole. (Not in line with conductors.) The bolt holes centres (normal & slotted in the bracket) shall be 100mm, 175mm and 400mm measured from the top of the pole. The bracket shall also be suitable for attaching to concrete poles using 2 x 20mm "Band-it" straps.
- 5.4.3 When mounted at the mid pole position, the switch shall use the same bracket as the pole top mounting switch. The switch shall be in the horizontal position and the diameter of the pole at the mounting position is nominally 350mm. The bracket shall also be suitable for attaching to concrete poles using 2 x 20mm "Band-it" straps.

5.5 Insulators

The insulator shall be a single piece, fully vitrified non-puncturable porcelain with cap type end fittings in accordance with AS 4398. Sulphur cement will not be accepted as the bonding agent between the cap end fittings and porcelain. The preferred colour is munsel grey in accordance with AS 2700.

The insulator shall be of adequate mechanical strength class to withstand the loads applied during the opening and closing cycles. The torsion strength of the insulator shall not be less than the minimum values specified in Table IV of AS 4398.1.

The manufacturer shall state the design features including the mechanical rating of the insulators and testing undertaken to meet these requirements.

Composite insulators in accordance with AS 4435 may be considered provided full details including service performance, resistance to wildlife attacks, etc. are submitted with the tender.

Each insulator shall be indelibly marked with the supplier name, date of manufacture and mechanical strengths for traceability.

For all insulators offered the Tenderer shall provide the name of the manufacturer, country of origin and independent test reports as per **Attachment 1**.

5.6 Support Arm and Interphase Coupling Rod

The support arm and interphase coupling rod shall use durable, corrosion resistant, low maintenance material with no shrinkage characteristics. Timber is NOT acceptable. The interphase coupling rod shall be adequately rated to withstand the mechanical forces during operation.

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Any fibreglass material must be covered by an anti-tracking material, details of which must be provided with the submission. Details of protection of material against pollution and corrosive environments are to be provided, including details of testing undertaken.

5.7 Mass of Unit

The nominal mass of the limited purpose 12kV and 24/36kV switches excluding handle and downrod equipment, shall preferably be not greater than 75kg and 100kg respectively. Manufacturer to provide details of weight.

5.8 Operating Equipment

The operation of the switch shall be achieved by the rotational movement of the operating handle in the horizontal plane or by means of a mid-pole or crossarm mounted actuator operated on the vertical plane.

Means shall be provided on individual phases to prevent over travel of the switch blade contacts. The primary stopping mechanism shall be easily adjustable and located in an accessible position.

The successful Tenderer shall work with the Purchaser in incorporating an operations counter to the air-break switch within 12 months of awarding the contract. If a suitable design is available this shall be included with the tender documentation for consideration.

5.8.1 Rotational Operating Handle Type

5.8.1.1 Downrod

The downrod shall consist of an upper section supplied by the manufacturer and a lower section supplied by the purchaser.

The upper section of the downrod shall be of a durable material with a minimum overall length of 3.2 metres from the switch to the point of connection to the lower section of the downrod. The lower section shall be 32mm nominal bore galvanised water pipe supplied by the purchaser.

The upper section of the downrod shall contain a HV insulated section. In order to achieve appropriate safe working clearances, irrespective of the mounting position of the switch (mid pole or pole top), the top of the HV insulated section shall be 975mm below the universal coupling (specified below) connecting the downrod to the switch. Further a 0.6/1kV insulated section of minimum length 300mm shall be provided at the connection to the lower section of the downrod supplied by the purchaser. Timber is not acceptable for the down rod HV or LV insulation. The HV insulated section of the downrod shall have the minimum lightning impulse and power frequency wet withstand voltage characteristics as detailed in Clause 5.3. **Type test reports to prove compliance with this requirement shall be included with the tender submission.**

The supplier shall provide full details of the downrod insulation offered and comment on the environmental soundness of all insulating materials. **Details of protection of material against pollution and ultra violet radiation are to be provided, including details of testing undertaken.**

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Connection of the downrod to the switch shall incorporate universal couplings i.e. couplings which allow freedom of movement in ALL directions. **Details of the connections and couplings shall be provided with the offer.**

Torsional downrod assembly including couplings shall be capable of withstanding a maximum torque of 500Nm.

5.8.1.2 Downrod Guide

Each switch shall be supplied complete with one downrod guide which shall allow for attachment to the pole using M16 x 100 mm coachscrews or by 2 x 13mm "Band-it" straps for concrete poles. The design of the guide shall allow attachment to the pole with the down rod in the final position. The coachscrews are to be supplied with the switch.

5.8.1.3 Operating Handle

The bracket for the operating handle shall be capable of being mounted to the pole using M16 x 100 mm coachscrews and/or 2 x 13 "band-it" straps for concrete poles. The coachscrews are to be supplied with the switch.

The operating handle assembly shall not protrude more than 90mm from the face of the pole. The assembly shall be free of protruding edges which may cause injury.

5.8.1.4 Earthing

An M12 earth stud protruding 35mm from the handle mounting bracket shall be provided to allow the connection of a compression lug suitable for up to 50mm sq copper cable. The lug shall be capable of being removed using open ended spanners with the switch in both the open and closed positions.

The manufacturer shall provide an effective earthing connection between the downrod pipe, the operating handle and its mounting bracket.

5.8.1.5 Locks

Means shall be provided in the operating handle assembly for locking the ganged switch in either the open or closed position using a padlock. The holes shall have a nominal diameter of 15mm to accommodate a Lockwood 234AB series padlock or equivalent.

Suppliers are requested to provide details on the availability of a suitable means to prevent the hasp of the lock being cut by vandals.

5.8.1.6 Operating Mechanism

Suppliers are requested to provide details on the availability of a suitable mechanism that allows the speed of the operation of the switch to be independent of the operator.

5.8.2 Mid-Pole or Crossarm Mounted Actuator

The actuator shall enable the operation of the switch using a standard hook stick. The operating mechanism shall be spring assisted allowing the speed of the operation of the switch to be independent of the operator.

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An adequately rated insulator shall be provided on the mid pole actuator coupling rod if the metallic components of the actuator assembly comes within 700mm of the LV circuit which is typically located 2000mm below the HV circuit on the ABS structure.

A minimum clearance of 280mm from the live mains shall be maintained for the 12kV switch with a crossarm mounted actuator. For the 24kV / 36kV switches the minimum clearance shall be 380mm.

The actuator mechanism shall be lockable at either on the "OPEN" position and the "CLOSE" position using a standard hook stick. An interlocking device shall be fitted to the up/down lever preventing the switch from opening or closing unless the interlock is in the "unlocked" position.

Details of the actuator and couplings shall be provided with the offer.

5.9 Contacts

5.9.1 General

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 for a service life of 35 years.

Contacts shall be of the self-aligning type. **The material used in both fixed and moving contacts is to be stated in the offer.**

If "button" contacts are used, the method of attachment of the button is to be specified and any special provision to safeguard against in-service detachment of the button from its mounting is to be detailed.

5.9.2 Switching Attachments

- a) Each limited purpose switch shall be supplied complete with flicker blades and load make contacts and shall be capable of meeting the switching duties specified in clause 5.3. The switch shall be capable of being converted to general purpose duty by the replacement of detachable flicker blades with load-break expulsion interrupters and if necessary changing of load make contacts. Preference will be given to switches that can be modified to general purpose duty using glove and barrier live line techniques.
- b) Each general purpose switch shall be supplied complete with load-break expulsion interrupters fitted. Full details of the load break devices offered including the method of changing them in service shall be submitted with the tender. Preference will be given to switches which support the changing of load break devices using glove and barrier live line techniques.

The load-break devices shall be capable of making and breaking of load currents of up to 630 amps (12 and 24kV) and 400 amps (36kV) with full recovery voltage across the switch and interrupting and making transformer magnetising and line charging currents as specified in Clause 5.3.

Details of the operating characteristics of the load-break device i.e. a graph of "Switching Current" Vs "Number of Interruptions" shall be provided with the offer.

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5.10 Terminal Connections

- 5.10.1 Terminal palms of 4.5mm minimum thickness shall be provide on both the supply and load side of the switch and shall provide for a lug connection using a single M12 bolt.
- 5.10.2 M12 x 40mm stainless steel bolts and nuts shall be provided on both the supply and load side terminal palms and shall be fitted with stainless steel belleville or spring washers so as to provide positive locking pressure at all times when tightened.
- 5.10.3 The connections shall be designed for use with aluminium or copper conductors and to minimise the effects of electrolytic corrosion of dissimilar metals.

5.11 Hardware

- 5.11.1 All nuts, bolts and washers associated with each phase assembly and the interphase coupling rod 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.
- 5.11.2 The bolts and nuts shall be threaded in accordance with AS 1111 and AS 1112 respectively. The resulting thread form shall conform to the commercial quality recommended in AS 1275.

5.12 Corrosion Protection

- 5.12.1 All support brackets and other ferrous parts of the units other than stainless steel shall be galvanised in accordance with AS 4680.
- 5.12.2 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 in accordance with AS 4169.
- 5.12.3 Galvanised Steel or Aluminium is acceptable for the support arm and interphase coupling rod provided that additional corrosion protection measures are taken. e.g. powder coating or painting.
- 5.12.4 Corrosion of the ABS insulator metal hardware and consequent failure of the insulators has been a major cause of ABS failures. **Tenderers are requested to submit full details of corrosion prevention features incorporated in the products offered to ensure a service life of 35 years under the specified conditions.**

5.13 Bird/Fauna/Vermin Proofing

The switch 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.

5.14 Corona

Precautions shall be taken to avoid corona by ensuring there are no sharp edges, points, or loose metal fittings on the switch where these parts will be energised.

5.15 Marking

Each switch shall be clearly and durably marked in accordance with AS 60265.1 Clause 5.10. Individual air-break switch shall be provided with serial number to allow traceability. Serial number shall be provided on both the switch unit and operating device. Additionally, the Purchaser's structured plant number (SPN) shall be marked on the switch unit and the operating device. The structured plant numbers will be nominated in the purchase orders to

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the successful Tenderer. The SPN will be an eight digit number prefixed by two alpha characters.

Flicker blades and the underside of the switch blades shall be marked with fluorescent tape to distinguish between the open and closed position at night.

5.16 Lifting

Lifting lugs or any other means to prevent sling slippage during lifting shall be provided. The location of the lifting points shall ensure that during the lifting operation by a crane or EWP, the switch shall remain in its final orientation with respect to the mounting bracket.

5.17 Positioning of Switch onto Pole Bracket

A positive location mechanism shall be provided so that the switch is always mounted in the same position on the mounting bracket i.e. to assist with installation where it is required to align holes for a bolted connection, a locating mechanism shall be provided. Further, the position of the pole relative to the switch shall be indicated on the switch support arm.

6. Performance and Testing

6.1 Type Tests

Test reports on the type tests in accordance with Clause 6 of AS 60265.1 for both limited and general purpose switches shall be provided with the offer. Type test report for the insulators and HV downrod insulation shall also be provided with the offer.

6.2 Routine Tests

Routine Test certificates shall be conducted in accordance with Clause 7 of AS 60265.1. Mechanical endurance test to class M1 shall be required on 2% of the switches delivered. Copies of the test certificates shall be forwarded to the Purchaser via electronic mail to: inventory.nameplatedata@ergon.com.au

All test certificates shall include the manufacturer's serial number, the Purchaser's structured plant number, the order number, contract/item number and specification number. The test certificates shall also be accompanied with a completed **Attachment 5** returned electronically as a MS Excel document.

The Purchaser reserves the right to witness all tests and to select the samples for routine testing. The Tenderer shall confirm two weeks in advance his intention to commence routine testing of air break switches.

6.3 Batch Test on Insulators

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

7. Risk Assessment

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).

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7.1 Formal Risk Assessment

Offered items shall be subjected to a formal risk assessment prior to acceptance. **It is preferred that the suppliers perform the risk assessment themselves and provide the resultant documentation with their offer.** Where risk assessment documentation is not provided with the offers, or does not meet the required standard, such offers shall have their price loaded with the estimated costs associated with the Purchaser conducting the assessments. Any documented risk assessment which accompanies the offer must meet the requirements of AS/NZS 4360 Risk Management as a minimum standard. It is preferred that the risk assessment methodology uses an energy model to identify hazards.

7.2 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.
- The “Risk Assessment” schedule in **Attachment 2** of this specification is to be completed by the Supplier and returned with the offer. Note the schedule contains a generic set of questions designed to cover all the purchaser’s plant and materials and the supplier is only required to complete those items applicable to the product offered.

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.

9. Samples

9.1 Production Samples

When requested, production samples of each item shall be submitted for evaluation of the offer. The samples must be delivered within one (1) week of the request.

10. Packaging and Marking

10.1 General

Each switch shall be supplied assembled on the support arm with interphase coupling rod but without the downrod and handle attached.

Crates shall contain individual switches and ancillary equipment together with assembly instructions.

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Crates must be sufficiently sturdy to allow for handling and transportation to the purchaser and storage at the purchaser's warehouse.

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, Contract Number, Ergon Item Identification Number and the structured plant number.
- d) Gross Mass of crate and contents
- 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

Potential first time Suppliers to the Purchaser shall state:

- The period of service achieved by the 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

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- Storage
- Application (particularly in areas of heavy coastal pollution)
- Installation
- Maintenance program
- 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.

15. Information to be Provided

15.1 Specific Technical Requirements

The tenderers are required to complete and return the following schedules with their offers.

- **Attachment 1** - Schedule of the technical details
- **Attachment 2** - Risk assessment schedule

15.2 Documentation to be supplied on commencement of contract

Electronic drawings of each item to be supplied in Autocad format.

15.3 Documentation to be Supplied During the Course of the Contract

Test certificates as required in Clause 6.

15.4 Checklist of Supporting Documentation

- **Attachment 3** - Checklist of supporting technical documentation.

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16. Attachment 1 – Technical Details

This schedule shall be completed and submitted with the offer. Separate schedules shall be provided for each voltage range.

Name of Manufacturer:	
Address of Manufacturer:	
Place of Manufacture:	
Manufacturer's Catalogue Number and Drawing Numbers (2 copies to be supplied):	
Will batch test certificates be supplied for the insulators?	YES/NO
Rated Voltage: (kV)	
Rated Continuous Current (A)	
Rated Load Switching Capacity:	
a) Making (A/pf)	
b) Breaking (A/pf)	
Rated Symmetrical short circuit making current (kA)	
Line Charging Current (A)	
No-load transformer breaking current (A)	
Mainly Active Load (approx 0.7 p.f.) (A)	
Material of Current Carrying Parts	
Details of Plating on Current Carrying Parts:	
a) Plating Material	
b) Thickness of Plating (mm)	
Details of Plating on Contact Surfaces:	
a) Plating Material	
b) Thickness of Plating (mm)	
Moving Contact Material	
Details of Plating on Moving Contact Surfaces:	
a) Plating Material	
b) Thickness of Plating (mm)	
Fixed Contact Material:	
Details of Plating on Fixed Contact Surfaces:	
a) Plating Material	
b) Thickness of Plating (mm)	
Method of Attachment of Button Contacts	
Total Mass of Switch (kg)	

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

Switch Insulation Co-ordination:	
Rated Lightning Impulse Withstand Voltage between phases (kV)	
Rated Lightning Impulse Withstand Voltage across the isolating distance (kV)	
Critical Flashover Voltage between phases in air in the open position (kV)	
Critical Flashover Voltage between phases in path of support insulator/base/support insulator in the open position (kV)	
Critical Flashover Voltage across isolating distance in the open position (kV)	
Rated One-Minute Power Frequency Wet Withstand Voltage between phases (kVrms)	
Rated One-Minute Power Frequency Wet Withstand Voltage across isolating distance (kVrms)	
Insulators:	
Name of Manufacturer:	
Place of Manufacture:	
Catalogue Reference Number:	
Type of bonding material used for bonding metal end caps to porcelain insulator	
Rated cantilever strength of insulator (kN)	
Rated torsional strength of insulator (kN.m)	
Power Frequency Wet Flashover Voltage (kVrms)	
Impulse Withstand Voltage (kV)	
Nominal Creepage Distance (mm)	
Dry Arcing Distance (mm)	
Will Batch Test Certificates be supplied?	YES/NO
Switch Support:	
a) Support Arm Material	
b) Details of Pollution and Corrosion Resistance	
Downrod:	
a) Downrod Material	
b) Details of Pollution and Corrosion Resistance	
c) Details of the Downrod HV Insulation Insert	
d) Rated One-Minute Power Frequency Wet Withstand Voltage of Downrod HV Insulation (kVrms)	
Force Required to Operate the Switch:	
a) Rotational movement of operating handle (N)	
b) Vertical movement of mid pole mounted actuator (N)	
c) Vertical movement of crossarm mounted actuator (N)	

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

Bird/Fauna/Vermin Proofing:	
Design features incorporated:	
Lubricants Used:	
Lubricant used on electrical contacts	
Lubricant used on stainless steel bolts/nuts	
Lubricant used on moving parts	
Load Break Expulsion Interrupters:	
Name of Manufacturer:	
Place of Manufacture:	
Catalogue Reference Number	

SIGNATURE OF TENDERER: _____

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18. Attachment 2 – Risk Assessment

This schedule details the risk assessment parameters to be provided by the Tenderer for items covered by this specification. This schedule shall be completed and submitted with the offer.

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

REF.	PARTICULARS	RESPONSE
1.	Have Risk Assessments been carried out on equipment tendered which meet the requirements of AS 4360 (Yes/No)	
2.	Have copies of such risk assessments been included with the tender (Yes/No)	
3.	What is the weight of the components to be moved (for example – cable box covers/drawout circuit breaker trucks)?	
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) (eg. 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 surface have adequate fall protection (eg. 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?	

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19. Attachment 2 – Risk Assessment ...(Cont'd)

REF.	PARTICULARS	RESPONSE
14.	What are the sound pressure levels (expressed in dB(A))?	
15.	What hazardous substances are used/produces (including after failure) such as:	
15.1	Dust	
15.2	Gas	
15.3	Fume	
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 (eg. Nip in points, exposed moving components)?	
24.	Are mechanical hazards appropriately controlled (eg. guarding, lockouts)?	
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 (eg 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?	
31.	What are the hazards associated with equipment failure?	

SIGNATURE OF TENDERER: _____

Technical Specification for 12kV, 24kV and 36kV Unitised Ganged Airbreak Switches



20. Attachment 3 – Technical Document Checklist

This schedule detail parameters referred to within the body of the specification for which a response by suppliers is requested. This schedule shall be completed and submitted with the offer.

PARTICULARS	CLAUSE	ANSWER (Yes/No)
Design features including Mechanical rating of insulators.	5.5	
Details of protection of fibreglass material for anti tracking and against pollution and corrosive environments, including details of testing undertaken.	5.6	
Details of operations counter available	5.8	
Down rod insulator and universal coupling & connection details	5.8.1.1	
Details of operating mechanism allowing the speed of operation of the ABS to be independent of the operator (if available)	5.8.1.6	
Details of the mid pole / crossarm mounted actuator and couplings included with the offer	5.8.2	
Material used in fixed and moving contacts and details of attachments and any special provision to safeguard against in-service detachment of any button contacts.	5.9.1	
Load break device operating characteristics.	5.9.2	
Details of corrosion protection features incorporated in the insulator/insulator cap assembly	5.12.4	
Type test reports included with offer.	6.1	
Risk Assessment (Attachment 2 completed)	7	
Documentary evidence of Q A Certification for both manufacturer and supplier.	8.2	
Service History Details	11	
Comments on reliability and performance	12	
Provide maintenance program of the switch	13	
Comments on Environmental Soundness.	14	
2 Copies of Drawings	Attachment 1	
Attachment 1 completed	15	

NAME OF TENDERER:

ADDRESS OF TENDERER: _____

SIGNATURE: _____ FOR AND ON BEHALF OF TENDERER

DATE: _____

Technical Specification for 12kV, 24kV and 36kV Unitised Ganged Airbreak Switches



21. Attachment 4 – Drawings

* Refer to attachment 'D' figure 2 for phase centers.

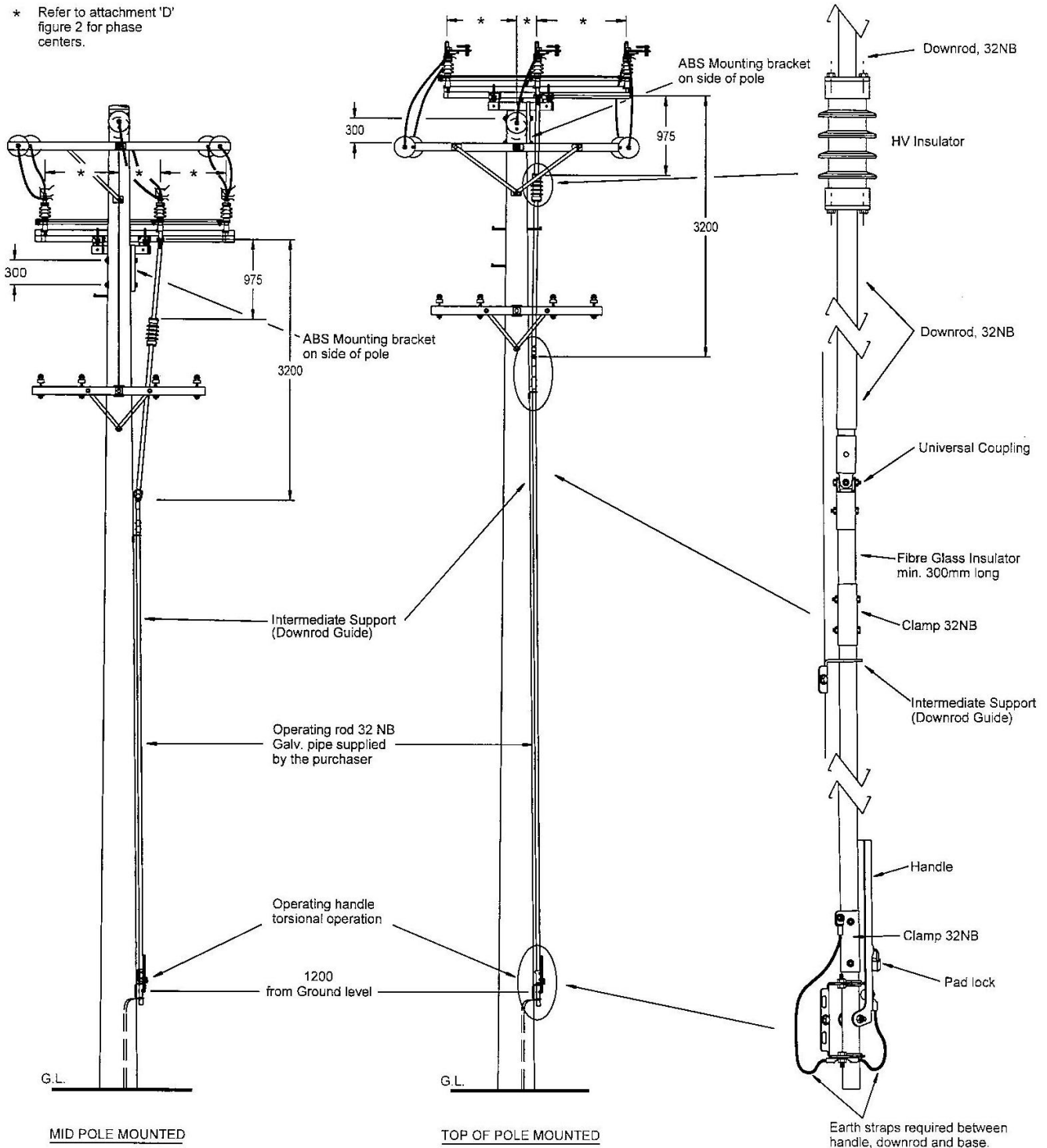


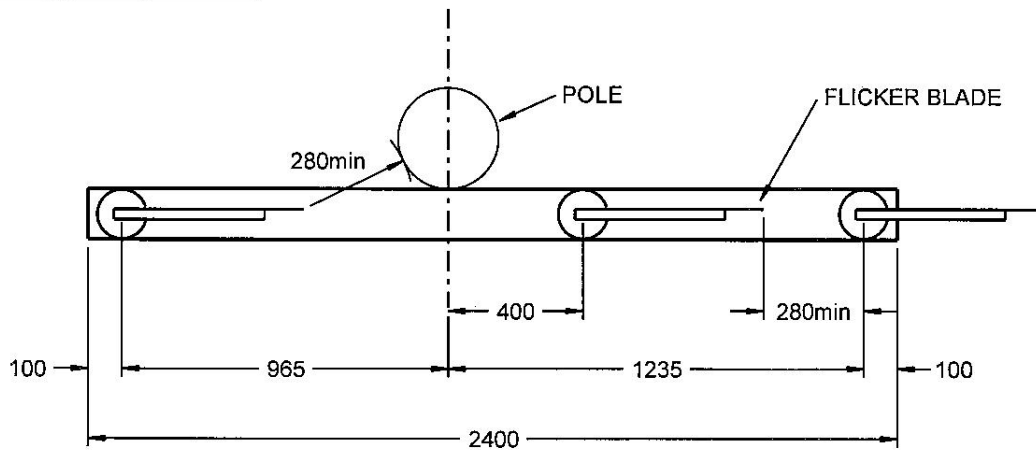
FIGURE 1. AIR-BREAK SWITCH - GENERAL ARRANGEMENT

Technical Specification for 12kV, 24kV and 36kV Unitised Ganged Airbreak Switches



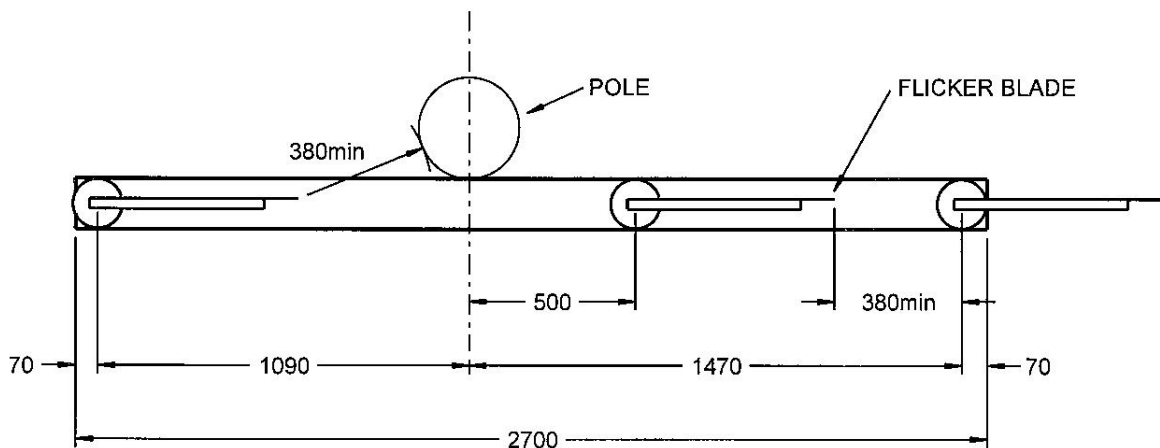
22. Attachment 4 – Drawings...(Cont'd)

Main structure/conductor minimum clearance:-
150kV B.I.L. - 280mm



11kV ABS

Main structure/conductor minimum clearance:-
200kV B.I.L. - 380mm



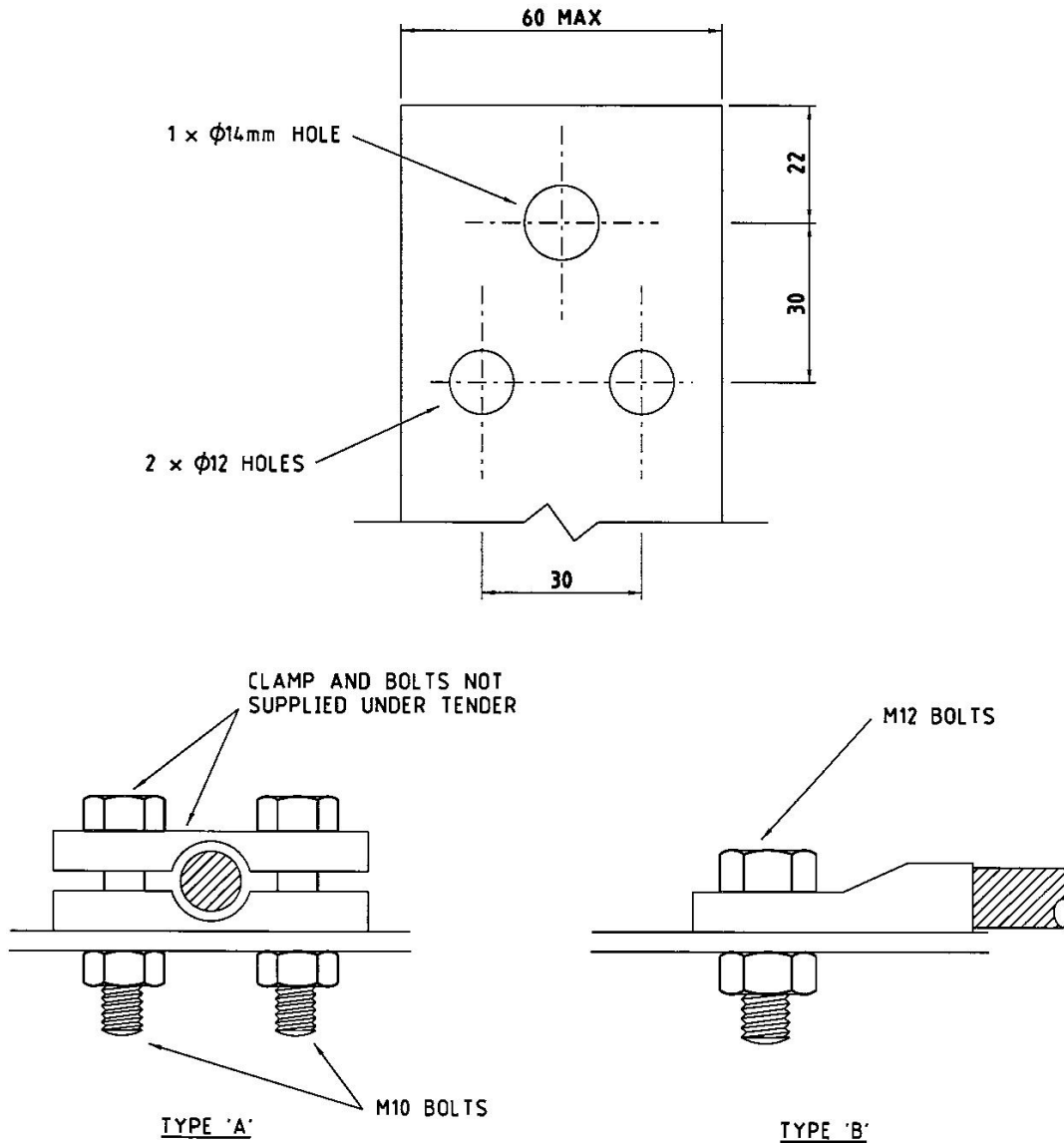
22/33kV ABS

FIGURE 2. AIR-BREAK SWITCH CLEARANCES

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23. Attachment 4 – Drawings...(Cont'd)



RATING:	630A
TOLERANCE:	+/-1,0mm unless otherwise shown
MATERIAL:	Palm thickness to be 4,5mm minimum
PROTECTIVE CLOTHING:	Palm surface to be electrolytically bright tin plate

FIGURE 3. PALM LUG - GENERAL ARRANGEMENT

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24. Attachment 5 – Nameplate Details

IIN / Stockcode					
Ergon Energy Structured Plant Number (Available from Purchase Order):					
RATED CURRENT (A)	AMPS-RATED				
CONTRACT NO	CONTRACT-NO				
MANUFACTURER OF SWITCH	MAKE-SWITCH				
MODEL NO	MODEL				
SERIAL NUMBER	SERIAL_NUMBER				
TYPE OF ARC BREAK (ABS)	SW-ARC-BRK				
RATED VOLTAGE (kV)	VOLT-RATED				
YEAR OF MANUFACTURE (dd/mm/yyyy)	YOM				
LIGHT IMPULSE WITHSTAND (KVP)	LIGHT-IMPULS				
SWITCH UNITISED FLAG (Y/N)	SW-UNITISED				