



Ergon Energy Corporation Limited

Technical Specification for Single Phase 19kV Recloser

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Contents

1. Purpose and Scope	1
2. References	1
2.1 Applicable Standards	1
ANSI/IEEE C37.60	1
3. Drawings	1
3.1 Drawings by the Purchaser	1
4. Service Conditions	1
5. Design and Construction	2
5.1 Ratings.....	2
5.2 Standard Operating Duty	2
5.3 Temperature Rise Limits	3
5.4 Auxiliary Supply	3
5.5 Operating Requirements	3
5.6 Tank.....	4
5.7 Insulating Medium.....	4
5.8 Joints and Gaskets	4
5.9 Lifting Lugs.....	4
5.10 Bushings and Terminals	4
5.11 Mounting Bracket.....	5
5.12 Surge Arrester Mounting Bracket.....	5
5.13 Earthing Terminal.....	5
5.14 Nameplate or Label.....	5
5.15 Recommended Spare Parts and Tools	5
5.16 Instruction Manuals.....	5
6. Performance and Testing	5
6.1 Type Tests	5
6.2 Routine Tests.....	6
7. Risk Assessment	6
7.1 Compliance	6



Technical Specification for Single Phase 19kV Recloser

7.2	Formal Risk Assessment	6
7.3	Hazards	6
8.	Quality Assurance.....	6
8.1	Purchasers Policy	6
8.2	Documentary Evidence.....	7
9.	Samples	7
9.1	Production Samples.....	7
10.	Packaging and Marking.....	7
10.1	General	7
10.2	Marking.....	7
10.3	Quarantine	7
11.	Service Performance	7
12.	Reliability	8
12.1	Service Life	8
13.	Training.....	8
14.	Environmental Considerations	8
15.	Information to be Provided	8
15.1	Specific Technical Requirements.....	8
15.2	Checklist of Supporting Documentation	8
15.3	Documentation to be Supplied During the Course of the Contract.....	8
16.	Attachment 1 – Technical Details	9
17.	Attachment 2 – Technical Details Checklist	10
18.	Attachment 3 – Risk Assessment.....	11
19.	Attachment 3 – Risk Assessment...(Cont'd)	12
20.	Attachment 4 – Nameplate Details.....	13

Technical Specification for Single Phase 19kV Recloser



1. Purpose and Scope

This specification sets out the technical requirements for the manufacture, testing, supply and delivery of single phase reclosers for use on overhead 11/12.7/19.1kV single wire earth return (SWER) electricity distribution systems in a totally exposed environment.

2. References

2.1 Applicable Standards

The reclosers 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 Purchaser for resolution.

Standard	Title
AS 1033	High voltage fuses (for rated voltages exceeding 1000 V)
AS 1768	Lightning protection
AS 1824	Insulation co-ordination (phase to earth and phase to phase, above 1kV)
AS 1856	Electroplated coatings - silver
AS 2650	High voltage A.C. switchgear and control gear - Common requirements
AS 4680	Hot-dip galvanised (zinc) coatings on fabricated ferrous articles
ANSI/IEEE C37.60	IEEE Standard Requirements for Overhead, Pad Mounted, Dry Vault, and Submersible Automatic Circuit Reclosers and Fault Interrupters for AC Systems
AS/NZS ISO 9001	Quality management systems - Requirements

3. Drawings

3.1 Drawings by the Purchaser

No drawings are attached to this specification.

4. Service Conditions

The sectionaliser 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

Technical Specification for Single Phase 19kV Recloser



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 equipment offered shall comply with the relevant requirements of AS 2650 and ANSI/IEEE C37.60 and shall have the following ratings under the specified service conditions.

Nominal System Voltage	(kV)	11, 12.7 and 19.05kV
Highest System Voltage	(kV)	21.9
Frequency	(Hz)	50
System LIWV to AS1824.1	(kVp)	200
Equipment LIWV (minimum) (*A higher value preferred)	(kVp)	150 *
Power frequency insulation withstand level-1min Dry (kV)		60
	- 10 sec Wet (kV)	50
Rated current	(A)	100
Rated line charging interrupting current	(A)	5
Rated symmetrical breaking current	(A)	2500
Rated symmetrical making current	(A)	2500
Continuous current rating (range) of the trip coil (In)	(A)	5 - 100
Minimum tripping current	(A)	2 x In

5.2 Standard Operating Duty

The recloser shall have a standard operating duty in accordance with ANSI/IEEE C37.60-1981, Table 2, Line 5 as indicated below:

No of Operations	% of Interrupting Rating	Minimum Circuit X/R
32	15-20	2
24	45-55	5
12	90-100	12

Technical Specification for Single Phase 19kV Recloser

5.3 Temperature Rise Limits

The temperature rise of the recloser components when carrying rated normal current continuously shall not exceed the values specified in ANSI C 37.60, Table 8, for insulation class 105.

5.4 Auxiliary Supply

The recloser shall be completely self contained with no auxiliary supply required for control or other purposes.

5.5 Operating Requirements

5.5.1 Over Current protection

The reclosers shall be fitted with overcurrent protection, the continuous rating of which shall be capable of being varied over a current range between 5 and 100 A.

The tripping current shall not exceed twice the continuous rated current.

If the rating of the reclosers offered is varied by replacing series connected trip coils, the full range of coil sizes and their prices shall be included in the tender submission along with the full instructions for replacing the coils.

5.5.2 Operating Sequence and Time-current Curves

The operating sequence of the reclosers shall be selectable as follows:

- 1 fast trip followed by up to 3 time-delayed trips to lockout
- 2 fast trips followed by up to 2 time-delayed trips to lockout
- 3 fast trips followed by 1 time-delayed trip to lockout
- 1 fast trip followed by up to 4 time-delayed trips to lockout

The number of operation to lockout shall be variable and full instructions for resetting operating sequence shall be included in the tender submission. The purchaser will nominate the operating sequence characteristics required for the equipment in the purchase order.

The 'dead time' of the recloser between successive trip and closing operations shall not be less than two seconds and preferably be adjustable up to 10 seconds.

The 'reset' time of the recloser shall preferably be selectable up to three minutes.

Full details of current- time curves for the fast and slow trips shall be included in the tender submission.

5.5.3 Mechanical/Manual Operation

A hook-stick operated external lever shall be provided for tripping and closing of the recloser manually. The recloser shall remain in the open position, after an automatic lockout or manual operation to open position, until the external lever is restored to its normal closed position.

A non-reclosing external lever capable of being operated with a hook stick shall also be provided to enable the recloser to be set to lockout on the first trip operation.

The two levers shall be identified with appropriate labels and /or colour codes.

Technical Specification for Single Phase 19kV Recloser

5.5.4 Operations Counter

The recloser shall be provided with an operations counter preferably visible from a distance of 5 metres.

5.5.5 Position Indication.

The recloser shall be provided with a "CLOSED/ OPEN" position indicator visible from ground level.

5.6 Tank

The tank shall be of robust, sealed type construction capable of being transported, installed, removed or dismantled for repairs by accepted methods without damage. All surfaces shall be designed to prevent accumulation of water.

The tank shall be so designed to withstand without permanent distortion at least the internal pressures due to temperature rise during normal operation of the recloser.

The internal and external surfaces of the tank shall be treated with a protective coating to guarantee a service life of 25 years under specified service conditions.

Exterior coating shall be storm grey, colour N42 to AS 2700, and shall be capable of being maintained on site.

5.7 Insulating Medium

The insulating medium shall be oil complying with the requirements of AS 1767. The reclosers shall be supplied complete with oil.

Offers involving reclosers with other insulating mediums will be considered provided full details are given in the tender.

5.8 Joints and Gaskets

All joints shall be oil tight. Joints that may need to be broken during testing and maintenance of the unit shall be sealed by gaskets manufactured from synthetic rubber or a synthetic rubber and cork composition, which is resistant to both corona discharge and the insulating oil. Gaskets exposed to UV radiation shall be UV stabilised.

5.9 Lifting Lugs

The recloser shall be provided with lifting lugs or eyes for the lifting of the complete unit and the lifting of the cover and the mechanism from the tank.

5.10 Bushings and Terminals

Bushings shall be of wet-process porcelain, fully vitrified. Preferred colour is silver grey, N24 to AS 2700.

Bushing terminals shall be provided with conductor clamps suitable for aluminium, steel or copper conductor with diameters ranging from 5.9 mm to 11.3 mm.

Minimum creepage distance of 950mm will be required.

Technical Specification for Single Phase 19kV Recloser

5.11 Mounting Bracket

The recloser shall be suitable for pole mounting and shall be supplied complete with all mounting brackets necessary. Brackets manufactured from ferrous material shall be hot dip galvanised to AS/NZS 4680.

The brackets shall be suitably dimensioned to meet all statutory clearance requirements.

5.12 Surge Arrester Mounting Bracket

Surge arrester mounting brackets shall be provided on both source and load sides.

Detailed drawings of the recloser with surge arresters / brackets fitted shall be provided with the tender submission.

5.13 Earthing Terminal

An earthing terminal shall be provided on the tank, on the same side as the pole-mounting bracket.

5.14 Nameplate or Label

The recloser shall be provided with a label in accordance with clause 8.7 9.7 of ANSI C37.60. Additionally the following information shall be marked on the nameplate.

- Contract Number
- Purchaser's Structured Plant Number.

The structured plant number will be nominated in the purchase orders to the successful Tenderer, and will be an 8 digit number prefixed by 2 alphas (e.g. RE12345678 for reclosers)

5.15 Recommended Spare Parts and Tools

A list of recommended special equipment and spare parts required for operation and maintenance of the recloser shall be included in the tender.

The special equipment shall include those required for testing.

5.16 Instruction Manuals

The supplier shall provide two copies of the erection, operation and maintenance manual with each recloser package, enclosed in a weatherproof covering.

The manual shall include:

- All drawings required for erection, maintenance, and repair of recloser.
- Description of all components
- Product information
- Erection, testing, commissioning, operation and maintenance instructions.
- Complete parts list.

6. Performance and Testing

6.1 Type Tests

Type tests shall be performed on the recloser in accordance with Clause 6 of ANSI C37.60

Technical Specification for Single Phase 19kV Recloser

The results shall conform to the guaranteed values stated in **Attachment 1 - Technical Details**.

Test certificates shall form part of the tender.

6.2 Routine Tests

Routine tests shall be performed on the reclosers in accordance with Clause 7 of ANSI C37.60.

In addition, a pressure test shall be made on each tank that is designed to withstand internal pressure in service. The test pressure, which shall be sustained for a minimum of 5 minutes, shall be quoted in **Attachment 1 - Technical Details**.

One copy of the routine test results shall accompany each unit delivered. A second soft copy 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, specification number. The test certificates will also be accompanied with the completed **Attachment 4** returned electronically as a MS Excel document.

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

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

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.

Technical Specification for Single Phase 19kV Recloser

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.

Tenderer's attention is drawn to [MP000801F100](#): Management Systems Information Schedule (Form) which forms an integral part of this specification.

9. Samples

9.1 Production Samples

When requested, production samples of each item shall be submitted with the offer.

10. Packaging and Marking

10.1 General

Reclosers shall be packed individually, complete with the pole mounting brackets. Two copies of the instruction manuals must be included in each package in accordance.

The packaging of the reclosers by the suppliers must ensure that the units are delivered undamaged giving due consideration to the quantity, distance and the mode of transportation, and the preferred method of handling at each location.

10.2 Marking

The recloser package shall be marked with the following:

- Manufacturers name or trademark
- Manufacturers Part No. or Type
- Rated System Voltage and BIL
- Actuating Current
- Number of Operation Counts/Sequence
- Serial Number/Batch Number
- Year of Manufacture
- Purchaser's stock code.

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 items offered within Australian service conditions;
- Australian electricity supply authorities who have a service history of the items offered;

Technical Specification for Single Phase 19kV Recloser

- 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

When the supplier is unable to provide reliability data for 1000 plant years of service, an extended warranty for the control and communication components will be an acceptable alternative. The duration of the extended warrantee shall be five years from the date of commissioning.

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

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

Attachments 1 is a schedule of the technical details that the Tenderers are required to complete and return with their offer.

15.2 Checklist of Supporting Documentation

Attachment 2 is a checklist of supporting technical documentation which the Tenderers are required to complete and return with their offer.

Attachment 3 is a Risk Assessment schedule that the Tenderers are required to complete and submit with their offer.

15.3 Documentation to be Supplied During the Course of the Contract

Test certificates as required in Clause 6.

Technical Specification for Single Phase 19kV Recloser



16. Attachment 1 – Technical Details

This schedule shall be completed and submitted with the offer.

PARTICULARS	UNITS	RESPONSE
Name and address of manufacturer		
Country of manufacture		
Manufacturer's product catalogue number and drawing numbers(2 copies to be supplied)		
Current interrupting medium		
Rated system voltage	kV _{rms}	
Rated maximum voltage	kV _{rms}	
Basic insulating level of unit	kVp	
Power frequency wet withstand voltage	kV _{rms}	
Phase-earth clearance of bushing terminals	mm	
Minimum creepage distance of bushings	mm	
Rated frequency	Hz	
Rated maximum continuous current	A _{rms}	
Rated short time current	kA _{rms}	
Duration of short time	sec	
Rated breaking current	kA _{rms}	
Rated making current	kA _{rms}	
Continuous current rating (range) of trip coil (I _n)	A _{rms}	
Minimum tripping current as a multiplier of I _n		
Does the recloser satisfy operating duty cycle specified in clause 5.2?		YES/NO
Temp. rise carrying max rated current	⁰ C	
Is the equipment self-contained with no auxiliary supply required?		YES/NO
Are operating sequences detailed in clause 5.5.2 selectable?		YES/NO
Is the number of operations to lockout variable?		YES/NO
Is the dead time between successive recloses adjustable?		YES/NO
Is a non-reclosing external lever provided?		YES/NO
Is an operations counter provided?		YES/NO
Is a "CLOSED?OPEN" position indicator provided ?		YES/NO
Test pressure applicable to tank	kPa	
Insulating medium		
Gasket material		
Are lifting facilities provided?		YES/NO
Is the connector on bushing terminal suitable for Cu/Al/steel conductor of diameter 5.9mm -11.3mm		YES/NO
Is the pole mounting bracket supplied?		YES/NO
Are surge arrester mounting brackets provided?		YES/NO
Is an earthing terminal provided		YES/NO
Is a nameplate provided		YES/NO
Overall dimensions:		
a) length	mm	
b) width	mm	
c) height	mm	
Total weight	Kg	
Qty of insulating oil	Kg/Litre	

SIGNATURE OF TENDERER: _____

Technical Specification for Single Phase 19kV Recloser



17. Attachment 2 – Technical Details Checklist

Have full and comprehensive details been submitted with the documents associated with each of the following items?

PARTICULARS	CLAUSE	ANSWER (Yes/No)
Full range of trip coil sizes, their prices and instructions for replacing the coils	5.5.1	
Instructions for resetting operating sequence	5.5.2	
Current-time curves for slow and fast trips available	5.5.2	
Details of internal and external paint systems on tank	5.6	
Insulating medium(if other than oil)	5.7	
List of recommended spares ,special equipment required for operation and maintenance with prices	5.15	
Type test reports.	6.1	
Comment on availability of routine test reports	6.2	
Documentary evidence of QA Certification.	8.2	
Service History Details.	11	
Comments on reliability and performance.	12.1	
Availability of a training package	13	
Comments on Environmental soundness.	14	
2 Copies of Drawings		
Attachment 1 - Technical Details -completed		
Attachment 3 - Risk Assessment - completed		

SIGNATURE OF TENDERER:

Technical Specification for Single Phase 19kV Recloser



18. Attachment 3 – 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?	
14.	What are the sound pressure levels (expressed in dB(A))?	

Technical Specification for Single Phase 19kV Recloser



19. Attachment 3 – Risk Assessment...(Cont'd)

REF.	PARTICULARS	RESPONSE
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?	

NAME OF TENDERER:

ADDRESS OF TENDERER: _____

SIGNATURE: _____ FOR AND ON BEHALF OF TENDERER

DATE: _____

Technical Specification for Single Phase 19kV Recloser



20. Attachment 4 – Nameplate Details

Ergon Energy Structured Plant Number (Available from Purchase Order):				
AMPS-RATED	RATED CURRENT (A)			
CONTRACT-NO	CONTRACT NO			
LIGHT-IMPULS	LIGHT IMPULSE WITHSTAND (KVP)			
MAKE-CB	MANUFACTURER OF THE CB			
MASS-TOTAL	TOTAL WEIGHT (KG)			
MODEL	MODEL NO			
SERIAL_NUMBER	SERIAL NUMBER			
SF6-QUANTITY	QUANTITY OF SF6 (KG)			
SHORT-TIME-C	SHORT TIME CURRENT (KA)			
VOLT-RATED	RATED VOLTAGE (KV)			
YOM	YEAR OF MANUFACTURE			