



**Ergon Energy Corporation Limited**

**Technical Specification for Earth  
Rods/Accessories, Connectors and  
Earth Enhancing Compound**

**ETS01-08-01**

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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## Contents

<b>1. Purpose and Scope</b> .....	<b>1</b>
<b>2. References</b> .....	<b>1</b>
2.1 Applicable Standards .....	1
<b>3. Drawings</b> .....	<b>2</b>
3.1 Drawings by the Purchaser .....	2
3.2 Drawings by the Tenderer.....	2
<b>4. Service Conditions</b> .....	<b>2</b>
4.1 Ground Conditions .....	2
<b>5. Design and Construction</b> .....	<b>3</b>
5.1 General .....	3
5.2 Rods - General.....	4
5.3 Rods - Tapered .....	4
5.4 Couplings .....	4
5.5 Driving Point.....	4
5.6 Driving Mechanism (Head + Pin as applicable) .....	5
5.7 Compression Connectors .....	5
5.8 Bolted Connectors .....	6
5.9 Earth Enhancing Compound.....	6
5.10 Technical Characteristics .....	7
<b>6. Performance and Testing</b> .....	<b>7</b>
6.1 Connectors.....	7
<b>7. Risk Assessment</b> .....	<b>8</b>
7.1 Compliance .....	8
7.2 Risk Assessment .....	8
7.3 Hazards .....	8
7.4 Risk Assessment Schedule.....	8
<b>8. Quality Assurance</b> .....	<b>8</b>
8.1 Purchasers Policy .....	8



# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

---

8.2	Documentary Evidence .....	9
8.3	Quality Certification Program .....	9
<b>9.</b>	<b>Samples .....</b>	<b>9</b>
9.1	Production Samples .....	9
<b>10.</b>	<b>Packaging and Marking .....</b>	<b>10</b>
10.1	Packaged Lots .....	10
10.2	Quarantine Requirements .....	10
<b>11.</b>	<b>Service Performance .....</b>	<b>11</b>
<b>12.</b>	<b>Reliability .....</b>	<b>11</b>
12.1	Service Life .....	11
12.2	Evidence in Support of Reliability .....	11
<b>13.</b>	<b>Training .....</b>	<b>11</b>
13.1	Training Material .....	11
13.2	Audio Visuals .....	11
<b>14.</b>	<b>Environmental Considerations .....</b>	<b>12</b>
<b>15.</b>	<b>Information to be Provided .....</b>	<b>12</b>
15.1	Specific Technical Requirements .....	12
15.2	Checklist of Supporting Documentation .....	12
<b>16.</b>	<b>Tools and Equipment .....</b>	<b>12</b>
<b>17.</b>	<b>Attachment 1 – Technical Details – Earth Rods .....</b>	<b>13</b>
<b>18.</b>	<b>Attachment 2 – Technical Details - Couplings .....</b>	<b>14</b>
<b>19.</b>	<b>Attachment 3 – Technical Details – Driving Points .....</b>	<b>15</b>
<b>20.</b>	<b>Attachment 4 – Technical Details – Compression Connectors .....</b>	<b>16</b>
<b>21.</b>	<b>Attachment 5 – Technical Details – Bolted Connectors .....</b>	<b>17</b>
<b>22.</b>	<b>Attachment 6 – Technical Details – Earth Enhancing Compound .....</b>	<b>18</b>
<b>23.</b>	<b>Attachment 7 – Risk Assessment .....</b>	<b>19</b>
<b>24.</b>	<b>Attachment 8 – Technical Document Checklist .....</b>	<b>21</b>

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## 1. Purpose and Scope

This technical specification sets out the requirements for the manufacture, testing at works, supply and delivery of copper sheathed earth rods and associated fittings, connectors and earth enhancing compound.

Earth rods and fittings are used to provide the interface to ground in order to achieve satisfactory earthing systems in overhead and underground electricity distribution and transmission networks.

Items covered by this technical specification, are listed as follows:

ITEM No.	DESCRIPTION	Ergon Stock Code
1	EARTH ROD, 1500mm x 13mm Dia, Copper Clad Steel Tapered	2404544
2	COUPLING Earth Rod 13mm Dia Tapered to suit Item #1	2404546
3	EARTH ROD, Driving Point to suit Item #1 (Normal type)	2404548
4	EARTH ROD, Driving Point to suit Item #1 (Star type)	0104417
5	CONNECTOR, 6 Profile, Compression (50/70 mm <sup>2</sup> cable to earth rod)	2401802
6	CONNECTOR, C Profile, Compression (50/70 mm <sup>2</sup> cable to 50/70 mm <sup>2</sup> cable)	2401803
7	CONNECTOR, C Profile, Compression (95/120 mm <sup>2</sup> cable to 16/70 mm <sup>2</sup> cable)	0719368
8	CLAMP Earth Rod U-Bolt Type 13/15mm Dia Earth Rod & 16/120mm <sup>2</sup> CU Cables	0719437
9	Earth enhancing compound premixed	2405324

## 2. References

### 2.1 Applicable Standards

The equipment and fittings 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 1112.1	ISO metric hexagon nuts
AS 1275	Metric screw threads for fasteners
AS/NZS 1442	Carbon steels and carbon-manganese steels - Hot-rolled bars and semifinished products

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

STANDARD	TITLE
AS 1567	Copper and copper alloys - Wrought rods, bars and sections
AS 1572	Copper and copper alloys - Seamless tubes for engineering purposes
AS 1931	High-voltage test techniques
AS 2239	Galvanic (sacrificial) anodes for cathodic protection
AS 2837	Wrought alloy steels – stainless steel bars and semi-finished products
AS/NZS 3679	Structural steel
AS/NZS 4360	Risk management
ISO 9002	Quality systems - Model for quality assurance in production, installation and servicing

## 3. Drawings

### 3.1 Drawings by the Purchaser

There are no drawings attached to this specification.

### 3.2 Drawings by the Tenderer

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

## 4. Service Conditions

### 4.1 Ground Conditions

The items will be exposed to a range of soil types, including the following:

- Clay - soft and compacted;
- Granite and gravel;
- Rock, shale and sandstone;
- Sand; and
- Alluvial sediment.

Across this range of ground conditions, both the electrical conductivity and corrosive properties of the soils, vary markedly.

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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## 5. Design and Construction

### 5.1 General

- 5.1.1 To ensure compatibility of component parts of the earth rod assembly, the items to be supplied under this contract specification shall consist of earthrods and accessories which form a "total system" (but excluding connectors and earthing enhancing compounds). This will include an assessment of the safety, productivity, reliability and long term performance of the items tendered.
- 5.1.2 The design of the rod assembly (including couplings and driving points) shall be of such mechanical strength that they shall withstand the stresses and abrasions present during installation with an electric/pneumatic hammer.
- 5.1.3 The design of the rods and couplings shall be such that during installation, the connection between the rod and the coupling shall "self-tighten". This self-tightening shall have the effect of improving the electrical and mechanical performances of the rod/coupling combination.

The Tenderer shall state the design features of the rod and accessories which verify the following features:

- Self-tightening;
- Improved electrical connection; AND
- No damage to the copper sheath on installation.

- 5.1.4 The rod system shall be extendable by the use of appropriate couplings.
- 5.1.5 All items including rods, couplings (including guiding pin and sleeve), driving points, driving mechanisms (heads and pins), and connectors shall be clean, free of burrs, cracks and sharp edges. The ends of the rods shall be chamfered.
- 5.1.6 Tenderers shall state available methods of covering the top of the earth rod at each earthing installation. The application of such a covering shall protect against corrosion of the earth rod. The covering does not have to meet any specific criteria eg. UV-stabilised.
- 5.1.7 Tenderers shall provide the recommended procedure for the correct assembly of the various components of the earthing system including the earth rod, coupling, driving mechanism, driving points and connectors.

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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## 5.2 Rods - General

- 5.2.1 The earth rods shall have a nominal outside diameter of 13 mm and a nominal length of 1 50 mm. The rod shall consist of a steel core of minimum grade AS 3679.1-250.
- 5.2.2 The copper sheath shall be either **molecularly bonded** or **extruded** so as to maintain intimate contact with the steel core of the earth rod. The application of the copper sheath shall prevent any electrolytic action to be initiated by moisture ingress between the copper and the steel.
- 5.2.3 Tenderers shall state the method used to apply the copper sheath to the rod together with the design features to verify the prevention of moisture ingress.
- 5.2.4 Extruded sheath rods shall have a final minimum thickness of copper of 0.45 mm.
- 5.2.5 Rods which have the copper applied electrolytically, shall have a minimum copper thickness of 0.25 mm.
- 5.2.6 Rods shall be "tapered" type complying with the clauses described below.  
NOTE: Threaded rods are NOT acceptable.

## 5.3 Rods - Tapered

- 5.3.1 Both ends of the rods shall be tapered. The taper shall be approximately 3:100 on diameter and the length of taper shall be at least 50 mm long (as measured parallel to the axis of the earth rod).

## 5.4 Couplings

- 5.4.1 The coupling device shall be designed to ensure good permanent electrical conductivity is maintained between the joined earth rods throughout a service life of 35 years for the installed earth rod assembly.
- 5.4.2 The couplings shall be manufactured from material compatible with the rods. The material used shall be selected to ensure that electrolytic action and/or stress corrosion cracking will not occur. In addition, the surfaces of the couplings exposed to the soil, shall be corrosion resistant.
- 5.4.3 Tenderers shall state the material(s) used in the coupling.

## 5.5 Driving Point

- 5.5.1 The driving points shall be designed to reduce the driving effort on the earth rod. The driving point shall be designed to prevent damage to the copper sheath during the installation process.
- 5.5.2 Both "Normal" and "Star" (rock) type driving points are required.
- 5.5.3 The diameter of both types of driving points must **NOT be LESS THAN** the diameter of the earth rod/coupler assembly.

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## 5.6 Driving Mechanism (Head + Pin as applicable)

- 5.6.1 The driving mechanism shall be used in conjunction with an electric/pneumatic hammer.
- 5.6.2 The driving mechanism shall cover the rod sufficiently so as to prevent it from bouncing off the rod when used in conjunction with an electric/pneumatic hammer.
- 5.6.3 The driving head shall not damage the copper coating of the earth rod. Further, the driving mechanism shall not distort the coupling and/or rod to such an extent that an additional earth rod cannot be fitted into the coupling.
- 5.6.4 Tenderers shall provide full details concerning the method of installation including:
- The removability of the driving pin and/or the last coupling when the installation process is completed;
  - The requirement for a coupling for driving purposes.
- 5.6.5 Tenderers shall state the extent of re-useability of the driving pin and the coupling.

## 5.7 Compression Connectors

- 5.7.1 Connector(s) shall satisfy the following requirements:
- (a) be suitable for direct burial in the ground.
  - (b) connect a 13 mm diameter rod with a stranded copper conductor of the following sizes :-  
Minimum conductor size: 50 mm<sup>2</sup> (19/1.78)  
Maximum conductor size: 70 mm<sup>2</sup> (19/2.14)
  - (c) be used to join the following stranded copper conductors:  
50 mm<sup>2</sup> to 50 mm<sup>2</sup>;  
50 mm<sup>2</sup> to 70 mm<sup>2</sup>; and  
70 mm<sup>2</sup> to 70 mm<sup>2</sup>.
  - (d) The same method of connection shall be used for a conductor/conductor joint as well as a conductor/rod joint.
- 5.7.2 The "C" shaped compression fitting is the preferred compression type connector.
- 5.7.3 The design of the connector shall allow the laying of two cables side by side when making a conductor/conductor connection.
- 5.7.4 Some form of anti-oxidant grease covering the inside of the connector is required for compression type fittings.
- 5.7.5 Compression connectors shall be suitable for use with the following die sizes (or equivalents) to be used with Utilux compression tool 38A (or equivalent):

Specification Item No.	Compression Clamp Type	Compression Die Type
7	Large	Burndy U-997 Dulmison DU1315
8	Small	Burndy U-0 Dulmison DUOT



# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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Tenders who are unable to conform to this requirement shall provide full technical details together with unit prices of the dies and the compression tools required for their system.

5.7.6 Tenderers shall indicate if the rod requires pre-crimping prior to compressing the connector.

## 5.8 Bolted Connectors

5.8.1 Connectors (Earth Rod/Conductor) shall satisfy the following requirements:

- (a) Be suitable for direct burial in the ground.
- (b) Be suitable for connecting a 13 mm diameter rod with one or two stranded copper conductors of the following sizes:  
Minimum conductor size: 35 mm<sup>2</sup> (19/1.53)  
Maximum conductor size: 70 mm<sup>2</sup> (19/2.14)
- (c) Be of double saddle type that houses the conductor and earth rod separately.
- (d) Be of materials which are resistant to corrosion and parts of the connector which are in direct contact with the conductor and earth rod shall be of material which does not cause interface corrosion.

5.8.2 The Connectors (conductor/conductor) shall satisfy the following requirements:

- (a) Be suitable for underground applications and shall have corrosion resistant properties similar to the 'earth rod/conductor' type connectors
- (b) **The Connectors (conductor /conductor) shall be suitable for joining the following types of stranded copper conductor;**
  - 35mm<sup>2</sup> to 35 mm<sup>2</sup>
  - 35mm<sup>2</sup> to 70mm<sup>2</sup>
  - 70mm<sup>2</sup> to 70 mm<sup>2</sup>

The connectors shall be supplied with stainless steel M10 nuts with head dimensions in accordance with AS 1112.

All bolts and washers shall be grade 316 stainless steel in accordance with AS 2837.

All nuts shall be grade 304 stainless steel in accordance with AS 2837.

Stainless steel bolts and nuts shall be suitably greased to prevent binding

The tenderer shall advise the minimum and maximum recommended tightening torques as well as the specified tightening technique/procedure.

## 5.9 Earth Enhancing Compound

The preferred compound is a granular mixture of Calcium Bentonite & Gypsum WITHOUT additional conductivity enhancing compounds.

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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**NOTE: Sodium Bentonite is NOT acceptable.**

A mixture of ingredients which complies with Clause 4.2(a) of AS 2239 shall be used to improve soil conductivity where rods are installed in drilled holes.

Tenderers shall state the components of the mixture as well as provide evidence that supports the non-corrosive properties of the mixture tendered, both in the short-term as well as the long-term.

Packaged weight of the mixture shall not exceed 20 kg and the contents shall be adequately contained within the package. The packaging material must be able to withstand up to 24 hours exposure in an outdoor environment without affecting the contents of the package. Further, the packaging material shall display the correct handling procedures including recommended clothing and safety equipment requirements.

Tenderers shall provide full details of the packaging materials in relation to these requirements.

Tenderers are required to provide details concerning the safety aspects associated with handling of the compound.

## 5.10 Technical Characteristics

Tenderers shall provide detailed drawings for all items tendered.

## 6. Performance and Testing

### 6.1 Connectors

Connectors shall be installed in accordance with the manufacturer's instructions.

The complete test procedure is given below:

- (a) the earth rod/connector/conductor combination shall be tested in still air. The locations of the connections for injecting the test current shall be positioned not less than twenty (20) times the diameter of the earth rod from the centre of the connector for all tests.
- (b) tests shall be carried out on the following connection combinations for both compression and bolted type connectors as detailed below:
  - 35 mm<sup>2</sup> conductor to earth rod (Bolted type only)
  - 50mm<sup>2</sup> conductor to earth rod (Compression type only)
  - 70 mm<sup>2</sup> conductor to earth rod (Both types)
  - 35mm<sup>2</sup> conductor to 35 mm<sup>2</sup> conductor (Bolted type only)
  - 35 mm<sup>2</sup> conductor to 70 mm<sup>2</sup> conductor (Bolted type only)
  - 50 mm<sup>2</sup> cable conductor to 50 mm<sup>2</sup> cable conductor (Compression type only)
  - 50 mm<sup>2</sup> cable conductor to 70 mm<sup>2</sup> cable conductor (Compression type only)
  - 70 mm<sup>2</sup> cable conductor to 70 mm<sup>2</sup> cable conductor (Both types)

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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- (c) A minimum average test current of 5 kA, 50 Hz for 1 second ( $I^2t$  of 25 MA<sup>2</sup>/second) shall be used for each test.
- (d) Visual inspection after the test shall ensure that there is no damage to the connector and there is no severe discolouration to the connector and surrounding areas. There should be no loosening of the connection between the cable and the rod or between the cable and the cable.

The successful tenderer shall provide test reports that verify the requirements detailed above before the first deliveries are accepted under the contract.

## 7. Risk Assessment

### 7.1 Compliance

Tenderers must comply with the requirements of the Queensland Workplace Health and Safety Act 1995 and associated compliance/ advisory standards.

### 7.2 Risk Assessment

Tendered items shall be subjected to a formal risk assessment prior to acceptance. It is preferred that the tenderer performs the risk assessment themselves and provide the resultant documentation with their tender. Where risk assessment documentation is not provided with the tenders, or does not meet the required standard, such tenders shall have their price loaded with the estimated costs associated with the Purchaser conducting the assessments. Any documented risk assessment which accompanies the tender 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.

### 7.4 Risk Assessment Schedule

The 'Risk Assessment' schedule included with this specification is to be completed by the Tenderer. Note the schedule contains a generic set of questions designed to cover all the purchaser's plant and materials and the tenderer is only required to complete those items applicable to the product tendered.

## 8. Quality Assurance

### 8.1 Purchasers Policy

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

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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## 8.2 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.

## 8.3 Quality Certification Program

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

## 9. Samples

### 9.1 Production Samples

With due regard to the items tendered by the Tenderer, the following items must be submitted as part of the tender package and at no cost to the purchaser:

- one (1) 20 kg bag of Bentonite/Gypsum; and
- two (2) production samples of all other items tendered

Samples MUST be delivered within one (1) week of the closing date of tenders and the requirement for samples is NOT waived, even if the tendered items are currently or have previously been supplied to the purchaser.

Again, depending on the items tendered, Tenderers shall also provide the following:

- A sample of a coupling fitted with a short length of earth rod (suggested length 50-100 mm) at each end. A section of the coupling shall be removed to show the internal connection at the rod centre-line;
- A sample of a "C" connector used to attach a short length of 50 mm<sup>2</sup> stranded copper conductor to a short length of earth rod (suggested length 100-200 mm of each);
- A sample of a "C" connector used to attach a short length of 50 mm<sup>2</sup> stranded copper conductor to a short length of 50 mm<sup>2</sup> stranded copper conductor (suggested length 100-200 mm of each).
- A sample of a bolted connector tendered for item 9, attaching a short length of 35 mm<sup>2</sup> stranded copper conductor to a short length of earth rod (suggested length 100-200 mm of each).
- A sample of a bolted connector tendered for item 9, attaching two short lengths of 35 mm<sup>2</sup> stranded copper conductor to a short length of earth rod (suggested length 100-200 mm of each).
- A sample of a bolted connector tendered for item 9, attaching a short length of 70 mm<sup>2</sup> stranded copper conductor to a short length of earth rod (suggested length 100-200 mm of each).
- A sample of a bolted connector tendered for item 9, attaching two short lengths of 70 mm<sup>2</sup> stranded copper conductor to a short length of earth rod (suggested length 100-200 mm of each).
- A sample of a bolted connector tendered for item 10, attaching a 35 mm<sup>2</sup> stranded copper conductor to a 35 mm<sup>2</sup> copper conductor (suggested length 100-200mm of each).
- A sample of a bolted connector tendered for item 10, attaching a 70 mm<sup>2</sup> stranded copper conductor to a 35 mm<sup>2</sup> copper conductor (suggested length 100-200mm of each).

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

- A sample of a bolted connector tendered for item 10 attaching a short length of 70 mm<sup>2</sup> stranded copper conductor to a short length 70 mm<sup>2</sup> stranded copper conductor (suggested length 100 – 200 mm).
- Samples shall be delivered freight free, suitably crated and packaged and labelled with the following information:

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

The purchaser may, at their discretion, either purchase the items at the tender price or return the samples to the respective tenderer after the contract has been awarded.

Samples shall be delivered to the Purchaser's address, marked to the attention of the Purchaser's Technical Representative nominated to receive the tender enquires, as per "Introduction and the Description of Works" attached to the Tender Documents.

## 10. Packaging and Marking

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

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

### 10.1 Packaged Lots

Each packaged lot shall be marked with the following information:

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

### 10.2 Quarantine Requirements

Should the items 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.

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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## 11. 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.

## 12. Reliability

### 12.1 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.

### 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

### 13.1 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

### 13.2 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.

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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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.

## 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 Tendered. In particular, comments should address such issues as recycling and disposal at the end of service life.

## 15. Information to be Provided

### 15.1 Specific Technical Requirements

The specific technical requirements for the items tendered shall be as stated in **Attachments 1 to 6** of this specification. The supplier shall provide all details requested by **Attachments 1 to 6** and shall guarantee such data.

### 15.2 Checklist of Supporting Documentation

**Attachment 7** details a checklist for the Risk Assessment information which is required to be submitted with the tender.

**Attachment 8** details a checklist of supporting technical documentation which is required to be submitted with the tender.

## 16. Tools and Equipment

The following is a list of tools which trucks are currently fitted with or which tradespeople carry:

- Pneumatic hammer
- Crimping tool

A list of any tools required for the installation of the earth rod system is to be provided. The evaluation of tenders will take into account the requirement for any additional tools.

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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## 17. Attachment 1 – Technical Details – Earth Rods

Item1:	Units	Guaranteed Value
Manufacturer's Name and Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Type Test Certificate No.		
Overall length	mm	
Outside diameter	mm	
Thickness of copper	mm	
Material Specification (Standard and Grade)		
Length of reduced section	mm	
Outside diameter of reduced portion	mm	
Pack Size		
Pack Weight	kg	

**SIGNATURE OF TENDERER:** \_\_\_\_\_



# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## 18. Attachment 2 – Technical Details - Couplings

Item 2:	Units	Guaranteed Value
Manufacturer's Name and Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Type Test Certificate No.		
Overall length	mm	
Outside diameter	mm	
Inside diameter	mm	
Wall Thickness	mm	
Material specification (Standard and Grade)		
Length of slip fit over rod	mm	
Guiding pin type (Standard and Grade)		
Guiding pin length	mm	
Guiding pin diameter	mm	
Pack Size		
Pack Weight	kg	

**SIGNATURE OF TENDERER:** \_\_\_\_\_



# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

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## 19. Attachment 3 – Technical Details – Driving Points

Items 3 & 4:	Units	Guaranteed Value
Manufacturer's Name and Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Type Test Certificate No.		
Overall length	mm	
Outside diameter of body	mm	
Material Specification (Standard and Grade)		
Pack Size		
Pack Weight	kg	

**SIGNATURE OF TENDERER:** \_\_\_\_\_

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## 20. Attachment 4 – Technical Details – Compression Connectors

Items 5, 6 & 7:	Units	Guaranteed Value
Manufacturer's Name and Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Type Test Certificate No.		
Type of connector		
Overall length	mm	
Outside width of body	mm	
Separation between opening of connector	mm	
Material Specification (Standard and Grade)		
Recommended installation components:  (a) compression tool (b) die size		
Pack Size		
Pack Weight	kg	

**SIGNATURE OF TENDERER:**

\_\_\_\_\_

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## 21. Attachment 5 – Technical Details – Bolted Connectors

Items 8:	Units	Guaranteed Value
Manufacturer's Name and Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Type Test Certificate No.		
Type of connector		
Overall length	mm	
Outside width of body	mm	
Material Specification (Standard and Grade)		
(a) Bolt : size	mm	
material grade		
width across flats	mm	
(b) Nut: size	mm	
material grade		
width across flats	mm	
Recommended lightning torque:		
(a) minimum		
(b) maximum		
Pack Size		
Pack Weight	kg	

**SIGNATURE OF TENDERER:** \_\_\_\_\_



# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## 22. Attachment 6 – Technical Details – Earth Enhancing Compound

Item 9:	Units	Guaranteed Value
Manufacturer's Name and Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Manufacturer's Drawing No.		
Type Test Certificate No.		
List of ingredients & approximate mixture by mass:		
Materials used in packaging		
Pack Size		
Pack Weight	kg	

**SIGNATURE OF TENDERER:** \_\_\_\_\_

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## 23. Attachment 7 – Risk Assessment

The Tenderer shall complete the relevant items (as applicable):

Clause Ref.	Particulars	Tenderer's Response
1.	Have Risk Assessments been carried out on equipment tendered which meet the requirements of AS/NZS 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 surfaces 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 Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## ATTACHMENT 7 - RISK ASSESSMENT (Cont'd)

Clause Ref.	Particulars	Tenderer's Response
15.	What hazardous substances are used/produced (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, lock-outs)?	
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?	
29.	What are the hazards associated with equipment failure?	

**SIGNATURE OF TENDERER:** \_\_\_\_\_

# Technical Specification for Earth Rods/ Accessories, Connectors and Earth Enhancing Compound

## 24. Attachment 8 – Technical Document Checklist

Clause Ref.	Particulars	Tenderer's Response
Have full and comprehensive details been submitted <b>WITH</b> the tender documents associated with each of the following items?		
5.1.3	Design features of the rod.	Yes/No
5.1.6	Earth rod top protective cover.	Yes/No
5.1.7	Assembly procedure	Yes/No
5.2.2	Method of application of copper sheath	Yes/No
5.4.2	Method of corrosion protection for couplings.	Yes/No
5.6.4	Installation methods - driving mechanism.	Yes/No
5.6.5	Pin re-useability	Yes/No
5.7.5	Dies, compression tools (if non-standard)	Yes/No
5.7.6	Requirement for pre-crimping of the rod	Yes/No
5.8.2	Non-corrosive properties of earth enhancing compound	Yes/No
5.9	Packaging materials for earth enhancing compound	Yes/No
5.9	Safety aspects re handling of earth enhancing compound	Yes/No
5.10	Drawings for all items tendered	Yes/No
6.1	Availability of Test Report - Connectors	Yes/No
7.2/7.4	Risk Assessments	Yes/No
8.2	Documentary evidence of the Quality System Certification of <b>BOTH</b> the <b>SUPPLIER</b> and the <b>MANUFACTURER</b> (including <b>Capability Statement</b> )	Yes/No
8.3	Supplier/Manufacturer's program to update QA Systems to ISO 9001	Yes/No
11	Service Performance	Yes/No
12	Reliability	Yes/No
13	Training Materials	Yes/No
13.2	Training Package	Yes/No
14	Environmental Considerations	Yes/No
14	<b>Attachments 1, 2, 3, ,4 ,5, 6, 7 and 8</b>	Yes/No

NAME OF TENDERER:

ADDRESS OF TENDERER: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ FOR AND ON BEHALF OF TENDERER

DATE: \_\_\_\_\_