



Ergon Energy Corporation Limited

Technical Specification for Live Line Tap Connectors

ETS-06-01-01

Technical Specification for Live Line Tap Connectors

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Technical Specification for Live Line Tap Connectors

1. Purpose and Scope

This Specification sets out the requirements for live line tap connectors for use on overhead electricity distribution systems in a totally exposed environment. The live line tap connector is primarily used to attach or remove a tap conductor to or from an energised conductor with the aid of a live line tool or an insulated clamp type head operating stick.

Items covered by this specification, are listed as follows:

ITEM No.	ITEM DESCRIPTION	STOCK CODE
1	Connector Tap Live Line Bi-Metallic	0410219

2. References

2.1 Applicable Standards

The connectors 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 1531	Conductors - Bare overhead - Aluminium and aluminium alloy
AS 1746	Conductors - Bare overhead - Hard-drawn copper
AS 2738	Copper and copper alloys - Compositions and designations
AS 3607	Conductors – Bare overhead, aluminium and aluminium alloy – Steel reinforced
AS 4169	Electroplated coatings - Tin and tin alloys
ESAA D(b)5	Current ratings of bare overhead line conductors
DIN 48 215	Overhead power lines, clamps and connectors, technical delivery specifications
AS/NZS ISO 9001	Quality management systems – Requirements

3. Drawings

3.1 Drawings by the Purchaser

There are no drawings attached to this specification.

3.2 Drawings by the Tenderer

The tenderer shall supply with the Tender, detailed drawings, sketches or pamphlets of the items tendered.

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4. Service Conditions

Temperatures	45°C summer day time -5°C winter night time
Solar Radiation Level	1 000 W/m ² with high ultraviolet content
Precipitation	Tropical summer storms with gust wind speeds above 160 km/h, and an annual rainfall in excess of 1 500mm
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 g/m ²

5. Design and Construction

5.1 Main Components

Connector jaws suitably profiled which are able to effectively engage the conductor to provide a durable electrical connection without corrosion or overheating.

A screwed spindle which when rotated by an operating stick to the right hand thread convention either applies the connector or loosens it from the conductor.

An element with spring characteristics which ensures that the jaws apply spring loaded contact to the conductor at all times.

A screw type connector fastening for connecting the tap conductor to the connector body to provide a spring loaded durable electrical connection.

5.2 Conductor Range

The connectors shall be capable of accommodating conductor sizes as follows:

- Main Connection – 5mm to 10mm diameter.
- Tap Connection – 5mm to 10mm diameter.

5.3 Connector Body

The connector body shall be of materials which are resistant to corrosion and suitable for use with Copper, Aluminium, Steel, or ACSR Mains and Tap Conductors. Protrusions on the spindle housing shall not prevent or hinder the installation or removal of the connector with live line tools or an insulated clamp type head operating stick.

5.4 Connector Spindle

The spindle shall be of material which prevents corrosion between the spindle and the connector body or components and binding of the thread. The operating end of the spindle shall be a ring type dimensioned to withstand an ultimate torque of 34Nm. The spindle shaft diameter shall not be less than 8.5mm and not more than 11mm. The parallel free shank between the ring and the connector body shall be a minimum of 35mm to facilitate the use of suitable operating sticks. A backstop shall be provided to prevent backing off of the spindle beyond the point where the connector jaws are fully opened.

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5.5 Spindle Threads

Thread Protection against Corrosion – Spindle threads shall be enclosed in a threaded housing and protected by a wide temperature range, corrosion inhibiting compound.

Thread Protection against Arcing and Burning – The threaded housing shall protect the threads from damage by arcing of power line charging currents as the clamp is applied or removed.

5.6 Connector Jaws

The connectors shall be constructed such that the jaws are tightened by turning the connector spindle against the resistance of a spring washer or spring acting on the jaws. The jaws shall be suitably profiled to provide optimum conductor contact, hold down joint temperature, minimise conductor cold flow, and prevent the conductor from twisting during tightening.

5.7 Mains/Tap Connection

For the tap connector, single eye bolt types only will be acceptable and shall be supplied with nut combined with lock washer so as to provide a positive locking and joint pressure at all times when tightened. The assembly shall be capable of withstanding an ultimate torque of 34Nm. U-bolt type connectors are not acceptable.

5.8 Finish

Castings shall be impervious and free from pores and slag. Burrs and sharp edges shall be removed.

5.9 Ferrous Metals

Ferrous materials other than stainless steel are not acceptable.

5.10 Marking

Connectors shall be marked with Manufacturer's name or trademark and the conductor cross sectional areas or the conductor diameters of both the main and tap connections for which the connectors are designed.

6. Technical Details

Technical details of connectors tendered are to be set out in **Attachment 1**.

7. Performance and Testing

7.1 Type Tests

Test reports on the following type tests shall be provided. (Upon written application the requirement that these reports be submitted may be waived at the purchasers' discretion.

- a) Electrical Rating -The connector shall be capable of carrying a minimum current of 100A continuously without damage when installed with a torque of 10Nm on a conductor rated in excess of 100A.
- b) Heating Cycle Test -Heating cycle type tests shall be in accordance with Clause 5.4.2 of AS 1154 Part 1. Installation torque for the test shall be 10Nm for both main (tapped) and the tap (tapping) connections.

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- c) Short Term Current Test - Short Term current Test – Short time current type test shall be in accordance with Clause 5.4.3 of AS 1154 Part 1.
- d) Note 7/3.00 AAC (maximum conductor allowable) has a short circuit current rating of 3250A for 2 seconds.
- e) Spindle Torque Test –
 - 1. with the spindle against the backstop and a torque of 8.5Nm applied to it, the spindle shall not break free from the body.
 - 2. with a maximum applied torque of 34Nm the connector shall suffer no damage.
- f) Tap Connection Torque Test -With a maximum applied torque of 34Nm (using the largest diameter conductor to which the fitting may be applied) the connector shall suffer no damage.
- g) Mechanical Test -Mechanical type test shall be in accordance with AS 1154 Part 1 for non tension joints.

7.2 Batch Tests

Where specified each delivery of connectors shall be accompanied by copies of recent batch test carried out in accordance with the type tests specified in Clause 7.1.

Where recent batch test results are not available the Purchaser may require the following batch tests to be performed.

- 1. Spindle Torque Test
- 2. Tap Connection Torque test

Samples for batch tests shall be selected in accordance with Table 1.1 of AS 1154 1985 - Part 1.

8. Risk Assessment

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

9. Quality Assurance

9.1 Purchasers Policy

It is the Purchaser's policy to procure materials from sources that demonstrate the ability to supply quality products.

9.2 Documentary Evidence

Documentary evidence shall be provided concerning the level of quality system certification associated with the supplier and /or the manufacturer. This documentation shall include the Capability Statement associated with the Quality System Certification.

9.3 Quality Certification Program

Tenderers shall provide details of their program to upgrade their Quality Certification to meet the requirements of ISO 9001:2008.

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10. Samples

10.1 Production Samples

The Tenderer must submit, when requested, one (1) production sample of each item Tendered to assist in the evaluation of the Tender. Samples shall be delivered to the address nominated within five (5) working days of the request. The Tenderer shall allow the cost of supply and delivery of samples in the Tendered prices.

10.2 Waivered Conditions

The requirement for samples may be waived for the following conditions.

- The Tendered item is currently under contract or has previously been supplied to Ergon Energy under contract and there have been no changes to the design or material.
- The Tendered items have been supplied to Ergon Energy for approval prior to this Tender and there have been no changes to the design or material.

10.3 Sample Delivery

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

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

11. Packaging and Marking

11.1 Packaged Lot

Each packaged lot shall be marked with the following information:

Manufacturers Name
Purchase Order Number
Contract No.
Ergon Stock Code
Item Description
Pack Size
Pack Weight

12. Service Performance

Suppliers shall state:

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

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13. Reliability

13.1 Service Life

Suppliers are required to comment on the reliability of the equipment and the performance of the materials tendered for a service life of 35 years under the specified system and environmental conditions.

13.2 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.

14. Training

14.1 Training Material

Training material in the form of drawings, instructions and/or audio visuals (in CD format) are required to be provided for the items accepted under the tender. The Tenderers shall allow the cost of production and delivery of training material in the tendered prices.

The training materials should include but not be limited to the following topics:

- Handling
- Storage
- Application (particularly in areas of heavy coastal pollution)
- Installation
- Maintenance
- Environmental performance
- Electrical performance
- Mechanical performance
- Disposal

14.2 Training Audio Visuals

The successful Tenderer is required to provide training audio visuals for the Purchaser's staff/contractors in the correct use of all items to be supplied under the contract. Training audio visuals are to be supplied BEFORE the 1st deliveries are made under the contract.

The format and content of the audio visuals will be subject to negotiation between the Purchaser and the successful tenderer concerned. It is expected that as a minimum, the audio visuals will detail the correct installation practice for all items covered by the contract. The number of audio visuals required, in CD format, is thirty (30). Permission shall be given to the Purchaser to make additional copies if required.

In the production of the audio visuals, the Purchaser will make available suitable staff and equipment to demonstrate the recommended installation techniques.

15. Environmental Considerations

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

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16. Information to be Provided

16.1 Specific Technical Requirements

The specific technical requirements for the items Tendered 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.

16.2 Checklist of Supporting Documentation

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

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17. Attachment 1 – Technical Details

Particulars	Units	Tenderer's Response
Manufacturer's Name & Address		
Place of Manufacture		
Manufacturer's Product Catalogue Number		
Manufacturer's Drawing Number		
Will Batch Test Certificates be supplied?	Yes/No	
Type Test Report/Certificate No.		
Rated Continuous Current	(A)	
Rated Short Time Current	(A)	
Material used in Connector Body		
Material used in Connector Spindle		
Minimum Main Conductor Diameter	(mm)	
Maximum Main Conductor Diameter	(mm)	
Minimum Tapping Conductor Diameter	(mm)	
Maximum Tapping Conductor Diameter	(mm)	
Maximum Torque Spindle	(Nm)	
Maximum Torque Tap Connector	(Nm)	
Connector weight	(kg)	
Pack Size		
Pack Weight	(kg)	

SIGNATURE OF TENDERER: _____

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18. Attachment 2 – Technical Document Checklist

Clause Ref.	Particulars	Tenderer's Response
Have full and comprehensive details been submitted WITH the Tender documents associated with each of the following items?		
3.2	Drawings of item Tendered	Yes/No
7.1	Type Test Certificate	Yes/No
9.2	Documentary evidence of the Quality System Certification of BOTH the SUPPLIER and the MANUFACTURER (including Capability Statement)	Yes/No
9.3	Program to upgrade Quality Certification to meet the requirements of AS 9001:2008	Yes/No
12	Service Performance	Yes/No
13	Reliability	Yes/No
14	Training materials	Yes/No
15	Environmental considerations	Yes/No
16	Information to be Provided: Completed Attachment 1 & 2	Yes/No

NAME OF TENDERER:

ADDRESS OF TENDERER: _____

SIGNATURE: _____ FOR AND ON BEHALF OF TENDERER

DATE: _____