



Ergon Energy Corporation Limited

Technical Specification for Composite Line Post Insulators

ETS10-02-02

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Technical Specification for Composite Line Post Insulators

1. Purpose and Scope

This specification sets out the requirements for the manufacture, testing and delivery of **composite line post insulators** for use on overhead 66kV and 132kV sub-transmission networks in a totally exposed environment.

Insulators covered by this technical specification, are listed as follows:-

ITEM No.	Description	STOCK CODE
1	132 kV Composite Post Insulator with Horizontal Clamp Top	0104629
2	66 kV Composite Post Insulator with Horizontal Clamp Top	0104630
3	66 kV Composite Post Insulator with 2 Slot Dropped Tongue	0104631
4	66 kV Composite Post Insulator with horizontal Clamp top C/W Bendable Gain Base	2416311

2. References

2.1 Applicable Standards

The insulators 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 1154	Insulator and conductor fittings for overhead power lines
AS 1824	Insulation coordination (phase-to-earth and phase-to-phase, above 1 kV)
AS 1832	Iron castings - Malleable cast iron
AS 4068	Flat pallets for materials handling
AS 4435	Insulators - Composite for overhead lines - Voltages Greater than 1000 V a.c.
IEC 61109	Composite Insulators for AC Overhead Lines with Nominal Voltage Greater than 1000 V
AS 4680	Hot-dip galvanised (zinc) coatings on fabricated ferrous articles
AS/NZS ISO 31999-2009	Risk Management
AS/NZS/ISO 9001	Quality management systems – Requirements
AS/NZS ISO 9002	Quality management systems - Model for quality assurance in production, installation and servicing

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3. Drawings

3.1 Drawings by the Purchaser

The following drawings are included and form part of this specification.

N026-1681-01B Transmission Lines – 132 kV Yalkula-Lakeland – assemblies A&B

N026-1681-02B Line Post Insulator Detail - Assembly 'C'

These sample drawings from a previous project serve to illustrate the insulator general arrangement and application.

N026-1346-05B Transmission Lines – 132 kV Yalkula-Lakeland – C1T90B steelwork details

N026-1677-04A C1F10 & C1F25 Steelwork Details (Gain Base)

These drawings provide the required base mounting details for the insulators.

Drawings for the 66 kV assemblies, which are similar in application are not provided.

4. Service Conditions

4.1 Environmental Conditions

The insulators will be exposed to the following environmental conditions: -

Temperatures	50 ⁰ C summer day time -20 ⁰ C winter night time
Solar Radiation Level	1 000 Wm ⁻² with high ultraviolet content
Precipitation	Tropical summer storms with high wind speeds and an annual rainfall in excess of 1500mm
Humidity	Extended periods of relative humidity in excess of 90%
Pollution	Areas of coastal salt spray and/or industrial pollution with equivalent salt deposit densities in the range 2.0 to 3.0 gm ⁻²
Wind Velocity	210km/hr (58m/s)

4.2 System Conditions

The insulators shall be suitable for use under the following system conditions.

Characteristic	Units	Item 1	Items2 & 3
Normal System Operating Voltage	kV	132	66
Maximum Continuous Operating Voltage	kV	148	72.5
System frequency	Hz	50	50
Phase to Phase Separation	mm	2200	1800

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(Vertical)			
Earth fault Current with duration of 0.7 sec	kA	7.8	7.8

5. Design and Construction

5.1 General

The general configuration and application of the 132 kV and 66 kV insulators will be as shown on Drawing Nos. N026-1681-01A and N026-1681-02A included as part of this specification.

The insulators shall be designed and manufactured in accordance with the relevant parts of Standard IEC 1109, except where modified by the requirements of this specification.

The insulators shall comply with the required dimensional, electrical and mechanical characteristics listed in **Attachment 1**.

The insulators are required to maintain satisfactory electrical and mechanical performance throughout their lifetime, which is specified as 40 years.

Full dimensional drawings (including tolerances) shall be supplied with the Offer.

A set of Load Application Curves showing the mechanical rating for various combinations of vertical (cantilever), transverse (tension or compression) and longitudinal loads, relevant to the insulators offered shall also be included in the tender submission.

5.2 Insulator Core

Insulators required by this Specification shall be constructed using a central member or “core” of solid high density, axially aligned, glass-fibre-reinforced, epoxy resin rod, of uniform cross-section to form the mechanical load bearing component of the insulator. The core shall be free of cracks and voids. The minimum required diameter of the core, in accordance with Attachment 1 shall be 63.5 mm.

5.3 Housing and Shed Material

The housing and sheds for the insulators shall be moulded from an elastomer which is stabilised against the effects of ultraviolet and other solar radiation and against depolymerization by hydrolysis.

The elastomer shall be Silicone Rubber. Other compounds may be considered by the Purchaser, provided satisfactory evidence of performance and long term hydrophobic characteristics can be provided by the Tenderer.

The insulators shall be in one piece, with the housing and sheds either injected moulded or high temperature vulcanised (HTV) onto the core.

Any sheath shall have a minimum thickness of 2 mm.

Cracks on the insulator surface are not allowed. Superficial defects or cavities are allowed provided the total defective area does not exceed 0.2% of the total insulator surface and the individual defective areas do not exceed 25 mm². The depth of any cavities must not

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exceed 1 mm or 5% of the layer thickness of the blanket material in the area under consideration. Individual protrusions on the insulator surface are allowed up to 2 mm as long as their total protruded area does not exceed 0.2% of the total surface of the insulator and the individual protruded area does not exceed 25 mm².

5.4 Interfaces Between Core, Housing and Sheds, and End Fittings

All interfaces between the insulator core, housing and sheds, and end fittings shall be completely sealed to prevent contamination of the core by moisture or the environment.

The interface seal shall be maintained under all mechanical loading conditions applied to the insulator, and shall prevent the ingress of moisture during high pressure water jet washing during service

The tenderer shall provide information explaining the construction of the interface between core and housing and the core, housing and end fittings with respect to the elimination of moisture ingress and subsequent longitudinal tracking.

5.5 Metal End Fittings

The end fitting material for all insulators shall be hot dipped galvanised forged steel or aluminium alloy.

The end fittings shall be compressed/crimped onto the fibreglass core.

The line end fittings shall be designed and manufactured to prevent the incidence of RIV and corona under the service conditions defined in clause 4

The zinc coating on hot dipped galvanised forged steel end fittings shall have a surface deposit density of not less than 600 g/m².

The post insulators for Item 1, Item 2 and Item 3 shall be supplied with a four hole flange (pedestal type) end fitting suitable for mounting onto the gain base shown on Drawing Nos. N026-1346-05B and N026-1677-04A included in this specification. The base shall incorporate a 127 mm (5 inch) bolt circle with the four holes orientated as shown on the drawing. Hole diameters on the insulator flange shall suit mounting of the insulator to the gain base using GR8.8 Hex M16 bolts, nuts & spring washers. The post insulator for Item 4 shall be supplied complete with a bendable gain base suitable for mounting the insulator on a pole with a circular cross section using two M20 bolts spaced 305mm, one of the bolt holes shall be slotted to 12Rx50 mm (nominal). A 13mm diameter hole shall also be provided to facilitate earthing of the insulator base. Full details of the gain base shall be provided with the tender.

For Item 1, Item 2 and Item 4 the end fitting at the line end of the insulator shall be a **Horizontal Clamp Top** which shall accept a standard armour grip support clamp.

For **Item 3** the end fitting at the line end of the insulator shall be a **Two Slot Extended/Dropped Blade/Tongue**. The end fitting shall allow for an unimpeded swing of the line hardware of 600 either side of the vertical.

The line hardware is not required.

5.6 Markings

Each insulator shall be marked with the following in accordance with AS 4435.4:

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- Manufacturer's name or trademark,
- Year of manufacture
- The maximum design cantilever load.

Additionally the Manufacturer's catalogue number or product code shall also be marked on each insulator. These markings shall be legible and indelible.

6. Performance and Testing

6.1 General Requirements

The insulators shall be tested in accordance with Australian Standard AS4435.4 - 1997, except where varied by this Specification. Testing to IEC1109 or ANSI C29.11 - 1989 may be accepted, provided that the Supplier or Manufacturer can demonstrate that the test procedure to be undertaken is identical or very similar to that in AS 4435.4.

The Design and Type tests shall have been undertaken at a NATA registered testing authority.

- Note :** Should tenderers be unable to provide Design and Type Test reports from a NATA registered testing authority, then evidence SHALL be provided that the testing authority is:
- INDEPENDENT of the manufacturer; and
 - NATIONALLY ACCREDITED to carry out the relevant tests.

The Purchaser reserves the right to witness all or any of the tests, and to select the insulators for Sample testing. The Supplier shall provide a minimum of four weeks advance notice of the Sample testing.

The costs for all tests required by this Specification shall be included in the Schedule of Rate Prices tendered, unless otherwise requested.

The Purchaser may conduct further tests after delivery. Any material not in conformance with the Specification will be rejected and replaced at the Supplier's expense.

6.2 Design Tests

Design tests shall be conducted in accordance with the procedures, sampling and sequences described in AS 4435.4, and shall include:

- Visual inspection and dimensional check
- Dry power frequency flashover voltage test (before & after prestressing)
- Thermal-mechanical test
- Water immersion test
- Steep-front impulse voltage test
- Determination of elastic limit under load
- Core short-time cantilever failing load test
- Test of housing: tracking and erosion test
- Core dye penetration test
- Core water diffusion test
- Core voltage test
- Flammability test

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6.3 Type Tests

The Supplier shall supply Type test certificates or test results relevant to the insulators offered.

Type testing shall be in accordance with AS 4435.4 and shall include:

- Dry lightning impulse withstand voltage test
- Wet power frequency test
- Wet switching impulse withstand voltage test
- Deflection test
- Cantilever failing load test
- Tensile test

6.4 Sampling Tests

Sampling tests shall be made on insulators (which have already passed the Routine tests), taken at random from lots offered for acceptance.

Testing and sample sizes shall be in accordance with AS 4435.4. Where the lot size is less than or equal to 300, sample sizes shall be E1 = 2 and E2 = 2.

Tests shall include:

- Verification of dimensions
- Verification of mechanical performance (deflection & cantilever failing test)
- Galvanizing test

The re-testing procedure and acceptance criteria shall be in accordance with the Standard.

6.5 Routine Tests

The routine tests shall be made on every insulator offered for acceptance.

Routine tests are required in accordance with AS 4435.4 and include:

Visual Examination - Each insulator shall be examined. The mounting of the metal end fittings on the insulating parts shall be in accordance with the drawings. The colour of the insulator shall be as specified.

Acceptance criteria, including those for superficial defects, shall be as described in the Australian standard.

Tensile Test - A tensile test load, equal to 50% of the agreed minimum failing load of the metal end fittings, shall be axially applied to each insulator.

The tensile load shall be increased rapidly but smoothly from zero to the rated test load and applied for at least 10 seconds. No partial or complete pull out of the core from the end fittings shall occur.

6.6 Test Certificates

Test Certificates or reports shall be provided by the Supplier for all tests required by this Specification.

Design test and Type test certificates/reports shall be provided with the Tender.

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Sampling test certificates/reports are to be delivered to the Purchaser as soon as possible, and shall be received before delivery of items covered by the certificates.

Payment under the Contract will not be made until the necessary certificates and documentation have been received. A Certificate of Compliance shall be provided with each delivery.

7. Risk Assessment

There is no requirement for manufacturer provided safety risk assessments for the items covered in this specification.

8. Quality Assurance

8.1 Purchasers Policy

It is the Purchaser's policy to procure goods, equipment and services from sources that demonstrate the ability to supply quality products.

8.2 Documentary Evidence

The supplier and/or manufacturer shall document and maintain a Quality System in conformity with AS/NZS ISO 9001 or equivalent international standard.

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 offered shall be submitted to assist in the evaluation of the offer.

9.2 Sample Delivery

Each sample shall be delivered freight free, suitably crated and packaged and labelled with the following information:

Name of Supplier and this Contract No
Contract Item Numbers
Any supporting data on features or characteristics

10. Packaging and Marking

10.1 General

Each insulator shall be marked as required in clause 5.6 of this specification.

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The successful tenderer(s) shall take all necessary precautions to ensure safe handling of all products supplied. In particular:

- a) Individual pack sizes shall not weigh more than 20kg.
- b) Palletised goods shall be supplied on standard wooden pallets although specially designed pallets will be acceptable where additional stability is required.
- c) Palletised goods are to be secured and stabilised with no overhang to facilitate unloading
- d) Goods shall not exceed 1100mm in height

10.2 Pallet Conformance

The pallets shall conform to the requirements of AS 4068.

10.3 Packaged Lots

Each packaged lot shall be marked with the following information:

Item Description
ERGON Stock Code
Purchase Order Number
Manufacturers Name
Pack Size
Pack Weight

10.4 Quarantine Requirements

Should the insulators be supplied from overseas manufacturers, 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 tendered price. In particular, timber crates must be fumigated with methyl bromide with a concentration of 48 grams per cubic metre for 24 hours at 21°C. The supplier shall ensure that the procedure does not produce any deleterious effects to the insulators or the crates.

11. Service Performance

Suppliers shall state:

- (a) the period of service achieved by the items offered within Australian service conditions;
- (b) Australian electricity supply authorities who have a service history of the items offered; AND
- (c) Contact names and phone numbers of relevant employees of those supply authorities who can verify the service performance claimed.

In the absence of relevant Australian Service performance, the information required in (a), (b) and (c) above shall be stated for service history in overseas countries. Priority shall be given to performance in environments similar to those described in Clause above.

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12. Reliability

12.1 Service Life

Suppliers are required to comment on the reliability of the equipment and the performance of the materials offered for a service life of 40 years under the specified system and environmental conditions.

12.2 Evidence in Support of Reliability

Such comments shall include evidence in support of the reliability and performance claimed including information on Failure Mode and Effect Analysis.

13. Training

Training material in the form of drawings, instructions and/or audio visuals may be required to be provided for the items accepted under the offer.

Tenders shall state the availability of training materials which should 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 disposability at the end of service life.

15. Information to be Provided

15.1 Specific Technical Requirements

The specific technical requirements for the items offered shall be as stated in **Attachment 1** of this specification. The supplier shall provide all details requested by **Attachment 1** and shall guarantee such data.

15.2 Checklist of Supporting Documentation

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

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16. Attachment 1 – Technical Details

Item 1: 132kV Composite Insulator with Horizontal Clamp Top	Specified Requirement	Guaranteed Value
Manufacturer's Name & Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Design Test Certificate No.		
Type Test Certificate No.		
Relevant Standard for Tests		
Shed and Housing Material	Silicon Rubber	
Number of sheds		
Maximum shed diameter (mm)		
Shed spacing (mm)		
Housing thickness over core (mm)		
Core material	Glass-fibre - reinforced epoxy resin	
Core Diameter (mm)	63.5	
End Fitting Material	Forged steel or aluminium alloy	
Thickness of galvanising of metal end fittings (if applicable) g/m ²	600 (minimum)	
Insulator Length (mm)	1350	

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ATTACHMENT 1 – TECHNICAL DETAILS (Cont'd)

Item 1: 132kV Composite Insulator with Horizontal Clamp Top	Specified Requirement	Guaranteed Value
Line End Fitting	Clamp Top	
Structure End Fitting	4 Hole Flange	
Insulator Colour	Light Grey/Light Blue	
Cantilever Failing Load (kN)	13.2	
Maximum Design Cantilever Load (kN)	6.6	
Minimum Arc Distance (mm)	1180	
Minimum Creepage Distance (mm)	3325	
Power Frequency Wet Withstand Voltage (IEC)		
(kV rms)	320	
Dry Lightning Impulse Withstand Voltage (IEC) (KVp)	650	
Pack Weight (kg)		

SIGNATURE OF TENDERER: _____

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ATTACHMENT 1 – TECHNICAL DETAILS (Cont'd)

Item 2: 66kV Composite Line Post Insulator with Horizontal Clamp Top	Specified Requirement	Guaranteed Value
Manufacturer's Name & Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Design Test Certificate No.		
Type Test Certificate No.		
Relevant Standard for Tests		
Shed and Housing Material	Silicon Rubber	
Number of sheds		
Maximum shed diameter (mm)		
Shed spacing (mm)		
Housing thickness over core (mm)		
Core material	Glass-fibre - reinforced epoxy resin	
Core Diameter (mm)	63.5	
End Fitting Material	Forged steel or aluminium alloy	
Thickness of galvanising of metal end fittings (if applicable) g/m ²	600 (minimum)	
Insulator Length (mm)	930	

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ATTACHMENT 1 – TECHNICAL DETAILS (Cont'd)

Item 2: 66kV Composite Line Post Insulator with Horizontal Clamp Top	Specified Requirement	Guaranteed Value
Line End Fitting	Clamp Top	
Structure End Fitting	4 Hole Flange	
Insulator Colour	Light Grey/Light Blue	
Cantilever Failing Load (kN)	18.0	
Maximum Design Cantilever Load (kN)	9.0	
Minimum Arc Distance (mm)	770	
Minimum Creepage Distance (mm)	2000	
Power Frequency Wet Withstand Voltage (IEC) (kV rms)	210	
Dry Lightning Impulse Withstand Voltage (IEC) (KVp)	420	
Pack Weight (kg)		

SIGNATURE OF TENDERER: _____

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ATTACHMENT 1 – TECHNICAL DETAILS (Cont'd)

Item 3: 66kV Composite Line Post Insulator with 2-Slot Dropped Tongue	Specified Requirement	Guaranteed Value
Manufacturer's Name & Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Design Test Certificate No.		
Type Test Certificate No.		
Relevant Standard for Tests		
Shed and Housing Material	Silicon Rubber	
Number of sheds		
Maximum shed diameter (mm)		
Shed spacing (mm)		
Housing thickness over core (mm)		
Core material	Glass-fibre - reinforced epoxy resin	
Core Diameter (mm)	63.5	
End Fitting Material	Forged steel or aluminium alloy	
Thickness of galvanising of metal end fittings (if applicable) g/m ²	600 (minimum)	
Insulator Length (mm)	930	

SIGNATURE OF TENDERER: _____

Technical Specification for Composite Line Post Insulators

ATTACHMENT 1 – TECHNICAL DETAILS (Cont'd)

66kV Composite Line Post Insulator with 2-Slot Dropped Tongue	Specified Requirement	Guaranteed Value
Line End Fitting	2 Slot Dropped Tongue	
Structure End Fitting	4 Hole Flange	
Insulator Colour	Light Grey/Light Blue	
Cantilever Failing Load (kN)	18.0	
Maximum Design Cantilever Load (kN)	9.0	
Minimum Arc Distance (mm)	770	
Minimum Creepage Distance (mm)	2000	
Power Frequency Wet Withstand Voltage (IEC)		
(kV rms)	210	
Dry Lightning Impulse Withstand Voltage (IEC) (KVp)	420	
Pack Weight (kg)		

SIGNATURE OF TENDERER: _____

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ATTACHMENT 1 – TECHNICAL DETAILS (Cont'd)

Item 4: 66kV Composite Line Post Insulator with Horizontal Clamp Top C/W Bendable Gain Base	Specified Requirement	Guaranteed Value
Manufacturer's Name & Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Design Test Certificate No.		
Type Test Certificate No.		
Relevant Standard for Tests		
Shed and Housing Material	Silicon Rubber	
Number of sheds		
Maximum shed diameter (mm)		
Shed spacing (mm)		
Housing thickness over core (mm)		
Core material	Glass-fibre - reinforced epoxy resin	
Core Diameter (mm)	63.5	
End Fitting Material	Forged steel or aluminium alloy	
Thickness of galvanising of metal end fittings (if applicable) g/m ²	600 (minimum)	
Insulator Length (mm)		

SIGNATURE OF TENDERER: _____

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ATTACHMENT 1 – TECHNICAL DETAILS (Cont'd)

Item 4: 66kV Composite Line Post Insulator with Horizontal Clamp Top C/W Bendable Gain Base	Specified Requirement	Guaranteed Value
Line End Fitting	Clamp Top	
Structure End Fitting	Bendable gain base	
Insulator Colour	Light Grey/Light Blue	
Upcast angle to the horizontal (degrees)	10 - 12	
Cantilever Failing Load (kN)	18.0	
Maximum Design Cantilever Load (kN)	9.0	
Minimum Arc Distance (mm)	770	
Minimum Creepage Distance (mm)	2000	
Power Frequency Wet Withstand Voltage (IEC)		
(kV rms)	210	
Dry Lightning Impulse Withstand Voltage (IEC) (KVp)	420	
Pack Weight (kg)		

SIGNATURE OF TENDERER: _____

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17. Attachment 2 – Technical Document Checklist

CLAUSE Ref.	PARTICULARS	UNITS
Have full and comprehensive details been submitted WITH the tender documents associated with each of the following items?		
5.4	Core - Shed interface construction (including drawings of cross-section)	Yes/No
5.5	Details of the bendable gain base for item 4	Yes/No
6.1	Certification of testing authority for Design & Type tests	Yes/No
6.2,6.3 & 6.6	Design & Type test certificates	Yes/No
8.2	Documentary evidence of the Quality System Certification of BOTH the SUPPLIER and the MANUFACTURER (including Capability Statements)	Yes/No
11	Service Performance	Yes/No
12	Reliability	Yes/No
13	Training materials	Yes/No
14	Environmental considerations	Yes/No
15	Completed Attachment 1 and 2	Yes/No

NAME OF TENDERER:

ADDRESS OF TENDERER: _____

SIGNATURE: _____ FOR AND ON BEHALF OF TENDERER

DATE: _____

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18. Attachment 3 – Drawings

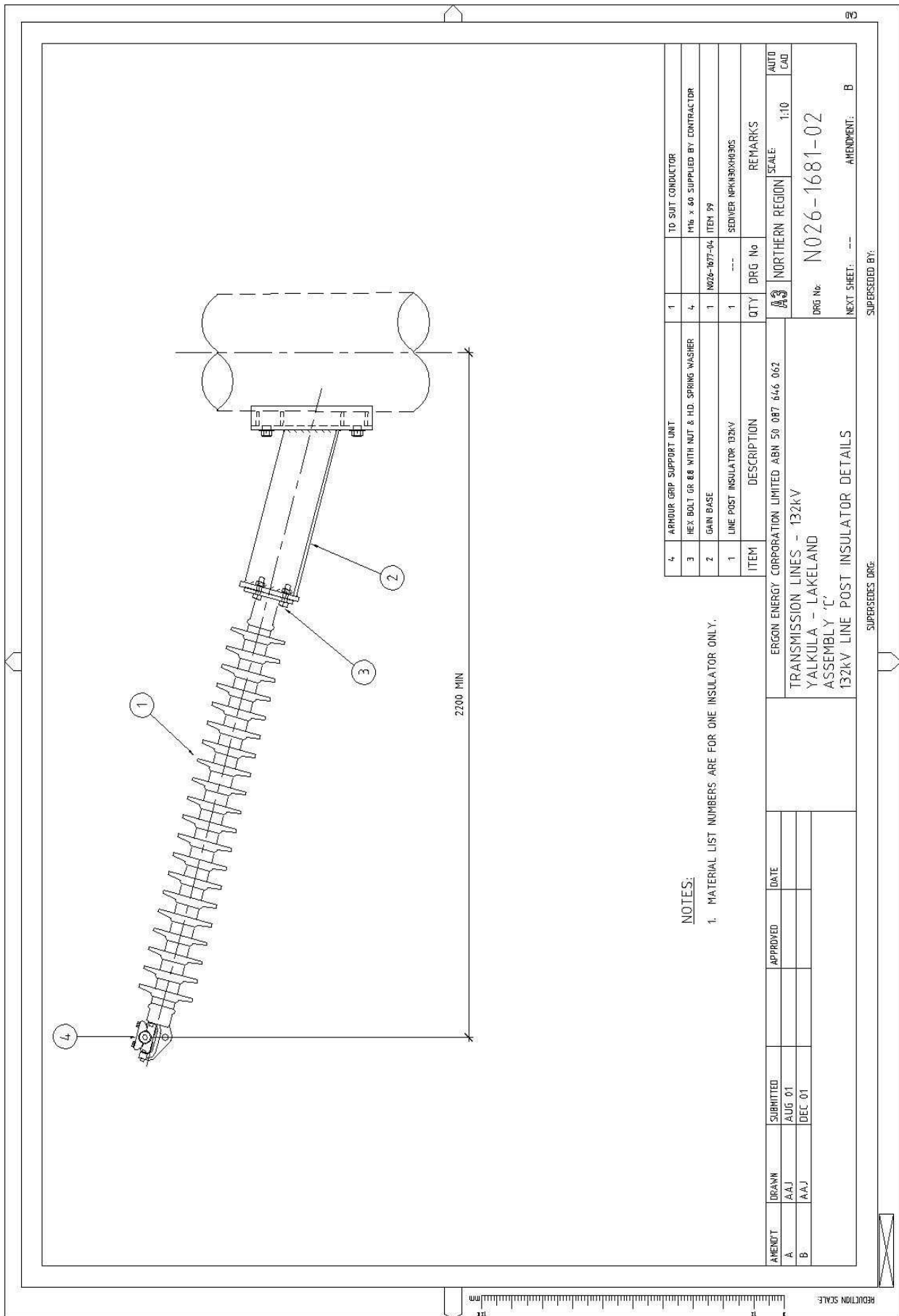
NOTES:

1. MATERIAL LIST NUMBERS ARE FOR ONE INSULATOR ONLY.

ITEM	DESCRIPTION	QTY 'A'	QTY 'B'	DRG No	REMARKS
8	HEX BOLT WITH FL WASHERS & SPLIT PMS	2	-		M24 x 75 SUPPLIED WITH ITEM 7
7	INSULATOR EXTENSION PLATE	1	-	N024-598-06	USE AS SHOWN ON POLE SCHEDULE TO SUIT CONDUCTOR - REFER AS 154.3 70MM
6	ARMOUR GRIP SUSPENSION UNIT	1	1		REFER AS 154.3 70MM
5	TWISTED EYE TONGUE	1	1		REFER AS 154.3 70MM
4	BOW SHACKLE	1	1		REFER AS 154.3 70MM
3	HEX BOLT GR BB WITH NUT & HD. SPRING WASHER	4	4		M16 x 60 SUPPLIED BY CONTRACTOR
2	GAN BASE	1	1	N024-677-04	ITEM 99
1	LINE POST INSULATOR 132kV	1	1	---	SECTOR MP0000049005

ERGN ENERGY CORPORATION LIMITED ABN 50 087 646 062	SCALE: 1:10	AUTO CAD
TRANSMISSION LINES - 132kV	DRG No: N026-1681-01	
YALKULA - LAKELAND	NEXT SHEET: 02	AMENDMENT: B
ASSEMBLIES 'A' AND 'B'		
132kV LINE POST INSULATOR DETAILS		
SUPERSEDES DRG:		
SUPERSEDED BY:		

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NOTES:

1. MATERIAL LIST NUMBERS ARE FOR ONE INSULATOR ONLY.

ITEM	DESCRIPTION	QTY	DRG No	REMARKS
4	ARMOUR GRIP SUPPORT UNIT	1		TO SUIT CONDUCTOR
3	HEX BOLT GR 8.8 WITH NUT & HD. SPRING WASHER	4		M16 x 60 SUPPLIED BY CONTRACTOR
2	GAIN BASE	1	N026-6077-04	ITEM 99
1	LINE POST INSULATOR 132kV	1	---	SEWVER NPK130KH30S

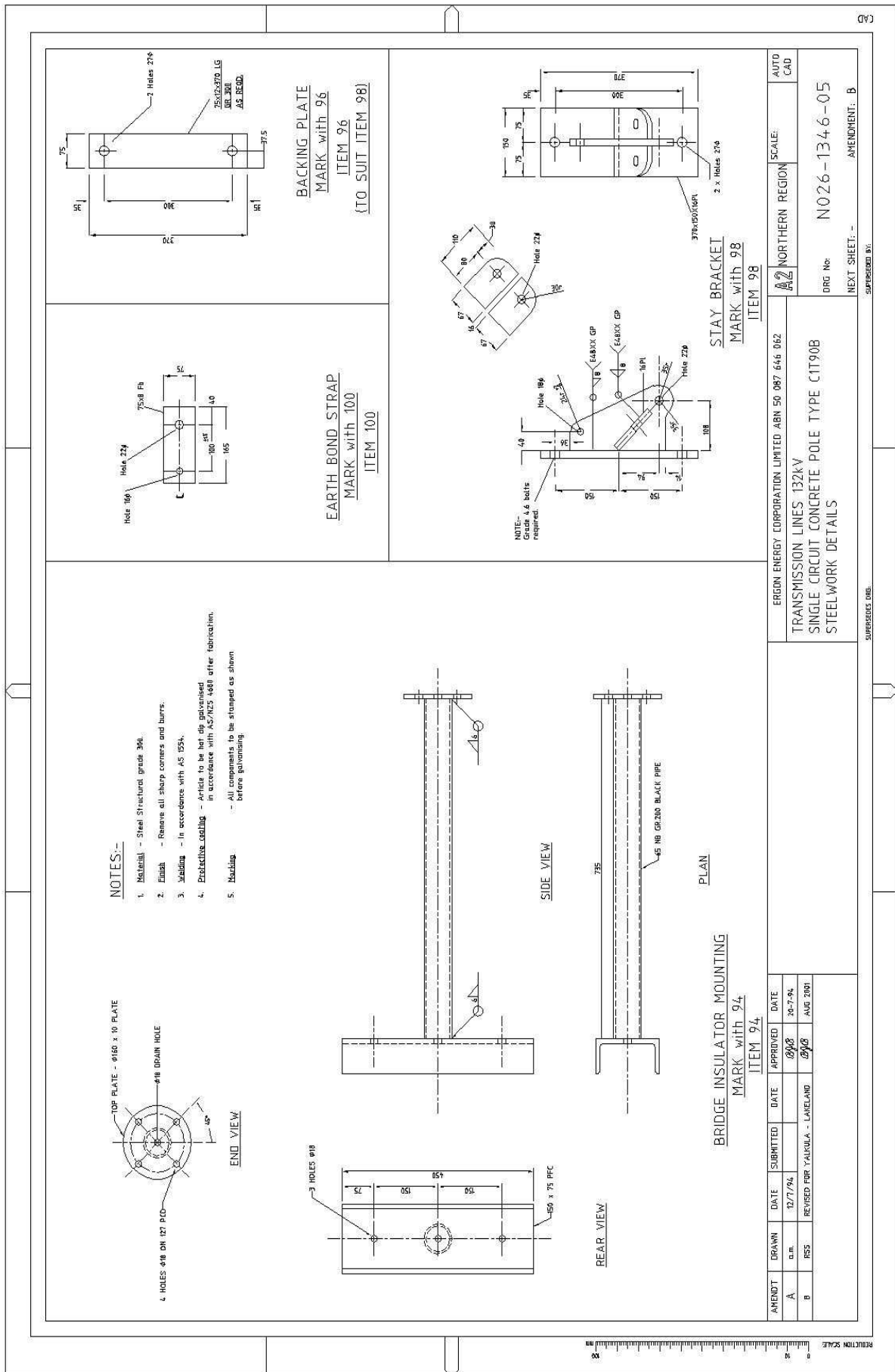
ERGON ENERGY CORPORATION LIMITED ABN 50 087 646 062 TRANSMISSION LINES - 132kV YALKULA - LAKELAND ASSEMBLY 'C' 132kV LINE POST INSULATOR DETAILS	NORTHERN REGION SCALE: 1:10 AUTO CAD
DRG No: N026-1681-02 NEXT SHEET: --- AMENDMENT: B	

SUPERSEDES DRG: ---

SUPERSEDED BY: ---

REDUCTION SCALE: ---

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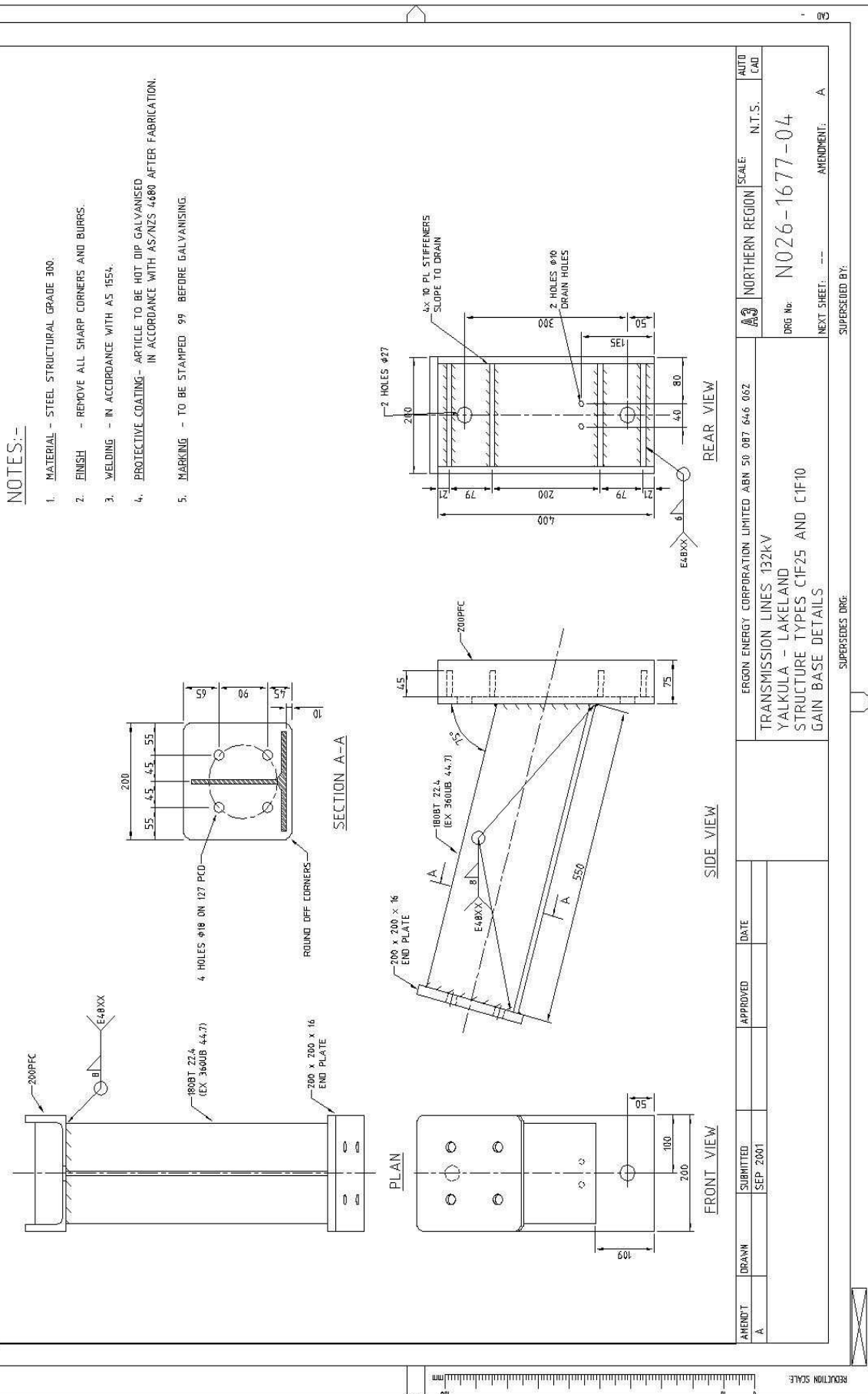


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NOTES:-

1. MATERIAL - STEEL STRUCTURAL GRADE 300.
2. FINISH - REMOVE ALL SHARP CORNERS AND BURRS.
3. WELDING - IN ACCORDANCE WITH AS 1554.
4. PROTECTIVE COATING - ARTICLE TO BE HOT DIP GALVANISED IN ACCORDANCE WITH AS/NZS 4480 AFTER FABRICATION.
5. MARKING - TO BE STAMPED 99 BEFORE GALVANISING.



AMENDT. A	DRAWN	SUBMITTED SEP 2001	APPROVED	DATE	ERGON ENERGY CORPORATION LIMITED ABN 50 087 646 062 TRANSMISSION LINES 132KV YALKULA - LAKELAND STRUCTURE TYPES C1F25 AND C1F10 GAIN BASE DETAILS	A3	NORTHERN REGION	SCALE: N.T.S.	AUTO CAD
					DRG No: N026-1677-04	NEXT SHEET: ---		AMENDMENT: A	