# Ergon Energy Document Revision List

**Project:** Sub-Transmission Construction Manual  
**Electronic - Website Version**

## Section 10 - Earthing Ver 5

**Issued Document Revision Number:**

<table>
<thead>
<tr>
<th>Section Title / Drawing Number</th>
<th>Current Published</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 10 – Earthing Ver 5 (891.5 KB)</td>
<td>16-Aug-17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10-1-1</td>
<td>0A</td>
<td>0A</td>
<td>0A</td>
<td>0A</td>
<td>0A</td>
</tr>
<tr>
<td>5-10-2-1</td>
<td>0A</td>
<td>0A</td>
<td>0A</td>
<td>0A</td>
<td>0A</td>
</tr>
<tr>
<td>5-10-2-2</td>
<td>0A</td>
<td>0A</td>
<td>0A</td>
<td>OB</td>
<td>OB</td>
</tr>
<tr>
<td>5-10-3-1</td>
<td>0A</td>
<td>OB</td>
<td>OC</td>
<td>OC</td>
<td>OC</td>
</tr>
<tr>
<td>5-10-4-1</td>
<td>0A</td>
<td>0A</td>
<td>OB</td>
<td>OB</td>
<td>OB</td>
</tr>
<tr>
<td>5-10-5-1</td>
<td>0A</td>
<td>0A</td>
<td>OB</td>
<td>OB</td>
<td>OB</td>
</tr>
<tr>
<td>5-10-6-1</td>
<td>0A</td>
<td>0A</td>
<td>OB</td>
<td>OB</td>
<td>OB</td>
</tr>
<tr>
<td>5-10-6-2</td>
<td>New Drawing</td>
<td>DA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONSTRUCTION</td>
<td>DESCRIPTION</td>
<td>DWG No.</td>
<td>CONSTRUCTION</td>
<td>DESCRIPTION</td>
<td>DWG No.</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------</td>
<td>---------</td>
<td>--------------</td>
<td>------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>Earthing Construction Codes</td>
<td>5-10-2-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional Earthing Codes</td>
<td>5-10-2-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECEGR00</td>
<td>Grading Arrangement - Concrete Pole</td>
<td>5-10-3-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECEPCSC/XC</td>
<td>Driver Rod Earthing Arrangement - Concrete Pole</td>
<td>5-10-4-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECEDDSC/EADD</td>
<td>Deep Drilled Earthing</td>
<td>5-10-5-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECECP00</td>
<td>Counterpoise Earthing</td>
<td>5-10-6-1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**EARTHING - STANDARD CONFIGURATIONS**

**ELECTRODE TYPE**
- 0: Not applicable
- C: Copper Clad

**ROD SPEC**
- 0: Nil
- S: Standard length
- X: Extended (2 rods)
- D: Deep drilled

**POLE TYPE**
- C: Conductive poles (Concrete or steel)

**SUBSIDIARY CONSTRUCTION**
- E P C: Pole Connection: connect earth electrode to concrete pole
- E G R: Concrete Pole with OHEW: Grading Ring
- E C P: Concrete Pole with OHEW: Counterpoise
- E A B: Single Concrete Pole with OHEW: Air-break switch
- E D A: Double Concrete Pole with OHEW: Air-break switch
- E D M: Double Concrete Pole with OHEW: Motorised air-break switch
- E C T: Concrete Pole with OHEW: 66kV Cable termination
- E S C: Concrete Pole with OHEW: Subsidiary Cable termination
- E O P: Concrete Pole with OHEW: OPGW cannister
- E D D: Concrete Pole with Deep Drilled Earthing
- N R E: Concrete Pole with no OHEW: Remote locations
- N F R: Concrete pole with OPGW: Deep Drilled earthing

**CONSTRUCTION CODE GUIDE**

**OVERHEAD SUB-TRANSMISSION**
- EARTHING
- CONSTRUCTION STANDARDS
- CONFIGURATIONS

**DRAWING NUMBER:** 5-10-2-1

**DRAWN BY:** L. BURTON

**CHECKED BY:** P. DE SOUSA ROQUE

**APPROVED BY:** C. NOEL

**DATE:** 15/11/2012

**HARD COPY UNCONTROLLED**
EARTHING - ADDITIONAL EARTHING

Additional earthing folder in subtransmission construction manual

E A

D C

ELECTRODE TYPE

C Copper Clad

ROD SPEC

0 Nil
S Standard length
X Extended (2 rods)
D Deep drilled

EARTHING:
Small world object type: Earth
MATERIAL

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1251-1</td>
<td>Grading ring arrangement</td>
<td>1</td>
</tr>
</tbody>
</table>

SEPARATION FROM COMMUNICATIONS:
- Provide the following minimum separation to communications manholes, pillars, pits etc:
  - Earth rod = 15m
  - Bare earth cable = 15m
  - Concrete pole = 15m

- Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
  - Earth rod = 1m
  - Bare earth cable = 1m
  - Concrete pole = 1m

- Minimum separation to gas pipeline
  12.5m from concrete pole, stay anchor, earth rod or earth cable:

For separation from other communications assets refer Standards Section.

Notes:
1. Burial depths
   - In Soil - Inner - 300mm
   - Outer - 600mm
   - In Rock - Both - 200mm

2. To allow for soil movement all risers shall contain 300 slack.

3. Copper conductor to be dry wire-brushed clean, and then liberally coated with electrical grease before making connection. Bend earth conductors to make connection. DO NOT CUT

4. Refer power co-ordinator guidelines agreement between Ergon Energy & Telstra

EARTHING

CONCRETE POLE

Notes:
- Caution tape
- Depth 600 in soil
- 200 in rock
- Additional earthing if required
- Depth 300 in soil
- 200 in rock

SEPARATION FROM COMMUNICATIONS:
- Refer to power co-ordinator guidelines agreement between Ergon Energy & Telstra
- Minimum separation to gas pipeline
  12.5m from concrete pole, stay anchor, earth rod or earth cable:

GRADING RING

Notes:
- Soil
- Soil

Construction Code
ECEGR00
**MATERIAL**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>ECEPCSC</th>
<th>ECEPCXC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1252-1</td>
<td>Driven Earth Rod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1252-2</td>
<td>Additional Earthing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SEPARATION FROM COMMUNICATIONS:**

- Provide the following minimum separation to communications manholes, pillars, pits, non-insulated metal sheathed cable etc:
  - Earth rod = 15m
  - Bare earth cable = 15m
  - Concrete pole = 15m

- Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
  - Earth rod = 1m
  - Bare earth cable = 1m
  - Concrete pole = 1m

- Minimum separation to gas pipeline
  12.5m from concrete pole, stay anchor, earth rod or earth cable:

For separation from other communications assets refer Standards Section.

**Notes:**

1. To allow for different pole soil movement, all risers shall contain approximately 300 slack.
2. If ferrule is recessed pack out with flat s/s washers as required to ensure flat contact surface.
3. Copper conductor to be dry wire-brushed clean, and then liberally coated with electrical grease before making connection. Bend earth conductors for additional earthing. (DO NOT CUT)
4. Refer power co-ordinator guidelines agreement between Ergon Energy & Telstra.
NOTES:
1. Earthing to run in direction of mains.

2. DEEP DRILLED EARTH TESTING:
   Specified earth resistance may not be achieved for some days after earthing is installed. Where specified resistance is not achieved prior to completion of work on site the installation shall be tested after 7 days and additional earthing added as necessary.

3. To allow for different pole soil movement, all risers shall contain approximately 300 slack.

4. If ferrule is recessed pack out with flat s/s washers as required to ensure flat contact surface.

5. Copper conductor to be dry wire-brushed clean, and then liberally coated with electrical grease before making connection. Bend earth conductors to make connection. (DO NOT CUT)

6. Refer power co-ordinator guidelines agreement between Ergon Energy & Telstra.

SEPARATION FROM COMMUNICATIONS:
- Provide the following minimum separation to communications manholes, pillars, pits etc:
  - Earth rod = 15m
  - Bare earth cable = 15m
  - Concrete pole = 15m
- Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
  - Earth rod = 1m
  - Bare earth cable = 1m
  - Concrete pole = 1m
- Minimum separation to gas pipeline 12.5m from concrete pole, stay anchor, earth rod or earth cable:

For separation from other communications assets refer Standards Section.

Construction Code
ECEDDSC
EADD (Additional)
MATERIAL

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1253-1</td>
<td>Counterpoise earthing to concrete pole</td>
<td>1</td>
</tr>
</tbody>
</table>

SEPARATION FROM COMMUNICATIONS:
- Provide the following minimum separation to communications manholes, pillars, pits etc:
  - Earth rod = 15m
  - Bare earth cable = 15m
  - Concrete pole = 15m
- Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
  - Earth rod = 1m
  - Bare earth cable = 1m
  - Concrete pole = 1m
- Minimum separation to gas pipeline 12.5m from concrete pole, stay anchor, earth rod or earth cable:

For separation from other communications assets refer Standards Section.

Notes:
1. Burial depths as directed by superintendent gradient control & grading ring earthing in soil
   - inner 200
   - outer 300
   - in rock - 200

Counterpoise 750 in soil suitable for cultivation
   - 300 in soil unsuitable for cultivation
   - 200 in rock

All trenches to be backfilled with original material
2. To allow for different pole soil movement, all risers shall contain approximately 300 slack.
3. Copper conductor to be dry wire-brushed clean, and then liberally coated with electrical grease before making connection. Bend earth conductors to make connection. (do not cut)
4. For agricultural areas earthing cable to be run down pole & through 50mm conduit in backfill.
5. If ferrule is recessed pack out with flat s/s washers as required to ensure flat contact surface.
6. Refer power co-ordinator guidelines agreement between Ergon Energy & Telstra

Construction Code
ECECP00

OVERHEAD SUB-TRANSMISSION
EARTHING
COUNTERPOISE EARTHING
CONCRETE POLE

Additional earthing to stay within the easement. Extend earthing away from metallic services (pipelines, fences, cables etc).

Unless specified otherwise footing resistance with OHEW disconnected and additional earthing connected to pole: 5Ω within 1km of substation or 1km from transition to unearthed overhead line. 10Ω elsewhere
Grading ring arrangement - ABS construction

Notes:
1. Burial depths
   - In Soil - Inner - 300mm
   - Outer - 600mm
   - In Rock - Both - 200mm

2. To allow for soil movement all risers shall contain 300 slack.

3. Copper conductor to be dry wire-brushed clean, and then liberally coated with electrical grease before making connection. Bend earthing conductors to make connection. DO NOT CUT

4. Refer power co-ordinator guidelines agreement between Ergon Energy & Telstra

For separation from other communications assets refer Standards Section.

Separation from communications:
- Provide the following minimum separation to communications manholes, pillars, pits etc:
  - Earth rod = 15m
  - Bare earth cable = 15m
  - Concrete pole = 15m

- Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
  - Earth rod = 1m
  - Bare earth cable = 1m
  - Concrete pole = 1m

- Minimum separation to gas pipeline 12.5m from concrete pole, stay anchor, earth rod or earth cable:

Notes:
1. Burial depths
   - In Soil - Inner - 300mm
   - Outer - 600mm
   - In Rock - Both - 200mm

2. To allow for soil movement all risers shall contain 300 slack.

3. Copper conductor to be dry wire-brushed clean, and then liberally coated with electrical grease before making connection. Bend earthing conductors to make connection. DO NOT CUT

4. Refer power co-ordinator guidelines agreement between Ergon Energy & Telstra

For separation from other communications assets refer Standards Section.

Notes:
1. Burial depths
   - In Soil - Inner - 300mm
   - Outer - 600mm
   - In Rock - Both - 200mm

2. To allow for soil movement all risers shall contain 300 slack.

3. Copper conductor to be dry wire-brushed clean, and then liberally coated with electrical grease before making connection. Bend earthing conductors to make connection. DO NOT CUT

4. Refer power co-ordinator guidelines agreement between Ergon Energy & Telstra

For separation from other communications assets refer Standards Section.