

Equipment Technical Specification

24kV outdoor air break switches

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EQUIPMENT TECHNICAL SPECIFICATION

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ETS 0076 - 24kV outdoor air break switches

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1.0 PURPOSE

To set out in detail the minimum requirements for the selection of 24kV outdoor air break switches for use in Endeavour Energy's 11kV and 22kV distribution network.

2.0 SCOPE

The scope of work consists of the design, manufacture and testing at the manufacturer's works, and delivery of the 24kV air break switches. It is intended that a switch with the same specification be used on both the 11kV and 22kV distribution systems.

It is not the intention to specify the manufacturing, testing and material requirements in detail. However, the switches shall be manufactured to the highest quality standards. The scope includes all items that are necessary for the operation of the equipment, whether specified or not, and includes all mounting, operating and locking facilities specified in this document.

This specification also includes, as an option, the supply and assembly of load break devices.

All supplied outdoor air break switches and associated equipment shall be manufactured and tested to the standards with the year of publication listed in 3.0 below. In some circumstances based on local network conditions and experience, this specification is more stringent or is inclusive of requirement not covered in Australian and International standards; in this circumstance the requirements of this specification shall take precedence.

The tenderer shall state any non-compliance with the specification in the tender submission and any alternative offers should be submitted in full and separately from the main offer. Any proposed variations from this specification shall be referred to Network Substations Manager for approval prior to acceptance.

3.0 REFERENCES

Internal

- Company Policy 9.2.5 - Network Asset Design
- Company Policy 9.2.10 - Network Asset Ratings
- Company Policy 9.7.1 - Network Asset Construction
- Company Policy 9.8.3 - Network Operations
- Company Policy 9.9.1 - Network Asset Maintenance
- Company Procedure GRM 0003 – Risk Management
- Company Procedure GSY 0026 – Work Health and Safety Risk Assessment
- Company Form FSY 0138 – Risk Register
- Network Management Plan December 2013 Review
- Earthing Design Instruction EDI 100 – Distribution earthing design, construction and test
- Environmental Management Standards EMS 0001 – Environmental impact assessment and environmental management plans
- Mains Construction Instruction MCI 0005 - Overhead distribution construction standards manual
- Mains Design Instruction MDI 0026 – Location of isolation points on the high voltage distribution network
- Substation Design Instruction SDI 120 – Testing and commissioning of distribution systems
- Substation Maintenance Instruction SMI 101 - Minimum requirements for maintenance of distribution equipment
- Branch Form FAE 3091 - 1kV/22kV Air Break Switch Product Approval Form

- Branch Procedure NCB 4187 (System Operations) - Operation of 11kV/22kV air break switches, underslung links and drop out fuses
- Drawing no. 332071 - Air break switch critical dimensions and loading requirements

External

- AS ISO *Electricity Supply Act 1995* (as amended)
- *Work Health and Safety Act 2011 (NSW)*
- ENA Cross-Arm Supply and Performance Specification (Doc 012-2006)
- ENA Doc 001-2008 National Electricity Network Safety Code
- ENA Doc 007-2006 - Specifications for Polemounting distribution transformers
- AS1000 - 1998 The international system of units (SI) and its application
- AS 1110.1:2000 - ISO metric hexagon bolts and screws – Product grades A & B – Bolts
- AS 1110.2:2000 - ISO metric hexagon bolts and screws – Product grades A & B – Screws
- AS 1824.2:1985 - Insulation coordination (phase to earth and phase to phase, above 1kv) – Application guide
- AS 1856:2004 - Electroplated coatings – Silver
- AS/NZS 2344:1997 - Limits of electromagnetic interference from overhead a.c. powerlines and high voltage equipment installations in the frequency range 0.15 to 1000MHz
- AS 3679.1:2010 - Structural steel - Hot rolled bars and sections
- AS 4435.1:1996 – Insulators – Composite for overhead lines-Voltage greater than 1000V ac.
- AS 62217:2007 - Polymeric insulators for indoor and outdoor use with a nominal voltage > 1000 V – General definitions, test methods and acceptance criteria
- AS 62271.1:2012 – High voltage switchgear and controlgear Part 1: Common specifications
- AS 62271.301-2005 High voltage switchgear and controlgear – Dimensional standardization of terminals
- AS 62231:2007 Composite station post insulators for substations with a.c. voltages greater than 1000V up to 245kV – Definitions, test methods and acceptance criteria
- AS/NZS 1554.1:2014 Structural steel welding – welding of steel structures
- AS/NZS 4673:2001 Cold-formed stainless steel structures
- AS/NZS 4680:2006 Hot dip galvanized (zinc) coatings on fabricated ferrous articles
- AS/NZS 60137:2008 Insulated bushings for alternating voltages above 1000V
- AS/NZS 60265.1-2001 High voltage switches - Switches for rated voltages above 1 kV and less than 52kv(IEC 60265-1:1998, MOD)
- AS/NZS 7000:2010 Overhead line design – Detailed procedures
- IEC 60093:1980 Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials

4.0 DEFINITIONS AND ABBREVIATIONS

ABS

air break switch

RMS

root mean square

UV

ultra violet

5.0 ACTIONS**5.1 Service conditions**

The switches shall be suitable for use on Endeavour Energy's 11kV and 22kV 3-phase 50Hz system. The neutral point of the 11kV and 22kV system is solidly earthed. The highest system voltages are 12kV and 24kV RMS respectively. The switch insulation shall be designed accordingly.

The equipment shall be designed for operation in the following conditions:

Service condition	Criteria
Altitude	<1000m
Maximum ambient temperature	45 deg. C
Minimum ambient temperature	-10 deg. C
Average annual lighting ground flash density	3 strikes per km ²
Solar radiation- maximum	1.1 kW/m ²
Average index of mean relative humidity: 9:00am	95%
Seismic acceleration coefficient (maximum)	0.09
Pollution level	Level IV in accordance with AS4436:1996
Wind speed	34m/s

All ratings and equipment shall be suitable for this environment.

All component parts shall be supplied and tested in accordance with the appropriate Australian Standard. All ferrous parts shall be treated to provide acceptable surface finish and protection. The manufacturer shall provide full details of the surface finishing and tests conducted on all component parts.

The insulation level shall be in accordance with the technical requirements stated and all components, including insulation, shall be fit for purpose for the life expectancy of the ABS, that is 45 years.

5.2 Health, safety and environment (HSE) requirements**5.2.1 Special environmental requirements - toxicology safety**

The supplier shall provide with the offer, full details, including composition and toxicological information, regarding the health and safety aspects of all the materials offered in their offer or supplied equipment regardless of content.

Recommended procedures shall be provided for the safe handling, safe operation and maintenance of products supplied. The means of disposal of the materials shall be clearly stated.

Material safety data sheets (MSDS) shall be provided for materials that are supplied and subject to safety considerations in handling and use.

All equipment, packaging and all other accessories provided shall be asbestos free.

The above information is required as part of the offer and will be reviewed as part of the tender process.

5.2.2 Fire and blast hazards

The ABS and its components shall be designed in a manner to reduce the risk of explosive failure and subsequent fire risk. All equipment must be designed so that there is no safety hazard to operating personnel.

5.3 Technical requirements

Description		24kV	
Applicable standards		AS/NZS 60265.1:2001	
Rated voltage	U_r	24 kV	
Highest system voltage		24 kV	
Rated frequency	f_r	50 Hz	
System earthing		Effective/non-effective earth	
Indoor/outdoor use		Outdoor	
No. of poles/phases		3	
		Switch alone	Switch + load break device
Rated current	I_r	630 A	630 A
Rated short circuit withstand current for 1 sec	I_k	16 kA	16 kA
Rated duration of short circuit	t_k	1 sec	1 sec
Rated peak withstand current	I_p	40 kA	40 kA
Rated mainly active load breaking current at 0.7 pf	I_1	10 A	630 A
Rated closed loop breaking current at 0.3 pf	I_{2a}	10 A	630 A
Rated no load transformer breaking current	I_3	10A	10A
Rated cable charging breaking current	I_{4a}	-	16 A
Rated line charging breaking current	I_{4b}	-	1.5 A
Rated short circuit making current	I_{ma}	-	40 kA
Power freq. withstand: ph-E across the open contacts		50kV for one (1) min 60kV for one (1) min	
Lightning impulse withstand: ph-E across the open contacts		125kVp 145kVp	
General purpose switch class		E1	
Mechanical endurance offload on/off operations		M1 (1000 operations)	
Minimum air gap between contacts in open position		255mm	
Current interrupting medium – switch		Air	

Description	24kV
Current interrupting medium – load break device	Air/vacuum
Insulation medium	Air
Operation	Manual
Insulators	Cycloaliphatic epoxy resin/silicone
Minimum nominal specific creepage distance	31mm/kV

5.4 Construction requirements

5.4.1 General

The air break switch is to be of a unitised construction on a 2400mm steel base. Wooden bases are **not** acceptable. Alternative bases will be considered upon submission.

The switch shall be suitable for single pole top or mid pole mounting.

Lifting eyes or other suitable means of adequate strength shall be provided to enable the switch to be lifted using a crane or a chain pulley block for erection on poles. The supply shall include all necessary crossarm and hardware needed to mount the switch on a timber or a concrete pole.

The switch shall be complete with the following:

- Crossarm.
- Separate phases.
- Phase to phase coupling rod.
- Mounting bracket.
- Manual operating handle/lever.
- Top down rod fabricated out of an insulating material such as fibreglass or equivalent (maximum pole length 14m).
- Intermediate support bracket(s)/guides, as required.
- Lockable operating handle or a manual operating lever located in a position that allows a two (2) step operation from the ground, using an appropriate operating stick.
- Hardware such as bolts, nuts, washers to complete the switch installation on timber or concrete poles. This does not include the hardware needed for mounting the switch on concrete or a timber pole.

The switch shall be suitable for outdoor mounting, either in the horizontal or vertical position, on a timber, concrete, steel or a composite pole. The switch construction shall be robust and shall be capable of satisfactory operation for a minimum of 40 years.

The switch shall be manually operated from the ground level, either from a manual operating handle or by using an insulated hook stick. The operation of the switch shall be smooth and shall not require undue effort on the part of the operator even after being kept in the open or closed position for a long time.

Refer to Drawing no. 332071 for critical dimensions and loading requirements of a typical air break switch.

5.4.2 Switch mechanism

The switch mechanism shall be either single or double break type. The three (3) poles of the switch shall be coupled together using an inter-phase coupling rod fabricated from fibreglass or steel.

Any insulated material used for coupling rods shall be UV stabilised, tested and certified.

The switch shall be fitted with stainless steel spring-loaded *flicker* arcing horns. Each phase shall be capable of individual adjustment to provide simultaneous closing of three phases.

An adjustable stop shall be provided in the closed position of the switch so that the moving blades do not *overshoot* the fixed contacts during the closing operation.

5.4.3 Mounting

The switch must be suitable for mid-pole or pole top mounting in either the horizontal or vertical position. A single unit that will suit both pole top and mid pole mounting is preferred. The phase separation dimensions for pole top mounting shall be 1000mm approximately, while for the mid pole mounting shall be 900mm.

The switch general arrangement, operating handle, hook stick operating lever, guides, crossarm drilling and other features shall be subject to approval.

When the switch is mounted horizontally it must be possible to attach the insulators or the long rod composite insulators of the overhead lines to the crossarms. This will be achieved either by using extension bars or rods that extend the attachment point of the insulators, level with, or greater than, the width of the switch. Effective means must be provided for easy adjustment to the switch to overcome the imperfections and irregularities in manufacturing including operating rod shrinkage over a period of time.

Provision must be made for tightening the base of each phase from below. Provision must also be made to prevent the phase bases from embedding into the crossarm.

All bolts and nuts used to mount phase channels to crossarms, crossarms to pole mounting bracket, and conductor attachments to crossarms, shall have a nut locking device fitted. All bolts, nuts and washers required are to be supplied by the manufacturer.

5.4.4 Cable connectors

A universal five (5)-hole terminal palm, suitable for aluminum or copper conductor sizes from 10sq mm minimum to 185sq mm maximum, is to be provided for cable connections. Terminal palms are to be electrical grade copper, bright tin electroplated to 20 microns thickness.

5.4.5 Locking

Where the switches are designed for operation from the ground level through an operating handle, provision shall be made for locking of the handle in the open position or closed position using a padlock with a 10mm diameter shank.

The distance between the handle pivot point and padlock should be the maximum obtainable to prevent shearing of the padlock by vandals.

5.4.6 Operating rods

The switches are to be supplied with a single top fibreglass down rod and intermediate support. The down rod shall be 50mm x 50mm in 3.3m long sections, between clevis pins. Provision shall be made to prevent the loosening of metal down rod fittings should the down rod show any tendency to split after a period in service.

The top end of the operating down rod must be capped to prevent deterioration due to weathering. The bearing surfaces of all pins used in linkage and drive connection must be clear of the threaded portions of the bolts.

The operating handle must be arranged so that the switch is opened with a downward movement and closed with an upward movement of the handle. The switch operating mechanism will be designed so that the operating handle operates in the same vertical plane as that containing the middle phase of the switch with the down rods substantially

vertical.

The design of the switch will allow for the down rod to be mounted on the side of the pole if required.

The operating rod (down rod) guides must provide for smooth and near vertical movement of the rod. The operating rod guides shall be suitable for mounting on either timber poles using 10mm diameter coach screws, or concrete poles using a single 19mm wide stainless steel *Band it* strap or similar.

5.4.7 Operating handles/levers

The switches shall be provided with one of the following mechanisms for operation of the switch. The requirements shall be specified by Endeavour Energy:

- Manual operating handle, for operation of the switch from ground level.
- Hook stick operating lever, for operation of the switch from ground level using an insulated hook stick.

The operating mechanisms, either ground level handles or hook stick operators mounted higher on the pole, must be suitable for mounting either to timber poles using 12mm diameter coach screws, or to concrete, steel and composite poles using two (2) 19mm wide stainless steel *Band it* straps or similar.

5.4.8 Manual operating handle

Where required/specified, the switch must be supplied with an operating handle for operation from the ground level.

Ground level operating handles must be isolated from the pole with insulators suitable for the full operating voltage (22kV) of the network.

The operating handle shall be provided with a flexible copper earthing conductor of minimum size 70sq mm to bridge between the operating handle and pole mounting bracket. Attachment of this earthing conductor shall be independent of any structural or mounting bolts and screws. The operating handle pole mounting steelwork shall have a 12mm diameter hole to provide connection to the separate main earth.

The operating handle, when fitted to the bottom down rod, shall be connected to the lower down rod with a length of 25NB galvanised pipe. This pipe shall be a minimum of 300mm longer than the operating handle so that all pipe fittings are clear of the operating handle travel.

The pipe and necessary down rod and handle fittings to accommodate the pipe is to be included. For security, all bolted connections between the operating handle and down rod will be fitted with a suitable lock nut.

The operating handle and insulators are to be mounted on a steel-mounting bracket and shall be supplied as a pre-assembled unit. Suitable means must be provided to mount the assembly on a timber pole using two (2) 12mm coach screws or, on a concrete, steel or a composite pole, using two (2) 19mm wide stainless steel *Band it* straps or similar.

5.4.9 Hook stick operating lever

Where required/specified, the switch shall be supplied with an operating lever for operation of the switch from ground level using an insulated hook stick. Facilities shall be provided to lock the operating mechanism/lever both in the *open position* and in the *closed position*.

It shall be possible to operate the locking device from the ground using an insulated hook stick. This locking device shall provide an operation to open or close the switch and be locked and unlocked with a suitable operating key. This is required to prevent a fraudulent/unauthorised operation.

Provision must be made to securely attach a danger tag/notice to the switch near the operating lever.

5.4.10 Insulators

The insulators shall be of cycloaliphatic epoxy resin or **silicone** suitable for outdoor use. Complete insulator details, such as a general arrangement drawing, electrical and mechanical characteristics, pollution performance and test certificates, must be submitted for approval. The insulator shall comply with the requirements of AS 62231:2007.

5.4.11 Contact arrangement

The switch moving contact shall be self-aligning and self-cleaning. Contact pressure shall be maintained by stainless steel springs secured in place by a threaded fastener.

This fastener shall be the means of providing adjustment to the spring tension and shall also act as a retainer to prevent the springs from dislodging during a through fault.

Full contact shall be maintained even when blades are up to 25mm from the fully closed position. The fixed contact shall be solid material suitably silver-plated. The silver plating shall not be less than 80 microns.

The hinge joints shall be fitted with silver contact rings or equivalent, with a suitable pressure device to compensate for wear during operation of the switch. No undue displacement of the connecting tail shall occur due to friction in the hinge joint.

5.4.12 Bolts and clamps

All ferrous nuts, bolts, washers and clamps used for any purpose other than for current carrying shall be hot dip galvanised.

All bolts washers and clamps attached to current carrying parts shall be manufactured from stainless steel grade 304, and all nuts shall be from stainless steel grade 316.

All bolts and clamps that may be required to carry an electrical current shall be fitted with a stainless steel spring washer. Contact springs shall not carry current and shall be insulated and ventilated as necessary to **be free** from heating effects.

5.4.13 Crossarms

The air break switch shall use a steel fabricated crossarm. The crossarms shall be a minimum of 100mm x 100mm cross section with a minimum thickness of 4mm to cater for the required loading and consistent performance throughout the expected life of the switch. The crossarms shall be predrilled and fabricated in accordance with approved drawings prior to finishing and/or galvanising. The galvanising of the crossarm shall comply with the requirements of AS 4680:2006. **Alternative crossarms will be considered.**

5.5 Identification and packing

Switches shall be supplied factory assembled as three phase units in crates. Drive parts shall be tied to the crate, while down rods shall be supplied bundled in sets. All separately supplied items are to be marked with the relevant specification number.

Each separate piece of equipment delivered under this specification shall be tagged with the specification number, the item number in the Schedule of Requirements, and a descriptive title identifying the component. The installation instructions shall be included in each crate.

5.5.1 Name plates

Each phase of the switch shall be provided with a permanent, weatherproof and corrosion proof nameplate. The nameplate shall provide the following minimum information.

- Manufacturer's name
- Continuous current rating
- Rated voltage
- Month and year of manufacture
- Specification number
- Designation of type
- Mass
- Lightning impulse withstand voltage
- Rated short circuit making current
- Rating short time withstand current
- Rated make/break current

5.6 Testing

5.6.1 General

The manufacturer shall provide one (1) copy of certified test reports for type and routine tests.

All tests shall be carried out by a testing authority holding appropriate accreditation:

- by NATA Australia; or,
- by an accreditation authority recognised by NATA Australia.

Tests from other testing authorities, such as KEMA, may be accepted at the discretion of Network Substations Manager Endeavour Energy.

Type tests more than five (5) years old may be acceptable at the discretion of the Network Substations Manager.

All type and routine test cost shall be borne by the manufacturer/supplier.

Endeavour Energy reserves the right to witness type and routine testing for which at least two (2) weeks' notice shall be given.

5.6.2 Type tests

The switch must be of a type-tested design in accordance with the requirements of AS/NZS 60265.1:2001.

No.	Type test	Acceptable value	Test method reference
1.	Dielectric tests including lightning impulse withstand tests, power frequency voltage withstands tests, and power frequency withstand test on auxiliary circuits	No failure	Clause 6.2 of AS 62271.1:2012
2.	Temperature rise test	<65K	Clause 6.5 of AS 62271.1:2012
3.	Measurement of resistance of the main circuit	The measured resistance shall not be >20% of before test.	Clause 6.4 of AS 62271.1:2012
4.	Short time withstand current and	The switch is operable.	Clause 6.6 of AS

No.	Type test	Acceptable value	Test method reference
	peak current withstand current tests	The measured resistance shall not be >20% of before test.	62271.1:2012
5.	Tests to prove ability of the switch to make and break the specified currents	No failure and the switch is operable.	Clause 6.101 of AS/NZS 60265.1:2001
6.	Tests to prove satisfactory mechanical operation and endurance	All parts in good condition and shall not show excessive wear.	Clause 6.102 of AS/NZS 60265.1:2001
7.	Radio interference voltage test	<2,500µV	Clause 6.9 of AS 62271.1:2012
	Crossarms		
(i)	Average failing load test	No breakage	Clause 5.1 of ENA DOC 012:2006
(ii)	Sudden load release test	No breakage	Clause 5.2 of ENA DOC 012:2006
(iii)	Coating and mass thickness (only for steel crossarm)	Table 1 & 2 of AS 4680:2006	Clause 9 of AS 4680:2006
(iv)	Dry lightning impulse withstand and 50% flashover voltage (only for insulated crossarm)	No damage	Clause 9.2.1 of AS 62231:2007
(v)	Power arc test (only for insulated crossarm)	No damage	Appendix ZZ of AS4435.1
(vi)	Resistance test (only for insulated crossarm)	Manufacturer to specify	Clause 10 of IEC 60093:1980

5.6.3 Routine tests

The following routine tests shall be conducted on each ABS supplied to Endeavour Energy:

No.	Routine test	Acceptable value	Test method reference
1.	Dielectric test on the main circuit	Meets the requirement of section 5.3 of this specification.	Clause 7.1 of AS 62271.1:2012
2.	Measurement of resistance of the main circuit	The measured resistance shall not exceed 20% of the resistance value	Clause 7.3 of AS 62271.1:2012

No.	Routine test	Acceptable value	Test method reference
		before the temperature rise test.	
3.	Mechanical operating test	Meets the requirement of Clause 7.101 of AS/NZS 60265.1:2001	Clause 7.101 of AS/NZS 60265.1:2001
4.	Design and visual checks	Verified by the manufacturer.	Clause 7.5 of AS 62271.1:2012

Duplicate copies of routine test certificates shall be submitted with the equipment.

5.7 Maintenance requirements

5.7.1 Spare parts and maintenance

The supplier shall supply a list of recommended spare parts, special tools and appliances required for the whole of life operation and maintenance of the ABS installation. The list, together with prices, shall be indicated in the appropriate schedule. The supplier must also provide details (if required) of the recommended maintenance and the frequency at which it must be carried out. Details of the manufacturers repair capability and options shall be provided.

5.7.2 Failure mode analysis and preventative maintenance

The supplier shall indicate and provide updates to Endeavour Energy the mean time between failures (MTBF) of the ABS and its components including the recommended maintenance regime and maintenance tasks and intervals. This regime shall be based on the mean time between failure (MTBF) and the critical failure modes identified by the failure mode, effects and criticality analysis (FMECA) of the equipment. Details substantiating the FMECA analysis shall be included in the offer.

5.8 Quality assurance

Quality assurance certification is required to establish the manufacturers ability to design and consistently manufacture air break switches to this specification. The supplier and all its contractors shall have a quality system which complies with the requirements of AS/NZS ISO 9001 or other comparable Australian or International equivalent. All nominated drawings and documents that have to be reviewed by Endeavour Energy are to be submitted as complete packages using document controls systems such that all the relevant information to enable the design to be reviewed is available. Design suitability approval will not relieve the supplier of its responsibilities for the correctness and appropriateness of the design or their responsibility to conform to this specification.

5.8.1 Quality assurance plan

A quality assurance plan is a document subject to approval of Endeavour Energy and shall contain as a minimum the following information:

- The supplier's organisational structure for the works.
- A planned outline meeting the requirements and all stages of the scope and specification.
- An index showing all existing procedures, inspection and test plans and drawings.

- AS/NZS ISO 9001 certification for itself and subcontractors.
- A plan detailing the design, ordering of materials, manufacturing and test plans.

5.8.2 *Quality Inspection and Test Plan (QITP)*

A quality inspection and test plan shall be developed and agreed which contains sufficient details of the workflow so that Endeavour Energy can review and / or make visits. The test plan shall be prepared in accordance with AS/NZS ISO 9001.

5.9 **Product approval**

Product approval and audit forms

Complete information of the ABS shall be provided on Branch Form FAE 3091.

Product approval process

Endeavour Energy will approve the equipment/components for use on the network. The ABS shall be evaluated under the product approval process set out in PAE 1004.

6.0 **AUTHORITIES AND RESPONSIBILITIES**

General Manager Asset Management has the authority and responsibility for:

- approving this Specification, including any variations;
- making all decisions concerning compliance in respect to this Specification;
- nominating Endeavour Energy's representative(s) for either the manufacturing facility inspection and/or witness testing; and,
- delegating any of these authorities and responsibilities to the Manager Asset Standards & Design

Manager Asset Standards & Design has the authority and responsibility for:

- reviewing this specification and making recommendations to the General Manager Asset Management;
- making recommendations concerning compliance in respect of this Specification; and
- making nominations of Endeavour Energy's representatives.

Network Substations Manager has authority and responsibility for:

- reviewing all type and routine test reports and alternative proposals submitted for evaluation, and making recommendations to the Manager Asset Standards & Design.
- clarifying all the technical aspects of this specification to the stakeholders; and
- approving the relevant actions required and outlined in this specification.

Contractor Operations Manager, Network Connections has the authority and responsibility for confirming that all air break switches installed by Level 1 Accredited Service Providers comply with the requirements of this Specification.

Commercial Manager has the authority and responsibility to certify that the air break switches purchased through the tender process complies with the requirements of this specification.

Manufacturers/suppliers have the authority and responsibility for:

- establishing awareness of their responsibilities under this specification;
- providing suitable training to their employees or contractor/s under their control to safely perform works to this specification;
- implementing an effective safety, environmental and quality auditing; and,

- implementing this specification and keeping Endeavour Energy or other responsible equivalent officers informed of any factors that may prevent them from accepting responsibility for its full implementation.

7.0 DOCUMENT CONTROL

Documentation content coordinator: Network Substations Manager

Documentation process coordinator: Branch Process Coordinator