



Ergon Energy Corporation Limited

Technical Specification for Pillars and Insulating Shrouds

ETS14-03-01

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Technical Specification for Pillars and Insulating Shrouds



1. Purpose and Scope

This Specification sets out the requirements for electricity supply pillar components comprising covers, bases and shrouds for use in low voltage Underground Distribution systems as a housing for service distribution points and/or LV interconnect points in Queensland.

2. References

2.1 Applicable Standards

The items 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 1145.1	Determination of tensile properties of plastics materials
AS 1275	Metric screw threads for fasteners.
AS 1368	Plastics- Thermoplastic materials-Determination of Vicat softening temperature (VST)
AS 1580 Part 481.1	Paints and related materials – Methods of tests Coatings exposed to weathering – Degree of flaking or peeling.
IEC 60243-1	Electrical strength of insulating materials-Test methods – Part 1: Tests at power frequencies.
AS/NZS 60529	Degrees of protection provided by enclosures for electrical equipment.
AS/NZS 60695.2.13	Fire hazard testing – Glowing/hotwire based test methods - Glow- wire ignitability test method for materials.
AS 2700	Colour standards for general purposes.
AS 2837 (withdrawn)	Wrought alloy steels - Stainless steel bars and semi-finished products.
AS/NZS 9001	Quality management systems - Requirements.

3. Drawings

3.1 Drawings by the Purchaser

The following drawings are attached and form part of this Specification.

Drawing	Title
QESI 04-03-01	Standard Base Electricity Supply Pillar Critical Dimensions
QESI 04-03-02	Standard Covers Electricity Supply Pillar Critical Dimensions
QESI 04-03-03	D-head Screw Electricity Supply Pillar Manufacturing Details
QESI 04-03-05	Insulating Shroud Electricity Supply Pillars Manufacturing Details
Page 568	Underground Distribution Assemblies Sign, (Asset Identification Number) To HV and LV Equipment

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4. Service Conditions

The supply pillars will be installed outdoors and will be exposed to the following environmental conditions:

Ambient Temperature	45°C summer daytime -5°C winter night time
Solar Radiation Level	1,000 Wm ⁻² with high ultraviolet content
Precipitation	Tropical summer storms with gust wind speeds exceeding 160 km/h and an annual rainfall in excess of 1,500mm
Humidity	Extended periods of relative humidity in excess of 90%
Moisture	Garden sprays and sprinklers set at any height from ground level upwards causing water to be sprayed against or to fall upon the pillar at angles between 40° below and 60° above the horizontal.
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

Note: The electricity supply pillars may be installed in locations where they will be subjected to grass fires.

5. Design and Construction

5.1 General Requirements

The pillar shall incorporate an injection moulded base with a removable injection moulded cover each being manufactured from electrically non-conducting materials.

The pillar cover shall attach to the base by the D-head fixing screws located in accordance with QESI Drawing No 04-03-02.

The base shall support the various types of panels, by means of the slots alone as detailed on QESI Drawing No 04-03-01. The base shall support the panels vertically and in a rigid manner.

The panel mounting slots shall meet the following requirements:

- (a) **Inserting Panels:** Each pair of panel mounting slots shall withstand a downward force of 0.20 kN applied to the panel without breaking or deforming the slots.
- (b) **Installing Fuses:** Each pair of panel mounting slots shall withstand a force of 0.20 kN applied horizontally in both directions at a height of 200 mm vertically above the slots without breaking or deforming the slots.

The pillar installed in normal service conditions shall afford a minimum degree of protection of IP24D to AS/NZS 60529 and shall incorporate free flow ventilation by way of openings to minimise condensation of moisture on the internal equipment. Full details of the ventilation design shall be supplied in the offer. IP24D protection must be maintained.

Note: A minimum of five (5) top ventilation holes shall be provided in the pillar cover 4 mm to 5 mm in diameter and to ensure compliance with the requirements of IP24D to AS/NZS 60529 the enclosure shall have a suitable barrier in place behind the holes, which complies with clause 3.1 of AS/NZS 60529. The base of the cover shall have an indirect entry path to facilitate ventilation.

The pillar installed in the normal service condition shall be capable of supporting a minimum uniformly distributed force of 1.5 kN applied to the top surface of the cover for up to thirty minutes without permanent deformation.

The manufacturer's identification and date of manufacture shall be moulded on both the cover and base in any position other than on the external walls of the base or on the external walls and external top surface of the cover.

The preferred colour of bases and covers shall be green near G14 as defined by AS 2700. Bases manufactured with natural pigments (base colour without additives) will be considered. The colour shall be stable to the ultraviolet effects of sunlight in Queensland. Full details of the colour and its ultraviolet stability shall be supplied with the offer.

Material used in the construction of bases and covers shall be impact resistant, ultraviolet stabilised, flame retardant with a glow-wire ignition temperature exceeding 650 0C when tested in accordance with AS/NZS 60695.2.13 (GWIT exceeding 6500C preferred) and resist scratching, crazing, fading and possess the characteristics listed in **Attachment 1**. Full details of flame retardants shall be supplied with the offer.

The weight of each base and each cover shall not exceed 16 kg.

Suppliers shall provide in **Attachment 1** details of stabiliser additives included in the formulation and copies of ultraviolet testing performed on the bases and covers offered.

To assist with tender analysis this information may be independently assessed.

5.2 Pillar Bases

Bases offered shall have dimensions as shown in QESI Drawing No 04-03-01.

The pillar base shall have no external ribbing above the groundline and all surfaces shall be free of air-voids and sharp edges.

Threaded brass inserts shall be located in the pillar bases as shown on QESI Drawing No 04-03-01 and have an internal thread of M10 x 1.5 pitch. The inserts shall be fully drilled and tapped so as to provide a through-hole free from contamination.

The four cover fixing screws as detailed in QESI Drawing No 04-03-03 shall be brass or 304 stainless steel with captive washer and secured into the base.

An alternative to the base as shown on QESI Drawing No 04-03-01 may be considered provided overall dimensions are similar, the pillar covers as specified below suit without modification and fuse panel slots as shown are provided.

5.3 Pillar Covers

Covers offered shall have dimensions as shown in QESI Drawing No 04-03-02.

The moulded cover shall have the words "DANGER" and "ELECTRICITY" moulded in raised lettering on the top surface, in letters not less than 25 mm high.

Covers shall be designed such that condensation and other moisture does not drip onto equipment housed in the pillar.

Suppliers shall provide a recommendation on the method of attaching a high density polyethylene unique identification label applied in the field. Refer drawing Page 568 for details the present method of attachment. The identification shall last the life time of the pillar.

5.4 Insulating Shrouds

Insulating shrouds shall be manufactured in accordance with QESI Drawing No 04-03-05 and afford an insulation level to 0.6/1.0 kV. The material used in the construction of the Insulating shrouds shall be flexible PVC or PE material and possess the characteristics listed in **Attachment 1**.

6. Performance and Testing

6.1 Pillar Bases and Covers

6.1.1 Evidence of Longevity

Suppliers shall supply evidence of the longevity of the materials used and copies of the results of tests detailed in clauses 7.1.2 and 7.1.3.

6.1.2 Resistance to Compression Test

Apparatus - The following apparatus are required:

- (a) A horizontal surface large enough to support a base and cover assembly oriented vertically.
- (b) An intermediate piece having flat surface dimensions of 250 millimetres by 200 millimetres.
- (c) A means of applying a compression force of 1.5 kN.
- (d) A conditioning chamber capable of maintaining a temperature of $45^{\circ} \pm 2^{\circ}\text{C}$.

Test Pieces - Tests shall be applied to one base and cover assembly.

Procedure - The procedure shall be as follows:

- (a) Place the test piece in the conditioning chamber at a temperature of 45°C for a time of at least 10 hours.
- (b) Immediately after conditioning place the base and cover assembly on the horizontal test surface and centre the intermediate piece on the top of the test piece.
- (c) Apply a compression force of 1.5 kN to the intermediate piece for 30 minutes.

Criteria of Acceptance - All components of the test piece shall have no permanent deformation.

6.1.3 Cover-Base Fixing Test

Apparatus - The following apparatus are required:

- (a) A means of rigidly fixing the test base to a horizontal surface.
- (b) A means of applying a horizontal force of 2.0 kN to the test piece.

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Test Piece - Tests shall be applied to one base and tall cover assembly using D-head screws for fixing.

Procedure - At ambient temperature apply a horizontal force of 2.0 kN, 100mm below the top surface on the wide side of the cover.

Criteria of Acceptance - The test piece shall show no signs of cracking or breaking at the mounting screws or dislodgment of the brass inserts.

Note: A pillar is comprised of two components, viz a base and cover. If a supplier manufactures or has access to only one component, a plug having the dimensions of the mating component shall be used for the purpose of testing for resistance to compression and cover-base fixing.

6.2 Insulating Shrouds

The insulating shrouds shall be type tested for electric strength in accordance with superseded AS 1255.3 or IEC 60243 - 1.

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

Tenderers are required to submit evidence that the design and manufacture of the products offered are in accordance with AS/NZS ISO 9001 and shall include the Capability Statement associated with the Quality System Certification.

If the Tenderer is a non-manufacturing supplier, the documentary evidence shall include the quality system certifications of both the supplier and the manufacturer.

9. Samples

9.1 Production Samples

Suppliers must submit, at no cost to the Purchaser, a minimum of three (3) production samples of each item offered. Samples **MUST** be delivered within one (1) week of the closing date of tenders. The requirement for samples may be waived for the following conditions.

- (a) The offered item is currently under contract or has previously been supplied to the Purchaser under contract and there have been no changes to the design or material.

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- (b) The offered items have been supplied to the Purchaser for approval prior to this offer and there have been no changes in design or material.

9.2 Sample Delivery

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

- (a) Name of Supplier and this Specification Number.
- (b) Item Numbers
- (c) Any supporting data on features or characteristics and test reports.

9.3 Samples for Tests

The Purchaser may at its discretion use samples for tests. Unused Items may be either purchased at the tender price or returned to the respective Supplier after the contract has been awarded.

10. Service Performance

Suppliers shall state:

- (a) the period of service for manufacturing and supplying within Australian service conditions, the materials used in the pillars, and
- (b) Electricity supply authorities within Australia or other users of the materials who have a service history of the materials proposed for use in the pillars.
- (c) Contact names and phone numbers of relevant employees of those supply authorities who can verify the service performance claimed.

11. Reliability

11.1 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 50 years under the specified system and environmental conditions.

11.2 Evidence in Support of Reliability

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

12. Training

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

This material shall include but is not limited to the following topics:

- Handling
- Storage
- Application (particularly in areas of heavy coastal pollution)

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- Installation
- Maintenance
- Disposal

13. Environmental Considerations

Suppliers are required to comment on the environmental soundness of the design and the materials used in the manufacture of the pillar components. In particular, comments should address such issues as recyclability and disposal at end of service life.

14. Information to be Provided

14.1 Specific Technical Requirements

Attachment 1 of this specification details the required characteristics of the materials to be used in the construction of the pillars. Suppliers shall complete **Attachment 1**, **Attachment 2** and **Attachment 3** of this specification with details of the equipment offered.

14.2 Checklist of Supporting Documentation

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

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15. Attachment 1 – Technical Details

The Supplier shall complete this Schedule.

PILLAR BASE			
Particulars	Units	Specified Requirement	Guaranteed Value
			IINo 168560
Manufacturer's Name and Address			
Manufacturer's Catalogue No & Drawing No			
Material Offered		Polymeric compound	
Ultra-violet Stability		Provide test report on UV stability	
Ignitability- Tested to AS/NZS 60695.2.13 (Glow-wire ignition temperature)	°C	>650 preferred	
Material Specification Sheet		Provide a copy.	
Minimum Wall Thickness	mm	4	
Mass (kg)	kg	16 (maximum)	
Yield Tensile Strength (MPa) (Stress)-tested to AS1145.1-77A@23°C	MPa	24 (Minimum)	
Izod Notched Impact Strength-tested to ASTM D256 @ 23°C	J/m	140 (Minimum)	
Melt Flow Index (MFI) – tested to ISO 1133 Condition E	gm /min.	2.0 (Maximum)	
Vicat Softening Point (VSP) – tested to AS1368	°C	128°C (Minimum)	
Compliance with panel mounting requirements		Inserting Panels: 0.20kN downward force without breaking or deforming slots.	
		Installing Fuses: 0.20kN horizontally at 200mm above base without breaking or deforming slots.	
Resistance to compression		Support 1.5kN downward force without permanent deformation.	
Cover-Base fixing		Withstand a 2.0kN horizontal force 100mm below top of cover without signs of dislodgment of the brass inserts.	
Means of supplying D-head screws with base		Screwed into inserts in base	
Colour		Green near G14 (AS2700)	
Base interchangeable with present design		Critical dimensions (Dwg. No. QESI 04-03-01)	
Ventilation		Indirect entry path (IP24D to AS/NZS 60529 with pillar cover fitted)	

The Supplier shall complete this Schedule.

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PILLAR COVER				
Particulars	Units	Specified Requirement	Guaranteed Value	
			IINo 168004	IINo 168002
Manufacturer's Name and Address				
Manufacturer's Catalogue Nos & Drawing Nos				
Material Offered		Polymeric compound		
Minimum Wall thickness	mm	4		
Ultra-violet Stability		Provide test report on UV stability		
Ignitability- Tested to AS/NZS 60695.2.13 (Glow-wire ignition temperature)	°C	>650 preferred		
Material Specification Sheet		Provide a copy.		
Minimum Wall Thickness	mm	4		
Mass (kg)	kg	16 (maximum)		
Yield Tensile Strength (MPa) (Stress)-tested to AS1145.1-77A@23°C	MPa	24 (Minimum)		
Izod Notched Impact Strength- tested to ASTM D256 @ 23°C	J/m	140 (Minimum)		
Melt Flow Index (MFI) – tested to ISO 1133 Condition E	gm /min.	2.0 (Maximum)		
Resistance to compression		Support 1.5kN downward force without permanent deformation.		
Cover-Base fixing		Withstand a 2.0kN horizontal force 100mm below top of cover without signs of cracking or breaking at the fixing screws.		
Colour		Green near G14 (AS2700)		
Cover interchangeable with present design		Critical dimensions (Dwg. No. QESI 04-03-02)		
Degree of protection to AS/NZS 60529		IP24D to AS/NZS 60529 when fitted to base		
Labelling- refer clause 5.3.2		"DANGER" "ELECTRICITY" >25mm high		
Ventilation with barrier		5 holes (minimum) 4-5mm in diameter IP24D to AS/NZS 60529		

SIGNATURE OF TENDERER: _____

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17. Attachment 3 – 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 ?		
5.1	Details of IP Rating and free flow ventilation.	Yes/No
5.1	Details of colour and its ultraviolet stability.	Yes/No
5.1	Test report on the ultraviolet stability of the material.	Yes/No
5.1	Stabiliser additives.	Yes/No
5.1	Test report on the ignitability of the material.	Yes/No
5.1	Flame retardency additives.	Yes/No
5.3	Recommendation for the method of attaching numbering to pillars.	Yes/No
5.4	Test report on the ignitability of the material.	Yes/No
6.1.2	Resistance to compression test report.	Yes/No
6.1.3	Cover-Base fixing test report.	Yes/No
6.2	Test report for electric strength of insulating shrouds.	Yes/No
8.0	Quality systems of both the Tenderer and the Manufacturer.	Yes/No
11.0	Service History.	Yes/No
12.0	Reliability.	Yes/No
13.0	Training Materials.	Yes/No
14.0	Environmental Soundness.	Yes/No

List below any variations in the items offered to the requirements of this specification:

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18. Attachment 4 – Alternative Offers

The following comment refers to Clause 5.1.

This technical specification prescribes injection moulded pillar covers and bases as the preferred construction. This preference is based on extensive experience with the materials used in the pillars and the method of construction of the pillar components. It is essential that:

- The bases and covers are dimensionally stable, providing consistent matching of new or in-service covers with new or in-service bases, and
- The bases render adequate rigidity in the walls and panel slot areas to facilitate the permanent and rigid support of the panels even when subjected to installation backfilling forces and the forces detailed in the technical specification.

Our experience has been that other known moulding and casting methods have failed in these performance requirements. Ergon Energy encourage alternative technologies and innovative solutions to its specified requirements and therefore will consider alternative offers. In these instances the Supplier will clearly demonstrate with their offer that their product/s will meet the requirements of this specification and of those outlined above.

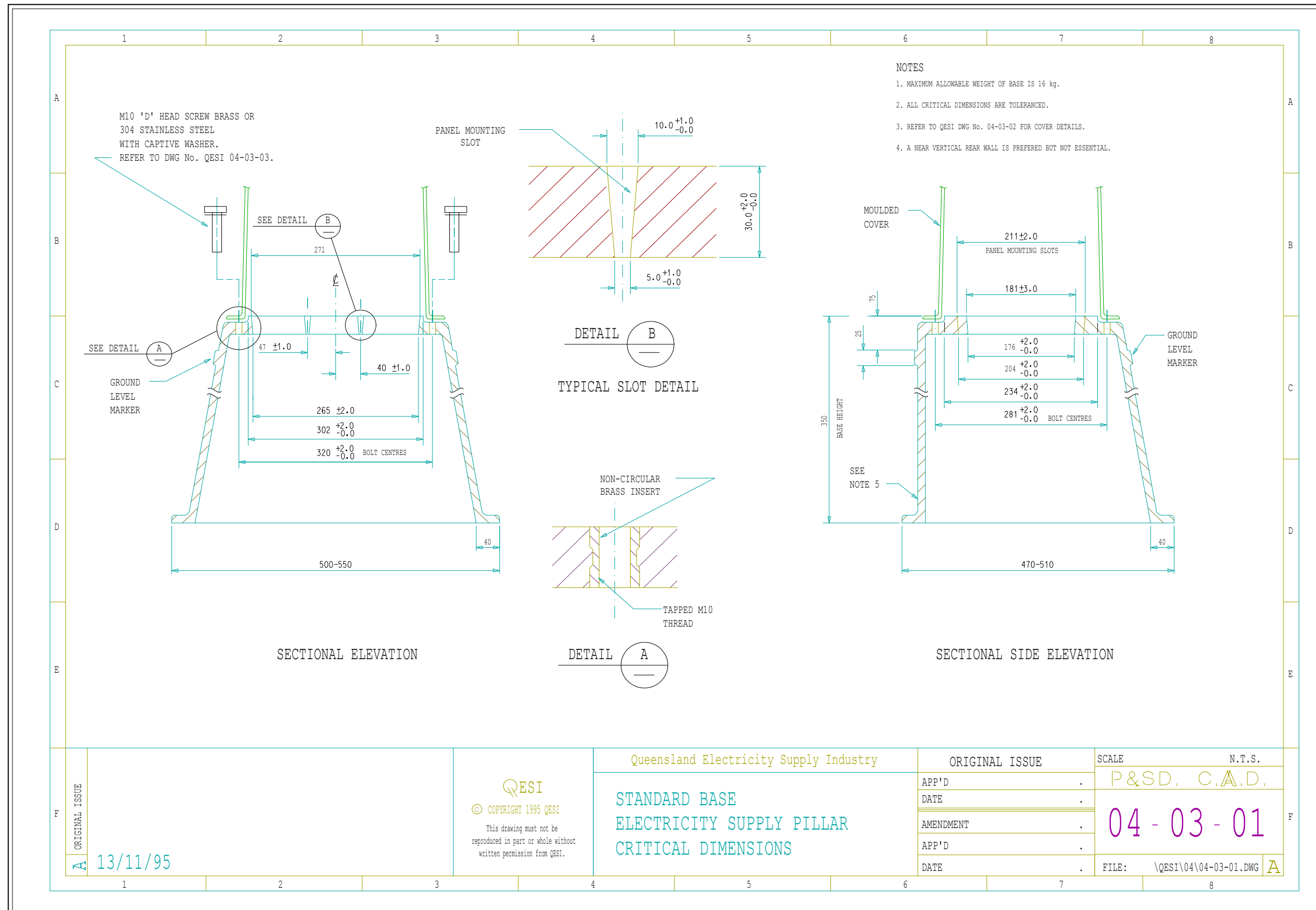
NAME OF TENDERER:

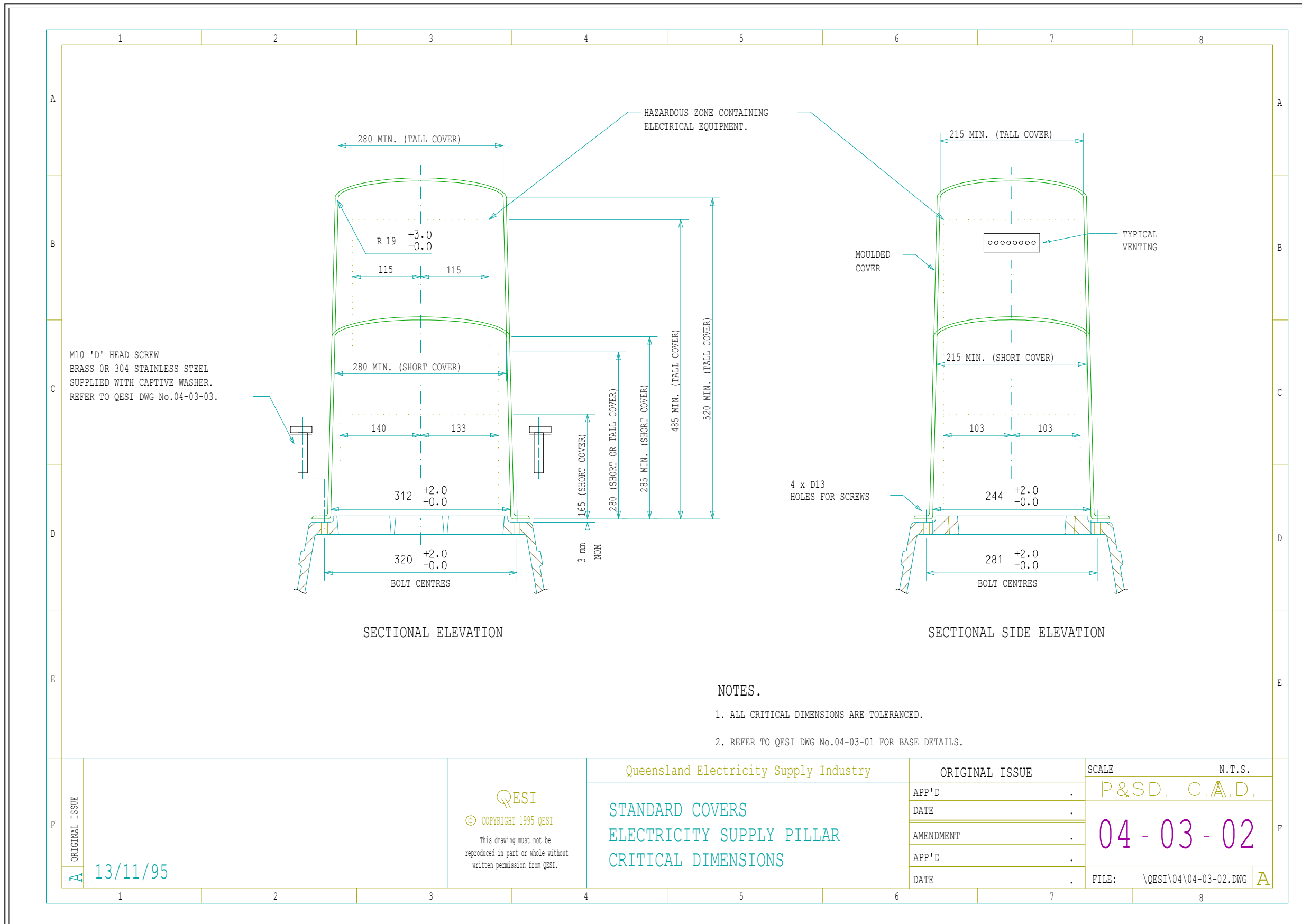
ADDRESS OF TENDERER: _____

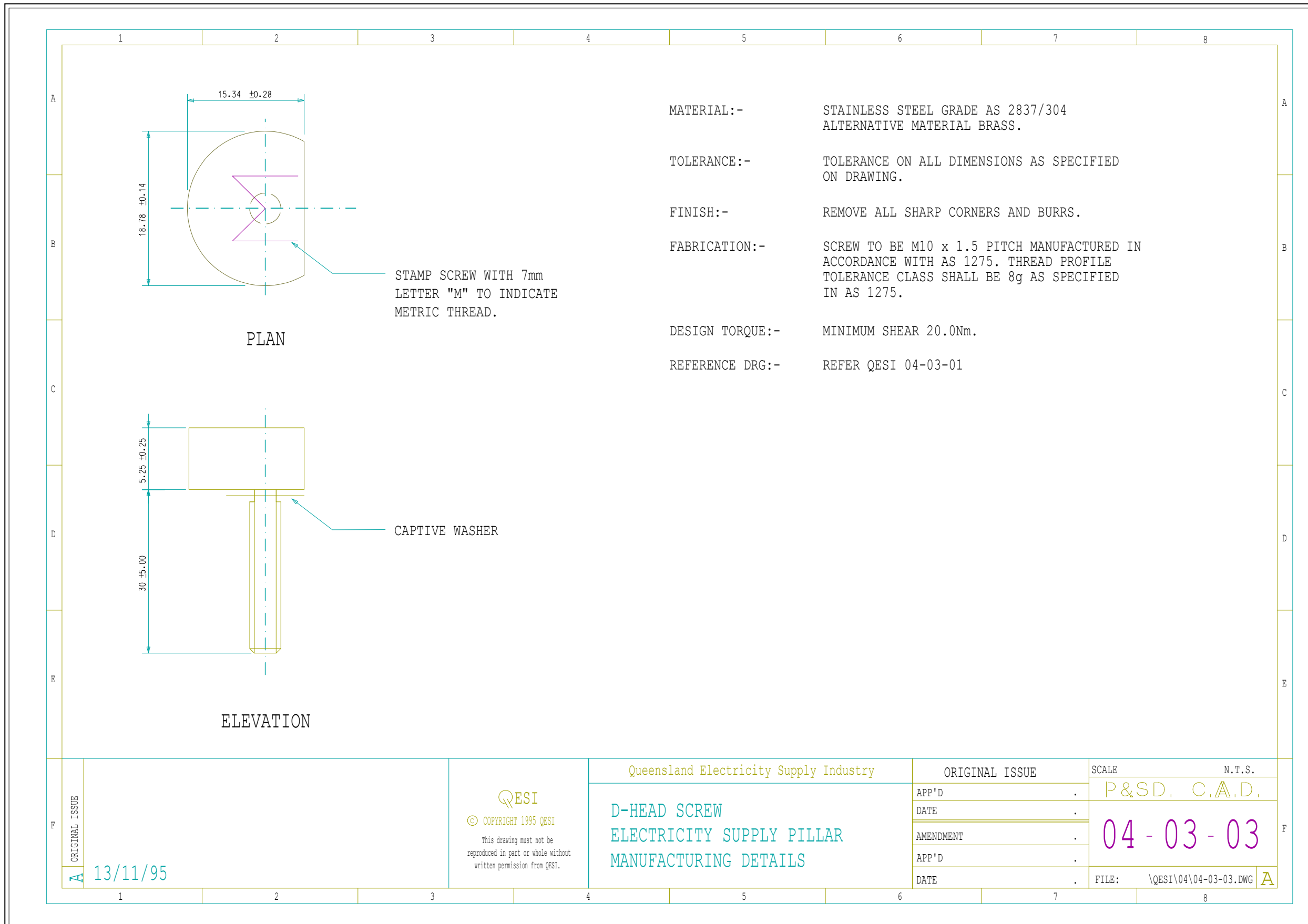
SIGNATURE: _____ FOR AND ON BEHALF OF TENDERER

DATE: _____

19. Attachment 5 – Drawings







TYPE	MINIMUM DIMENSIONS IN MILLIMETRES			
	A	B	C	T
1	100	55	65	2
2	160	50	65	3

MANUFACTURE: IN ACCORDANCE WITH DRAWING AND THE SPECIFICATION.

MATERIAL: FLEXIBLE P.V.C. COLOURED BLACK.

FABRICATION: REMOVE ALL SHARP EDGES AND BURRS.

TOLERANCES: GENERALLY SHALL BE $\pm 0.5\text{mm}$
BUT FOR THICKNESS SHALL BE $\pm 0.2\text{mm}$

PRELIMINARY

ALTERNATE SHAPE

ORIGINAL ISSUE	13/11/95	QESI © COPYRIGHT 1995 QESI This drawing must not be reproduced in part or whole without written permission from QESI.	Queensland Electricity Supply Industry INSULATING SHROUD ELECTRICITY SUPPLY PILLARS MANUFACTURING DETAILS	ORIGINAL ISSUE APP'D _____ DNE _____	SCALE P&SD. C.A.D.	N.T.S.		
				AMENDMENT APP'D _____ DNE _____	04-03-05			
				FILE: \P&SD\14-03-05-01.DWG/A				

MATERIAL			
I.I. No.	QTY		
2407012	1		
2406020	.1		

Sign, 5 digit asset identification number 2407012

Adhesive 2406020

LV Pillar (Typical)

**ASSEMBLY 568-1 SIGN, 5 DIGIT ASSET IDENTIFICATION NUMBER
GLUED TO HV AND LV EQUIPMENT**

A	ORIGINAL ISSUE		 Ergon Energy Corporation Ltd ABN 50 087 646 062	APPROVED <i>[Signature]</i> DATE 5/5/05 PASSED <i>D. McK.</i> DRAWN <i>C. Lindsay</i>	UNDERGROUND DISTRIBUTION ASSEMBLIES SIGN, (ASSET IDENTIFICATION NUMBER) TO HV AND LV EQUIPMENT
				FILE: 5 52 5198 1	Page 568