OVERHEAD
CONSTRUCTION MANUAL
EARTHING NAILED & STEEL BUTTED WOOD POLE
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EXPLANATION:

**EN PT/COM/DD**

- **EN** = Earth bond nailed pole
- **EB** = Steel butted wood pole
- **PT** = Pole Transformer
- **COM** = Common
- **SEP** = Separate
- **RCOM** = Remote common
- **RSEP** = Remote HV separate
- **DD** = Deep drilled
  - (Omit where driven rods used)

**Examples**:

- **EN PT/COM/DD** = Earth Bond Nailed Wood Pole transformer with common earth system (CMEN), deep drilled.
- **EB PT/RSEP** = Earth Steel Butted Wood Pole transformer with remote HV separate and LV earth systems, driven rods.

**ADDITIONAL EARTHING - CONSTRUCTION CODE**

- **E A** = Earthing, with additional extra depth rod.

**Examples**:

- **E AR** = Earthing, with additional extra depth rod.

**Additional Types**:

- **A** = Additional (Single depth rod assembly)
- **AR** = Additional Rod (Extra depth rod)
- **ADDC** = Additional Deep Drilled (Cable type)
- **RA** = Remote Additional (Single depth rod assembly)
- **RADDC** = Remote Additional Deep Drilled (Cable type)
- **ADDCC** = Additional Deep Drilled (Cable & 'C' crimp type)
**EB MEN/ABC**

**EARTH**
- EB = Steel butted wood pole

**SYSTEM**
- MEN = MEN - New Pole
- MENX = MEN - Existing Pole
- MG = Metal Guard (on LV cable)

**MAINS**
- ABC = LVABC Mains
- Al. = Bare Aluminium Mains
- Cu. = Bare Copper Mains

**EXAMPLE:** EB MEN / Al = Earthing steel butted wood pole, MEN - new, with bare Aluminium mains.
EBPTS/DD = Earth steel butted wood pole, pole transformer SWER, deep drilled.

ENPT = Earth bond nailed pole, pole transformer.
POLE LIGHTNING PROTECTION EARTHING - CONSTRUCTION CODE

EXAMPLES:

EB GAPX = Earth steel butted wood pole, Gapped bands existing rebutted pole

OVER HEAD EARTHWIRE - CONSTRUCTION CODE

EXAMPLES:

SWER/SINGLE AND THREE PHASE RECLOSER EARTHING - CONSTRUCTION CODE

Code shown within dashed box appears on relevant construction detail drawings in this manual.

EB ACRS/DD

EARTH
EB = Earth steel butted wood pole

RECCLOSER
ACRS = Recloser SWER
ACRX = Recloser SWER - Existing Pole

TYPE
DD = Deep drilled
(Omit where driven rods used)

EXAMPLES:- EB ACRS/DD = Earth steel butted wood pole, SWER recloser earth system, deep drilled.

ABS, HV EQUIPMENT & METAL GUARD EARTHING - CONSTRUCTION CODE

Code shown within dashed box appears on relevant construction detail drawings in this manual.

EB HVEMG MENX/SEP/ABC

EARTH
EB = Earth steel butted wood pole

EQUIPMENT
HVE = High Voltage Equipment - New Pole
HVEX = High Voltage Equipment - Existing pole
HVEMG = High Voltage Equipment and Metal Guard - New Pole
HVEMGX = High Voltage Equipment and Metal Guard - Existing pole
HVEMGMEN = High Voltage Equipment and Metal Guard with connection to LV mains - New Pole
HVEMGMEX = High Voltage Equipment and Metal Guard with connection to LV mains - Existing Pole
OP = Operation Point - New pole
OPX = Operation Point - Existing pole

SYSTEM
SEP = Separate
COM = Common
RSEP = Remote HV Separate
RCOM = Remote Common

MAINS (Neutral)
ABC
AL
CU
(Omit if no MEN req’d)

EXAMPLES:- EB HVEMG MENX/SEP/ABC = Earth steel butted wood pole, HV Equipment & Metal Guard with MEN on existing pole, separate earth system, connected to ABC mains neutral.

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE CONSTRUCTION CODE GUIDE
RECLOSER / A.B.S. / HV EQUIPMENT / METAL GUARD

DATE 19/11/12
PASSED C. Avenell
DRAWN L. Burton

FILE: 5 27 18035 1803 Sh5

Ergon Energy Corporation Ltd
ABN 50 087 646 062

APPROVED C. Noel

ORIGINAL ISSUE 24.1.14

A B
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<th>Nailed Poles Dwg Number</th>
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<td>S.W.E.R Reactor (Standard and Deep Drilled)</td>
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**Notes:**
- Do Not Use if installed in HFT conduit.
- Downlead by 50mm if not from insulated HV earth.
- Pole nail to be separated.
- Do NOT BOND.
### Quick Reference Guide for Earthing of Nailed & Steel Butted Wood Poles

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<th>Type of Earthing System</th>
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**Quick Reference Guide for Earthing of Nailed & Steel Butted Wood Poles**

**Type of Earthing System**

- HV equipment (Arrester, tank, sectionaliser, gas load break switch)
- HV Operational Earthing Point
- HV 3 Phase Recloser
- HV 3 Phase Regulator
- HV Equipment & Metal Cable Guard (Separate)

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### Type of Earthing System

- HV Equipment, Metal Cable Guard & MEN (Separate)
- HV Equipment, Metal Cable Guard & MEN (CMEN)
- HV Equipment Common
- Overhead Earth Wire
- LV Earth Only (MEN)
- Metal LV Cable Guard to Pole with LV Earth Only

**Quick Reference Guide for Earthing of Nailed & Steel Butted Wood Poles**

**Type of Earthing System**

- HV equipment (Arrester, tank, sectionaliser, gas load break switch)
- HV Operational Earthing Point
- HV 3 Phase Recloser
- HV 3 Phase Regulator
- HV Equipment & Metal Cable Guard (Separate)

<table>
<thead>
<tr>
<th>Type of Earthing System</th>
<th>Steel Butted Wood Poles Dwg Number</th>
<th>Nailed Poles Dwg Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV equipment (Arrester, tank, sectionaliser, gas load break switch)</td>
<td>1825</td>
<td>DO NOT BOND Pole nail to be separated from insulated HV earth downlead by 50mm if not installed in HFT conduit</td>
</tr>
<tr>
<td>HV Operational Earthing Point</td>
<td>1835</td>
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</tr>
<tr>
<td>HV 3 Phase Regulator</td>
<td>Do Not Use</td>
<td>DO NOT BOND Pole nail to be separated from insulated HV earth downlead by 50mm if not installed in HFT conduit</td>
</tr>
<tr>
<td>HV Equipment &amp; Metal Cable Guard (Separate)</td>
<td>1827</td>
<td>1840</td>
</tr>
</tbody>
</table>

### Type of Earthing System

- HV Equipment, Metal Cable Guard & MEN (Separate)
- HV Equipment, Metal Cable Guard & MEN (CMEN)
- HV Equipment Common
- Overhead Earth Wire
- LV Earth Only (MEN)
- Metal LV Cable Guard to Pole with LV Earth Only

**Quick Reference Guide for Earthing of Nailed & Steel Butted Wood Poles**

**Type of Earthing System**

- HV equipment (Arrester, tank, sectionaliser, gas load break switch)
- HV Operational Earthing Point
- HV 3 Phase Recloser
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**Quick Reference Guide for Earthing of Nailed & Steel Butted Wood Poles**

**Type of Earthing System**

- HV equipment (Arrester, tank, sectionaliser, gas load break switch)
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**Quick Reference Guide for Earthing of Nailed & Steel Butted Wood Poles**

**Type of Earthing System**

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**Quick Reference Guide for Earthing of Nailed & Steel Butted Wood Poles**

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<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>10</td>
</tr>
<tr>
<td>18-5</td>
<td>Connector IPC 25/95mm² main to 6/35mm² tap</td>
<td>1</td>
</tr>
<tr>
<td>87-3</td>
<td>Connector PG Al/Steel-Cu.</td>
<td></td>
</tr>
<tr>
<td>87-10</td>
<td>Connector PG Cu/Cu.</td>
<td></td>
</tr>
<tr>
<td>103-5</td>
<td>Earth MEN to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard LV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>238-5</td>
<td>Bandit strap to steel butted wood pole</td>
<td>1</td>
</tr>
</tbody>
</table>

## MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-1</td>
<td>Earth rod additional</td>
<td>AR</td>
</tr>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
</tbody>
</table>

## NOTES:

1. Earthing to run in direction of mains.
2. If disconnection test point required, fit connector.
   (connector not included in material list)
3. Number of earths:
   - Not counting consumer's earths:
     - There should be as a general rule: One earth at the remote end of each line, NOT required at end of cross street service.
     - A minimum of 2 earths per kilometre of line.
     - Earths at such intermediate points that will ensure no consumer's installation is more than 200m line distance from an M.E.N. earth.
4. Separation from communication equipment:
   - Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - LV earth rod or cable = 0.3m
   - Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - LV earth rod or cables = 0.3m
   - For separation from other communications assets refer Standards Section.
5. Earth bonds to steel butted wood poles are not required on poles with LV earths only.
Caution tape

To L.V. Neutral Connector Assy Selection 87-3 or 10 or 18-5

Assy 103-5

2.0m

4.0m Min. (Single rod)

8.0m Min. (Double rod)

Assy 14-1 (500 Intervals)

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 or 104-1 and 5

Trench sections. Refer EARTHING Dwg. 1238

Assy 105-5 (Saddles at 500 Intervals)

2600

2400 Min.

Assy 238-5

Bandit straps at 500 intervals on steel section

Strip insulation

Construction Type

EBMEN
EBMENX
EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
M.E.N. EARTH TO STEEL BUTTED WOOD POLE

DISCONNECTED
CONNECTED Separate System
CONNECTED Common System

Max. 30 ohm
Max. 10 ohm
Max. 1 ohm

L. Burton

C. Avenell
C. Noel

ABN 50 087 646 062

Dwg 1837 Sh 2

FILE: 5 27 1837 2

Ergon Energy Corporation Ltd
NOTES:

1. LV Metal cable guard must be connected to an M.E.N. earth system. Where a M.E.N. earth is not existing, one is to be installed in accordance with earthing nailed & steel butted wood pole drawing 1837. Construction types EBMEN or EBMENX.

2. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes payphones or miscellaneous earths:
     - LV earth rod or cable = 0.3m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - LV earth rod or cables = 0.3m
   For separation from other communications assets refer Standards Section.

3. Earth bonds to steel butted wood poles are not required on poles with LV earths only

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</thead>
<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
<td>1</td>
</tr>
<tr>
<td>87-12</td>
<td>Connector PG Cu/Cu. (PG5)</td>
<td>1</td>
</tr>
<tr>
<td>140-6</td>
<td>Cable insulated hard drawn Cu. 35mm²</td>
<td>1</td>
</tr>
<tr>
<td>141-14</td>
<td>Lug, compression 35mm² M12</td>
<td>1</td>
</tr>
<tr>
<td>238-5</td>
<td>Cable guard earth to steel butted wood pole</td>
<td>1</td>
</tr>
</tbody>
</table>

---

**OVERHEAD DISTRIBUTION**
EARTHING NAILED & STEEL BUTTED WOOD POLE
METAL LV CABLE GUARD TO M.E.N. EARTH ON NEW OR EXISTING STEEL BUTTED WOOD POLE

---

**Ergon Energy Corporation Ltd**
ABN 50 087 646 062
### MATERIAL - SEPARATE EARTH

<table>
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<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>20</td>
</tr>
<tr>
<td>102-1</td>
<td>Earth LV 35mm² to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>103-1</td>
<td>Earth HV 35mm² to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>87-12</td>
<td>Conductor PG Cu./Cu. (PG5)</td>
<td>1</td>
</tr>
<tr>
<td>233-5</td>
<td>Earth to steel butted wood pole</td>
<td>1</td>
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</tbody>
</table>

### MATERIAL - REMOTE SEPARATE EARTH

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<tr>
<td>102-1</td>
<td>Earth LV 35mm² to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>223-1</td>
<td>Earth remote HV separate 35mm² to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>87-12</td>
<td>Conductor PG Cu./Cu. (PG5)</td>
<td>1</td>
</tr>
<tr>
<td>233-5</td>
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### MATERIAL - ADDITIONAL EARTH

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### MATERIAL - ADDITIONAL EARTH REMOTE

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<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
<tr>
<td>225-3</td>
<td>Earth rod remote HV additional</td>
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**NOTES:**

1. Earthing to run in direction of mains.
2. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - LV earth rod or cable = 0.3m
     - HV earth rod = 15.0m
     - HV bare earth cable = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - LV earth rod or cable = 0.3m
     - HV bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section.
3. Attach warning sign beside remote HV earth lead.
4. A remote earth identification pit to be installed at first remote HV earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-3
5. Steel butt must be bonded to LV earth.
6. HV earth lead must be insulated from steel.
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

Additional earthing if required. If more than 4 additional earthrods are required, contact local Ergon branch. Assy selection 104-5 or 104-1 and 5

4.0m Min. (Single rod) 8.0m Min. (Double rod)

30 ohm Max.

2.0m

3400

2600 2400 Min

3000

2400

100

3400

H.V. CONNECTED
H.V. Earth wire must not be broken

H.V. CONNECTED

To Transformer tank

To Transformer L.V. Neutral bushing

Assy 103-1

Assy 102-1

Assy 87-12

Assy 233-5

Assy 14-1

(500 Intervals)

LV DISCONNECTED

10 ohm Max.

Strip insulation for portable earth connection

Construction Type

EBPT/SEP
EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
TRANSFORMER SEPARATE EARTH
STEEL BUTTED WOOD POLE - CONSTRUCTION
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

LV DISCONNECTED

10 ohm Max.

LV cables & apparatus between HV & LV earthwire downleads. Maintain as much separation as possible.

Strip insulation for portable earth connection

LV DISCONNECTED

10 ohm Max.

Trench sections
Refer EARTHING Dwg. 1238

Additional earthing if required. If more than 4 additional earthrods required, contact local Ergon branch. Assy selection 104-5 or 104-1 and 5

4.0m Min. (Single rod)

8.0m Min. (Double rod)

Remote HV earth pit

Refer note 4 sheet 1.

Additional earthing if required. If more than 4 additional earthrods required, contact local Ergon branch. Assy selection 104-5 and 225-3

Remote HV equipment pit

Refer note 3

Steel Butted Wood Pole

Assy 14-1
(500 Intervals)

Assy 102-1

Assy 87-12

Assy 233-5

Steel Butted Wood Pole

Refer sheet 1
note 3

Bandit straps at 500 intervals on steel section

30 ohm Max.

HV Earth
300 min

Telstra pit

Detail Top View

Caution tape

Remote HV ground

H.V. CONNECTED
H.V. Earth wire must not be broken

3400

100

2400 min

Assy 105-5
(Saddles at 500 Intervals on wood section)

Assy 223-1

To Transformer
L.V. Neutral bushing
To Transformer tank

H.V. CONNECTED

15.0m min

2.0m

Assy 87-12

Assy 233-5

Assy 105-5

Pole

Strip insulation

60

20

150

Pole

Strip insulation

60

150

20

150

Assy 102-1

Assy 105-5

(L.V. Neutral bushing)

L.V. cables & apparatus.
**Material - Separate Earth**

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<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>20</td>
</tr>
<tr>
<td>123-1</td>
<td>Earth LV 35mm² to wood pole - deep drilled</td>
<td>1</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>125-1</td>
<td>Earth HV to wood pole - deep drilled</td>
<td>1</td>
</tr>
<tr>
<td>87-12</td>
<td>Conductor PG Cu./Cu. (PG5)</td>
<td>1</td>
</tr>
<tr>
<td>233-5</td>
<td>Earth to steel butted wood pole</td>
<td>1</td>
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**Material - Remote Separate Earth**

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<tr>
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<td>Earth LV 35mm² to wood pole - deep drilled</td>
<td>1</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>224-1</td>
<td>Earth remote HV separate (35mm²) deep drilled to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>87-12</td>
<td>Conductor PG Cu./Cu. (PG5)</td>
<td>1</td>
</tr>
<tr>
<td>233-5</td>
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**Material - Additional Earth**

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</thead>
<tbody>
<tr>
<td>124-1</td>
<td>Earth additional - deep drilled</td>
<td>AR</td>
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**Material - Additional Earth Remote**

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<th>QTY</th>
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<tbody>
<tr>
<td>124-1</td>
<td>Earth additional - deep drilled</td>
<td>AR</td>
</tr>
<tr>
<td>225-7</td>
<td>Earth remote HV additional - deep drilled</td>
<td>1</td>
</tr>
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2. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - LV earth rod or cable = 0.3m
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed/jacketed or in plastic conduit:
     - LV earth rod or cable = 0.3m
     - HV bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section.
3. Attach warning sign beside remote HV earth lead.
4. A remote earth identification pit to be installed at first remote HV earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-7.
5. 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.
6. H.V. & L.V. electrodes
   - 35mm² bare copper cable deep drilled to a minimum of 20m unless good moisture is reached.
   - Good moisture is defined as extracted bore hole soil containing adequate proportion of water so that when squeezed by hand it holds its form and releases water content - similar to mud.
   - A drilling rig using nominal 75mm bit is required.
   - The holes are to be refilled immediately with dry earth enhancing compound. DO NOT ADD WATER
8. The additional earthing if required must be spaced at least two times the depth of adjacent earthing electrode. For example if adjacent earthing is at 20m, then the additional earthing must be spaced at least 40m.
9. Pole steel butt must be bonded to LV earth.
10. HV earth lead must be insulated from steel butt.
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

Strip insulation for portable earth connection

**LV DISCONNECTED**

- 10 ohm Max.

2600

2400

Assy 123-1

Steel Butted Wood Pole

Assy 14-1 (500 Intervals)

Assy 87-12

Assy 233-5

Assy 105-5

(Saddles at 500 Intervals on wood section)

Bandit straps at 500 intervals on steel section

Trench sections

Refer EARTHING Dwg. 1238

2.0m

4.0m

Additional earthing if required

Assy 124-1

Construction Type

EBPT/SEP/DD

EADDC (Additional)

**OVERHEAD DISTRIBUTION**

EARTHING NAILED & STEEL BUTTED WOOD POLE

TRANSFORMER SEPARATE EARTH DEEP DRILLED

STEEL BUTTED WOOD POLE - CONSTRUCTION

HARD COPY

UNCONTROLLED

<table>
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<th>A</th>
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<td>B</td>
<td>11.11.15</td>
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H.V. CONNECTED

H.V. Earth wire must not be broken

30 ohm Max.

10 ohm Max.

2.0m

4.0m

Pole

Strip insulation

Caution tape

Refer note 8

150

60

20

60

LV Neutral Bushing

To Transformer

L.V. Neutral Bushing

To Transformer tank

Assy 125-1

Refer EARTHING Dwg. 1238

Additional earthing if required

Assy 124-1

Construction Type

EBPT/SEP/DD

EADDC (Additional)
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

Strip insulation for portable earth connection

LV DISCONNECTED

10 ohm Max.

Caution tape

Trench sections Refer EARTHING Dwg. 1238

Additional earthing if required Assy 124-1

Refer note 8

2.0m

Refer note 4 sheet 1.

Construction Type

EBPT/RSEP/DD ERADDC (Additional)

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE TRANSFORMER REMOTE SEPARATE EARTH DEEP DRILLED STEEL BUTTED WOOD POLE - CONST.

Ergon Energy Corporation Ltd
ABN 50 087 646 062

DATE 6/6/12
PASSED C. Avenell
DRAWN L. Burton

APPROVED C. Noel

FILE: 5 27 1799.3 Dwg 1799 Sh 3
NOTES:

1. Earthing to run in direction of mains.

2. Separation from communications equipment:
   - Bare earth cable = 0.3m
   - Earth rod = 2.0m
   - Bare earth cable = 2.0m
   - Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - Earth rod = 0.3m
     - Bare earth cable = 0.3m
   * Provide the following minimum separation to communications manholes, pillars, pits etc:
     - Earth rod = 2.0m
     - Bare earth cable = 2.0m
   For separation from other communications assets refer Standards Section

3. Attach warning sign beside remote CMEN earth lead.

4. A remote earth identification pit to be installed at first remote earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-3.
To Transformer
L.V. Neutral bushing
Assy 140-14
141-18
To Transformer tank
Assy 14-1
(500 Intervals)
Assy 102-1
Assy 87-12
Assy 233-5
Assy 105-5
(Saddles at 500 Intervals on wood section)

Bandit straps at 500 intervals on steel section

Strip insulation for portable earth connection

Trench sections Refer EARTHING Dwg. 1238

4.0m Min. (Single rod)
8.0m Min. (Double rod)

Caution tape

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 or 104-1 and 5

Construction Type
EBPT/COM
EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
TRANSFORMER COMMON EARTH
STEEL BUTTED WOOD POLE - CONSTRUCTION
To Transformer L.V. Neutral bushing
1 ohm Max.

To Transformer tank
Assy 14-1 (500 Intervals)
Assy 223-3
Assy 87-12
Assy 233-5

DISCONNECTED
30 ohm Max.

CONNECTED

L.V. Steel Butted Wood Pole

HV Earth
300 min
Telstra pit
Detail Top View
Trench sections
Refer EARTHING Dwg. 1238

Remote HV earth pit
Telstra pit or equipment

Strip insulation for portable earth connection

Refer sheet 1 note 3
Assy 105-5
(Saddles at 500 Intervals on wood section)
Bandit straps at 500 intervals on steel section

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 and 225-3
4.0m Min. (Single rod)
8.0m Min. (Double rod)

Construction Type
EBPT/RCOM
EAR (Additional)
ERA (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
TRANSFORMER REMOTE COMMON EARTH
STEEL BUTTED WOOD POLE - CONSTRUCTION
### 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. Separation from communication equipment:
   - Provide the following minimum separation to communications manholes, pillars, pits etc:
     - Earthing rod = 2.0m
     - Bare earth cable = 2.0m
   - Good moisture is defined as extracted bore hole soil containing adequate proportion of water so that when squeezed by hand it holds its form and releases water content - similar to mud.
   - For separation from other communications assets refer Standards Section
4. Attach warning sign beside remote CMEN earth lead
5. A remote earth identification pit to be installed at first remote HV earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-7.
6. H.V. & L.V. electrodes
   - 35mm² bare copper cable deep drilled to a minimum of 20m unless good moisture is reached.
   - Good moisture is defined as extracted bore hole soil containing adequate proportion of water so that when squeezed by hand it holds its form and releases water content - similar to mud.
   - A drilling rig using nominal 75mm bit is required.
   - The holes are to be refilled immediately with dry earth enhancing compound.
   - DO NOT ADD WATER.
7. The additional earthing if required must be spaced at least two times the depth of adjacent earthing electrode. For example if adjacent earthing is at 20m, then the additional earthing must be spaced at least 40m.

### MATERIAL - COMMON EARTH

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<th>DESCRIPTION</th>
<th>QTY</th>
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<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>10</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>123-2</td>
<td>Earth HV 35mm² to wood pole - deep drilled</td>
<td>1</td>
</tr>
<tr>
<td>140-14</td>
<td>Cable insulated annealed Cu. 70mm²</td>
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</tr>
<tr>
<td>141-18</td>
<td>Lug, compression 70mm² M12</td>
<td>2</td>
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<tr>
<td>87-12</td>
<td>Connector P.G. Cu. - Cu. (PG5)</td>
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<tr>
<td>233-5</td>
<td>Earth to steel butted wood pole</td>
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### MATERIAL - REMOTE COMMON EARTH

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<tr>
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<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
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<tr>
<td>224-3</td>
<td>Earth rempte CMEN (35mm²) deep drilled to wood pole</td>
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<td>140-14</td>
<td>Cable insulated annealed Cu. 70mm²</td>
<td>1</td>
</tr>
<tr>
<td>141-18</td>
<td>Lug, compression 70mm² M12</td>
<td>2</td>
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<tr>
<td>87-12</td>
<td>Connector P.G. Cu. - Cu. (PG5)</td>
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</tr>
<tr>
<td>233-5</td>
<td>Earth to steel butted wood pole</td>
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### MATERIAL - ADDITIONAL EARTH

<table>
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<tbody>
<tr>
<td>124-1</td>
<td>Earth additional - deep drilled</td>
<td>AR</td>
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### MATERIAL - ADDITIONAL EARTH REMOTE

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<td>Earth additional - deep drilled</td>
<td>AR</td>
</tr>
<tr>
<td>225-7</td>
<td>Earth remote HV additional - deep drilled</td>
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</table>
To Transformer
L.V. Neutral bushing
Assy 140-14
141-18
To Transformer tank
H.V.
Assy 14-1
(500 Intervals)
Assy 123-2
Assy 87-12
Assy 105-5 on wood section
(Saddles at 500 Intervals)
Assy 233-5

2600
2400 Min.
100

Caution tape

Additional earthing
if required
Assy 124-1

2.0m

Bandit at 500mm intervals
on steel section

Strip insulation for portable
earth connection

Construction Type
EBPT/COM/DD
EADDC (Additional)

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
TRANSFORMER COMMON EARTH DEEP DRILLED
STEEL BUTTED WOOD POLE - CONSTRUCTION
To Transformer
L.V. Neutral bushing
Assy 140-14
141-18
To Transformer tank
Assy 14-1
(500 Intervals)
Assy 224-3
Assy 87-12
Assy 105-5 on wood section
(Saddles at 500 Intervals)
Strip insulation for portable earth connection
Refer sheet 1 note 4
Assy 233-5
Bandit at 500mm intervals on steel section

1 ohm
Max.

30 ohm
Max.

HV Earth
300 min
Telstra pit
Detail Top View

Remote HV earth pit
Telstra pit or equipment

Construction Type
EBPT/RCOM/DD
ERADDC (Additional)

Trench sections
Refer EARTHING Dwg. 1238

Additional earthing if required
Refer assy 124-1 and 225-7

Refer note 5 sheet 1
Refer note 7

CONNECTED
DISCONNECTED

Ergon Energy Corporation Ltd
ABN 50 087 646 062

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
TRANSFORMER REMOTE COMMON EARTH DEEP
DRILLED STEEL BUTTED WOOD POLE - CONSTRUCTION

DATE 06.06.12
APPROVED C.Noel
PASSED C.Avenell
DRAWN T.Borg

FILE: 5 27.1801.3
Dwg 1801 Sh 3

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MATERIAL

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<tr>
<td>102-1</td>
<td>Earth LV 35mm² to wood pole</td>
<td>1</td>
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<tr>
<td>105-10</td>
<td>Earth guard SWER to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>121-1</td>
<td>Earth HV SWER (35mm²) to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>238-5</td>
<td>Bandit strap to steel butted wood pole</td>
<td>1</td>
</tr>
<tr>
<td>239-3</td>
<td>LV earth guard (20mm) with HV heatshrink insulation to wood pole</td>
<td>1</td>
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</table>

MATERIAL - ADDITIONAL EARTH

<table>
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<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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<tbody>
<tr>
<td>104-1</td>
<td>Earth rod additional</td>
<td>AR</td>
</tr>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
</tbody>
</table>

The minimum separation shall not be less than 50mm.

Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus.

To Transformer E.R. bush
Refer note Assy 114

Assy 105-10
(Saddles at 500 Intervals)

Assy 238-5
Bandit straps at 500 intervals on steel section

Construction Type

EBPTS
EBPTSX
 EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
S.W.E.R.TRANSFORMER EARTH
TO STEEL BUTTED WOOD POLE

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Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 27 1818 1
Dwg 1818 Sh 1

Approve: C. Noel 30/10/12
Passed: C. Avenell
Drawn: L. Burton

10 ohm Max.

Strip insulation for portable earth connection

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 or 104-1 and 5
4.0m Min. (Single rod)
8.0m Min. (Double rod)

L.V. DISCONNECTED

Assy 2600
2400 Min.

Assy 3400
2600 Min.

150 20
60

OV 1818

2.5m
3.0m

Trench sections
Refer EARTHING Dwg. 1238

H.V. CONNECTED MAX. RESISTANCE
(Minimum of 3 electrodes)

<table>
<thead>
<tr>
<th>kVA</th>
<th>11kV</th>
<th>12.7kV</th>
<th>19.1kV</th>
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<tr>
<td>10</td>
<td>13Ω</td>
<td>15Ω</td>
<td>22Ω</td>
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<tr>
<td>25</td>
<td>6Ω</td>
<td>7Ω</td>
<td>10Ω</td>
</tr>
<tr>
<td>50</td>
<td>3.3Ω</td>
<td>3.5Ω</td>
<td>5Ω</td>
</tr>
<tr>
<td>100</td>
<td>2Ω</td>
<td>2.3Ω</td>
<td>3.4Ω</td>
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</tbody>
</table>

Caution tape

Sign

Strip insulation on both HV Earth downleads

L.V. Neutral bushing

To T/former

H.V. Earth wires must not be broken

Refer note Assy 114

To Transformer tank

Assy 121-1

EBPTSX

To Transformer E.R. bush

Assy 102-1

H.V. Butted Wood Pole

L.V. Neutral bushing

L.V. Butted Wood Pole

150 20
60

Pole

Assy 239-3

Strip insulation for portable earth connection

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 or 104-1 and 5
4.0m Min. (Single rod)
8.0m Min. (Double rod)

10 ohm Max.

Strip insulation for portable earth connection

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 or 104-1 and 5
4.0m Min. (Single rod)
8.0m Min. (Double rod)

10 ohm Max.

Strip insulation for portable earth connection

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 or 104-1 and 5
4.0m Min. (Single rod)
8.0m Min. (Double rod)

10 ohm Max.

Strip insulation for portable earth connection

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 or 104-1 and 5
4.0m Min. (Single rod)
8.0m Min. (Double rod)

10 ohm Max.
3. Earthing to run in direction of mains.
4. L.V. earthing system to be connected to L.V. neutral (M.E.N. system).
5. H.V. earthing system to be connected to H.V. Earth bushing and tank earth. Earth leads to run down opposite side of the pole and must be insulated and continuous from H.V. earth bushing to first H.V. electrode and from tank earth to first H.V. electrode on opposite side of pole.
6. The H.V. Earth system is to be a minimum of 1.0m from any insulated communication cable and 15.0m from any communications manhole, pit or pillar.
7. Customer Underground Mains are not allowed on S.W.E.R. poles carrying H.V. Earths.

8. Separation from communication equipment:
   - Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - LV earth rod or cable = 0.3m
     - HV earth rod = 15.0m Distribution Transformer / 25.0m Isolating Transformer
     - HV bare earth cable (site earth) = 15.0m
   - Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - LV earth rod or cable = 0.3m
     - HV earth cable (site earth) = 1.0m
   For separation from other communications assets refer Standards Section.
9. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards.
10. A minimum 2.0m separation shall be maintained between the H.V. earth system and any conductive structure.
The minimum separation shall not be less than 50mm.

Additional earthing if required
Assy 124-1 Refer note 8

Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus.

Strip insulation for portable earth connection

Additional earthing if required
Assy 124-2 Refer note 8
NOTES

1. Do not bond earth leads to steel butt.
2. LV earth to be insulated from steel butt with HV heatshrink.
3. Earthing to run in direction of mains.
4. LV. earthing system to be connected to LV. neutral (M.E.N. system).
5. H.V. Earthing system to be connected to H.V. earth bushing and tank earth.
   H.V. Earth leads to run down opposite sides of the pole and must be insulated and continuous from H.V. earth bush and tank earth to first H.V. electrode.
6. H.V. & L.V. electrodes - 35mm² bare copper cable deep drilled to a minimum of 20m unless good moisture is reached.
   - Good moisture is defined as extracted bore hole soil containing adequate proportion of water so that when squeezed by hand it holds its form and releases water content - similar to mud.
   - A drilling rig using nominal 75mm bit is required.
   - HV earthing electrode shall be installed to the same depth
   - The holes are to be refilled immediately with dry earth enhancing compound. **DO NOT ADD WATER.**
7. DEEP DRILLED EARTH TESTING - Specified earth resistance may not be achieved for some days after earthing is installed. Where specified resistance is not chieved prior to completion of work on site the installation shall be tested after 7 days and additional earthing added as necessary.
8. The additional earthing if required must be spaced at least two times the depth of adjacent earthing electrode.
   For example if adjacent earthing is at 20m, then the additional earthing must be spaced at least 40m.
10. Separation from communication equipment:
    * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
      - LV earth rod or cable = 0.3m - HV earth rod = 15.0m Distribution Transformer / 25.0m Isolating Transformer
      - HV bare earth cable (site earth) = 15.0m Distribution transformer / 25.0m Isolating transformer
    * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
      - LV earth rod or cable = 0.3m - HV earth cable (site earth) = 1.0m. For separation from other communications assets refer Standards Section.
11. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards.
12. A minimum 2.0m separation shall be maintained between the HV earth system and any conductive structure.
The minimum separation between HV earthwire downleads, LV cables & apparatus shall not be less than 50mm.

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch. Assy selection 104-5 or 104-1 and 5

Trench sections Refer EARTHING Dwg. 1238

Construction Type
EBPREAS (Reactor)
EBPREASX (Reactor)
EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
S.W.E.R. REACTOR EARTH TO
STEEL BUTTED WOOD POLE

MATERIAL
ASSY | DESCRIPTION | QTY
--- | --- | ---
14-1 | Saddle Cu. 10mm to suit 35mm² cable to wood pole | 20
105-10 | Earth guard SWER to wood pole | 2
121-1 | Earth H.V. SWER (35mm²) to wood pole | 1
238-5 | Bandit strap to steel butted wood pole | 1

MATERIAL - ADDITIONAL EARTH
ASSY | DESCRIPTION | QTY
--- | --- | ---
104-1 | Earth rod additional | AR
104-5 | Earth rod additional depth | AR
NOTES:

1. Do not bond earth leads to steel butt.
2. Earthing to run in direction of mains.
3. H.V. earthing system to be connected to H.V. Earth bushing and tank earth. Earth leads to run down opposite sides of the pole and must be insulated and continuous from H.V. earth bushing to first H.V. electrode and from tank earth to first H.V. electrode on opposite side of pole.
4. The minimum requirements for electrodes is that they be copper clad electrodes.
5. The spacing of additional earth electrodes to be equal to twice the earth electrode length installed.
6. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV earth cable (site earth) = 1.0m
   For separation from other communications assets refer Standards Section
7. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards.
8. A minimum of 2m separation shall be maintained between the HV earth system and any conductive structure.
MATERIAL

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<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>20</td>
</tr>
<tr>
<td>105-10</td>
<td>Earth guard SWER to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>122-1</td>
<td>Earth H.V. SWER (35mm²) to wood pole - deep drilled</td>
<td>1</td>
</tr>
<tr>
<td>238-5</td>
<td>Bandit strap to steel butted wood pole</td>
<td>1</td>
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MATERIAL - ADDITIONAL EARTH

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<td>124-2</td>
<td>Earth additional HV - deep drilled</td>
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H.V. CONNECTED MAX. RESISTANCE

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<td>7.5Ω</td>
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<tr>
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<td>3.5Ω</td>
<td>4Ω</td>
<td>6Ω</td>
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Maintain as much separation as possible between HV earthwire downleads & LV cables & apparatus. The minimum separation shall not be less than 50mm.

To Transformer E.R. bush
Refer note Assy 152

To Transformer tank

Assy 14-1 (500 Intervals)

Strip insulation on both HV Earth downleads

Assy 238-5

Bandit straps at 500 intervals on steel section

Assy 105-10 (Saddles at 500 Intervals)

Assy 122-1

EARTHING NAILED & STEEL BUTTED WOOD POLE

OVERHEAD DISTRIBUTION

EARTHING NAILED & STEEL BUTTED WOOD POLE

SWER REACTOR EARTH DEEP DRILLED TO STEEL BUTTED WOOD POLE

Construction Type

EBPREAS/DD (Reactor)

EBPREASX/DD (Reactor)

EADDCC (Additional)
NOTES

1. Do not bond earth leads to steel butt.
2. Earthing to run in direction of mains.
3. H.V. Earthing system to be connected to H.V. earth bushing and tank earth. H.V. Earth leads to run down opposite sides of the pole and must be insulated and continuous from H.V. earth bush and tank earth to first H.V. electrode.
4. H.V. electrodes - 35mm² bare copper cable deep drilled to a minimum of 20m unless good moisture is reached.
   - Good moisture is defined as extracted bore hole soil containing adequate proportion of water so that when squeezed by hand it holds its form and releases water content - similar to mud.
   - A drilling rig using nominal 75mm bit is required.
   - HV earthing electrode shall be installed to the same depth
   - The holes are to be refilled immediately with dry earth enhancing compound.

5. 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.
6. The additional earthing if required must be spaced at least two times the depth of adjacent earthing electrode.
   For example if adjacent earthing is at 20m, then the additional earthing must be spaced at least 40m.
7. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m - HV bare earth cable (site earth) = 15.0m
     - HV earthing electrode shall be installed to the same depth
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV earth cable (site earth) = 1.0m
   For separation from other communications assets refer Standards Section
8. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards
9. A minimum of 2m separation shall be maintained between the HV earth system and any conductive structure.
## MATERIAL

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>20</td>
</tr>
<tr>
<td>105-10</td>
<td>Earth guard SWER to wood pole</td>
<td>2</td>
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<tr>
<td>121-1</td>
<td>Earth H.V. SWER (35mm²) to wood pole</td>
<td>1</td>
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<tr>
<td>140-6</td>
<td>Cable insulated annealed Cu. 35mm²</td>
<td>6</td>
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<tr>
<td>141-14</td>
<td>Lug, compression 35mm² M12</td>
<td>8</td>
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<tr>
<td>87-12</td>
<td>Connector P.G. Cu to Cu</td>
<td>1</td>
</tr>
<tr>
<td>238-5</td>
<td>Bandit strap to steel butted wood pole</td>
<td>1</td>
</tr>
</tbody>
</table>

### H.V. CONNECTED

H.V. Earth wires must not be broken

(Minimum of 3 electrodes)

Recloser - 25 ohms max.

### MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-1</td>
<td>Earth rod additional</td>
<td>AR</td>
</tr>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
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</table>

Maintain as much separation as possible between HV earthwire downleads, LV cables & apparatus.

The minimum separation shall not be less than 50mm.

### OVERHEAD DISTRIBUTION

EARTHING NAILED & STEEL BUTTED WOOD POLE

S.W.E.R. RECLOSER (WITH VT) EARTH TO STEEL BUTTED WOOD POLE

**Construction Type**

- **EBACRS**
- **EBACRSX**
- **EA** (Additional)
- **EAR** (Additional rod)

**Dwg 1820 Sh 1**

**FILE:** 5 27 1820-1

**C. Noel**

**31/1/13**

**C. Avenell**

**L. Burton**

**ABN 50 087 646 062**

**Ergon Energy Corporation Ltd**
NOTES:
1. Do not bond earth leads to steel butt.
2. Earthing to run in direction of mains.
3. H.V. earthing system to be connected to H.V. Earth bushing and tank earth. Earth leads to run down opposite sides of the pole and must be insulated and continuous from H.V. earth bushing to first H.V. electrode and from tank earth to first H.V. electrode on opposite side of pole.
4. The minimum requirements for electrodes is that they be copper clad electrodes.
5. The spacing of additional earth electrodes to be equal to twice the earth electrode length installed.
6. Separation from communication equipment:
   - Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   - Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV earth cable (site earth) = 1.0m
   For separation from other communications assets refer Standards Section
7. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards.
8. A minimum of 2m separation shall be maintained between the HV earth system and any conductive structure.
H.V. CONNECTED

H.V. Earth wires must not be broken

(Minimum of 3 electrodes)
Recloser - 25 ohms max.

Strip insulation on both HV
Earth downleads

MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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<tbody>
<tr>
<td>124-2</td>
<td>Earth additional HV - deep drilled</td>
<td>AR</td>
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</table>

Maintain as much separation as possible between HV earthwire downleads, LV cables & apparatus.
The minimum separation shall not be less than 50mm.

Additional earthing if required
Assy 124-2
Refer note 6

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
S.W.E.R. RECLOSER (WITH VT) DEEP DRILLED
EARTH - TO STEEL BUTTED WOOD POLE

Assy 14-1
(500 Intervals)

Assy 105-10
(Saddles at 500 Intervals)

Assy 87-12

Assy Selection 140-6 and 141-14

Assy 238-5

Bandit straps at 500 intervals on steel section

Construction Type
EBACRS/DD
EBACRX/DD
EADDCC (Additional)
NOTES:
1. Do not bond earth leads to steel butt.
2. Earthing to run in direction of mains.
3. H.V. Earthing system to be connected to H.V. earth bushing and tank earth. H.V. Earth leads to run down opposite sides of the pole and must be insulated and continuous from H.V. earth bush and tank earth to first H.V. electrode.
4. H.V. electrodes - 35mm² bare copper cable deep drilled to a minimum of 20m unless good moisture is reached.
   - Good moisture is defined as extracted bore hole soil containing adequate proportion of water so that when squeezed by hand it holds its form and releases water content - similar to mud.
   - A drilling rig using nominal 75mm bit is required.
   - HV earthing electrode shall be installed to the same depth
   - The holes are to be refilled immediately with dry earth enhancing compound. **DO NOT ADD WATER**
5. 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.
6. The additional earthing if required must be spaced at least two times the depth of adjacent earthing electrode. For example if adjacent earthing is at 20m, then the additional earthing must be spaced at least 40m.
7. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV earth cable (site earth) = 1.0m
   For separation from other communications assets refer Standards Section
8. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards.
9. A minimum 2.0m separation shall be maintained between the HV earth system and any conductive structure.
### NOTES:

1. Do not bond earth lead to steel butt.
2. The earthing electrode of other apparatus mounted on the same pole should be located at least 3.0m clear of earth mat and the conductor insulated to avoid transfer potential.
3. For wood pole attachments and foundations refer to Construction Practices.
4. Earthing to run in direction of mains. For clarity, drawing shows earth trenching transverse to mains.
5. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV bare earth cable (site earth) = 0.3m
   
   For separation from other communications assets refer Standards Section.
6. Attach warning sign beside remote HV earth lead.
7. A remote earth identification pit to be installed at first remote HV earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-3.

### HOT WATER SYSTEM

#### HARD COPY

**OVERHEAD DISTRIBUTION**

EARTHING NAILED & STEEL BUTTED WOOD POLE

HV EQUIPMENT EARTH ARRANGEMENT TO STEEL BUTTED WOOD POLE - MATERIAL

---

### MATERIAL - SEPARATE EARTH

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<thead>
<tr>
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<th>DESCRIPTION</th>
<th>QTY</th>
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<tbody>
<tr>
<td>14-1</td>
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<td>10</td>
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<tr>
<td>103-1</td>
<td>Earth HV 35mm² to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>87-12</td>
<td>Connection P.G. Cu-Cu</td>
<td>1</td>
</tr>
<tr>
<td>238-5</td>
<td>Bandit strap to steel butted wood pole</td>
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</table>

### MATERIAL - REMOTE SEPARATE EARTH

<table>
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<th>ASSY</th>
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<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>10</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>87-12</td>
<td>Connection P.G. Cu-Cu</td>
<td>1</td>
</tr>
<tr>
<td>223-1</td>
<td>Earth remote HV separate 35mm² to wood pole</td>
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</tr>
<tr>
<td>238-5</td>
<td>Bandit strap to steel butted wood pole</td>
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### MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
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<td>Earth rod additional</td>
<td>AR</td>
</tr>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
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### MATERIAL - ADDITIONAL EARTH REMOTE

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<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
<tr>
<td>225-3</td>
<td>Earth rod remote HV additional</td>
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</tbody>
</table>
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

Additional earthing if required. If more than 4 additional earthrods required, contact local Ergon branch. Assy selection 104-5 or 104-1 and 5

4.0m min (single rod)
8.0m min (double rod)

Refer EARTHING Dwg. 1238

Assy 14-1
(Saddles at 500 intervals)

Bandit straps at 500 intervals on steel section

Construction Type
EBHVEX

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
HV EQUIPMENT EARTH ARRANGEMENT TO
STEEL BUTTED WOOD POLE - CONSTRUCTION
Refer EARTHING Dwg. 1238

HV Earth wire must not be broken

30 ohm Max.

Refer sheet 1 note 6

Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus.
The minimum separation shall not be less than 50mm.

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 and 225-3

Refer note 7 sheet 1

Overhead Distribution
EARTHING NAILED & STEEL BUTTED WOOD POLE
HV EQUIPMENT REMOTE EARTH ARRANGEMENT TO STEEL BUTTED WOOD POLE - CONSTRUCTION

H.V. CONNECTED
H.V. Earth wire must not be broken

15.0m min

HV Earth
300 min

Telstra pit
Detail Top View

Wire insulation

C. Noel
20/11/12
APPROVED

C. Avenell
PASSED

E.Newton
DRAWN

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 27 1825 3

Dwg 1825 Sh 3

EBHVEX
EBHVE
EAR (Additional)
ERA (Additional rod)
### Material - Separate Earth

<table>
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<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
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<tr>
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<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
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<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
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<td>18-5</td>
<td>Connector I.P.C. 25/95mm² main to 6/35mm² tap</td>
<td>1</td>
</tr>
<tr>
<td>87-3</td>
<td>Connection P.G. Al./Steel - Cu. (PG2)</td>
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</tr>
<tr>
<td>87-10</td>
<td>Connection P.G. Cu. - Cu. (PG4)</td>
<td>1</td>
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<tr>
<td>87-12</td>
<td>Connection P.G. Cu. - Cu. (PG5)</td>
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<td>103-1</td>
<td>Earth 35mm² to wood pole</td>
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<tr>
<td>103-5</td>
<td>Earth M.E.N to wood pole</td>
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<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
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<td>140-6</td>
<td>Cable, insulated hard drawn Cu. 35mm²</td>
<td>6m</td>
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<td>141-14</td>
<td>Lug, compression Cu. 35mm² M12</td>
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<tr>
<td>238-1</td>
<td>Cable guard earth to steel butted wood pole</td>
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### Material - Remote Separate Earth

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<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
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<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
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<td>18-5</td>
<td>Connector I.P.C. 25/95mm² main to 6/35mm² tap</td>
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<tr>
<td>87-3</td>
<td>Connection P.G. Al./Steel - Cu. (PG2)</td>
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<tr>
<td>87-10</td>
<td>Connection P.G. Cu. - Cu. (PG4)</td>
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<tr>
<td>87-12</td>
<td>Connection P.G. Cu. - Cu. (PG5)</td>
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<tr>
<td>223-1</td>
<td>Earth remote HV separate 35mm² to wood pole</td>
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<tr>
<td>103-5</td>
<td>Earth M.E.N to wood pole</td>
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<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
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<td>140-6</td>
<td>Cable, insulated hard drawn Cu. 35mm²</td>
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<td>Lug, compression Cu. 35mm² M12</td>
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<tr>
<td>238-1</td>
<td>Cable guard earth to steel butted wood pole</td>
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</tr>
</tbody>
</table>

**NOTES:**

1. Do not bond HV equipment earth (e.g. arrestor / tank) to steel butt.
2. Bond metal cable guard to steel butt.
3. The earthing electrode of other apparatus mounted on the same pole should be located at least 3.0m clear of earth mat and the conductor insulated to avoid transfer potential.
4. For wood pole attachments and foundations refer to Construction Practices.
5. Earthing to run in direction of mains. For clarity, drawing shows earth trenching traverse to mains.
6. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes payphones or miscellaneous earths:
     - HV earth rod = 15.0m, Cable guard = 0.3m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section
7. Attach warning sign beside remote HV earth lead.
8. A remote earth identification pit to be installed at first remote HV earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-3.
9. The L.V. neutral is to be connected to the cable guard earth.

---

**OVERHEAD DISTRIBUTION**

- **EARTHING NAILED & STEEL BUTTED WOOD POLE**
- **HV EQUIPMENT, METAL GUARD AND M.E.N. SEPARATE**
- **EARTH TO STEEL BUTTED WOOD POLE - MATERIAL**

**ASSY** | **DESCRIPTION** | **QTY** | **ASSY** | **DESCRIPTION** | **QTY**
---|---|---|---|---|---
104-1 | Earth rod additional | AR | 104-5 | Earth rod additional depth | AR
225-3 | Earth rod remote HV additional | 1
H.V. CONNECTED

H.V. Earth wire must not be broken

HV equipment earth and Metal guard earth MUST NOT BE CONNECTED

30 ohm Max.

Caution tape

Trench sections Refer EARTHING Dwg. 1238

Steel Butted Wood Pole

Assy 103-5

3.0m Min.

(Refer Note 3 on sheet 1)

Assy 103-1

Assy 87-12

Assy 105-5

(Saddles at 500 intervals)

2600

2400

100

4.0m Min. (Single rod)

8.0m Min. (Double rod)

M.E.N. SYSTEM

RESISTANCE TO GROUND

DISCONNECTED

CONNECTED

30 ohm Max.

10 ohm Max.

LV / HV Cable Guard Refer U/G Construction Manual

Bandit straps at 500 intervals on steel section

MUST NOT BE CONNECTED

Additional earthing if required.

If more than 4 additional earthrods required, contact local Ergon branch.

Assy Selection 104-5 or 104-1 and 5.

Construction Type

EBHVEMGMEN

EBHVEMGMENX

Maintain as much separation as possible between HV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

Assy 141-14

Assy 140-6

Assy 238-1

Assy 14-1

(Saddles at 500 intervals)

Construction Manual

Guard Refer U/G

LV cables & apparatus.

Assy Selection 87-3, 10 or 18-5

To HV equipment

(e.g. Arrester/Tank/Sectionaliser/Darverter)

To LV neutral

Assy Selection 87-3, 10 or 18-5

To Control Cubicle

(if required)

Assy 86-12

Assy 141-14

Assy 140-6

Assy 238-1

Assy 14-1

(Saddles at 500 intervals)

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Ergon Energy Corporation Ltd
ABN 50 087 646 062

A ORIGINAL ISSUE

DATE 20/11/12

PASSED C. Avenell

DRAWN L. Burton

FILE: 5 27 18262 Dwg 1826 Sh 2

OVERHEAD DISTRIBUTION

EARTHING NAILED & STEEL BUTTED WOOD POLE

HV EQUIPMENT, METAL GUARD AND M.E.N. SEPARATE EARTH TO STEEL BUTTED WOOD POLE
Refer EARTHING Dwg. 1238
Trench sections
Refer EARTHING Dwg. 1238

M.E.N. SYSTEM
RESISTANCE TO GROUND

DISCONNECTED
CONNECTED

M.E.N. SYSTEM
RESISTANCE TO GROUND

30 ohm Max.
10 ohm Max.

HV Earth wire must not be broken
HV equipment earth and Metal guard earth MUST NOT BE CONNECTED

HV equipment earth and Metal guard earth MUST NOT BE CONNECTED

Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm

Remote HV earth pit

Additional earthing if required. If more than 4 additional earthrods required, contact local Ergon branch. Assy selection 104-5 and 225-3

Additional earthing if required. If more than 4 additional earthrods required, contact local Ergon branch. Assy Selection 104-5 or 104-1 and 5.

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
HV EQUIPMENT, METAL GUARD AND M.E.N. REMOTE SEPARATE EARTH TO STEEL BUTTED WOOD POLE

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Ergon Energy Corporation Ltd
ABN 50 087 646 062

A
ORIGINAL ISSUE

DATE
21/11/12

PASSED
C. Avenell

DRAWN
L. Burton

APPROVED
C. Noel

FILE: 5 27 1826 3
Dwg 1826 Sh 3
### MATERIAL - COMMON EARTH

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<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>20</td>
</tr>
<tr>
<td>18-5</td>
<td>Connector I.P.C. 25/95mm² main to 6/35mm² tap</td>
<td></td>
</tr>
<tr>
<td>87-3</td>
<td>Connection P.G. Al./Steel - Cu. (PG2)</td>
<td>1</td>
</tr>
<tr>
<td>87-10</td>
<td>Connection P.G. Cu. - Cu. (PG4)</td>
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<td>87-12</td>
<td>Connection P.G. Cu. - Cu. (PG5)</td>
<td>3</td>
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<tr>
<td>103-1</td>
<td>Earth HV 35mm² to wood pole</td>
<td>1</td>
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<tr>
<td>105-5</td>
<td>Cable guard (20mm) HV/LV to wood pole</td>
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<tr>
<td>140-6</td>
<td>Cable, insulated hard drawn Cu. 35mm²</td>
<td>2m</td>
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<td>141-14</td>
<td>Lug, compression Cu. 35mm² M12</td>
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<tr>
<td>233-5</td>
<td>Earth to nailed and steel butted wood pole</td>
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### MATERIAL - REMOTE COMMON EARTH

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<tr>
<td>18-5</td>
<td>Connector I.P.C. 25/95mm² main to 6/35mm² tap</td>
<td></td>
</tr>
<tr>
<td>87-3</td>
<td>Connection P.G. Al./Steel - Cu. (PG2)</td>
<td>1</td>
</tr>
<tr>
<td>87-10</td>
<td>Connection P.G. Cu. - Cu. (PG4)</td>
<td></td>
</tr>
<tr>
<td>87-12</td>
<td>Connection P.G. Cu. - Cu. (PG5)</td>
<td>3</td>
</tr>
<tr>
<td>105-5</td>
<td>Cable guard (20mm) HV/LV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>223-3</td>
<td>Earth remote common 35mm² to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>233-5</td>
<td>Earth to nailed and steel butted wood pole</td>
<td>1</td>
</tr>
</tbody>
</table>

### MATERIAL - ADDITIONAL EARTH REMOTE

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
<tr>
<td>225-3</td>
<td>Earth rod remote HV additional</td>
<td>1</td>
</tr>
</tbody>
</table>

### NOTES:

1. Bond earth to steel butt.
2. For wood pole attachments and foundations refer to Construction Practices.
3. Earthing to run in direction of mains. For clarity, drawing shows earth trenching traverse to mains.
4. Separation from communication equipment:
   * Provide the following minimum separation to communications manholes, pillars, pits etc:
     - Earth rod = 2.0m
     - Bare earth cable = 2.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - Earth rod = 0.3m
     - Bare earth cable = 0.3m

For separation from other communications assets refer Standards Section.
5. Attach warning sign beside remote HV earth lead
6. A remote earth identification pit to be installed at first remote HV earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-3.
**EARTHING NAILED & STEEL BUTTED WOOD POLE**

- **Construction Type**
  - EARTHING NAILED & STEEL BUTTED WOOD POLE

**HV EQUIPMENT COMMON EARTH TO STEEL BUTTED WOOD POLE**

- Assortment 103-1
- Assortment 87-12
- Assortment 105-5
- Assortment 233-5
- Assortment 140-6 and 141-14

**Additional Earthing if Required**
- If more than 4 additional earthing required, contact local Ergon branch.
- Assortment 104-5 or 104-1 and 5.

**Earthing**
- 4.0m Min. (Single rod)
- 8.0m Min. (Double rod)
- Bandit straps at 500 intervals on steel section

**Earthing to HV Equipment (e.g. Arrester/Tank/Sectionaliser)**
- To HV equipment
  - Assortment 140-6 and 141-14
  - Assortment 87-12

**Earthing to LV Neutral**
- Assy Selection 87-3,10 or 18-5

**Earthing to Control Cubicle (if required)**
- Assy Selection 87-3,10 or 18-5

**Earthing to LV Neutral**
- Assy Selection 140-6 and 141-14

**Earthing to HV Equipment**
- Assy Selection 103-1

**Earthing Trench Sections**
- Refer EARTHING Dwg. 1238

**Earthing Caution Tape**
- 1 ohm Max.
- 30 ohm Max.

**Earthing Assortment**
- Assy 14-1 (500 intervals)
- Pole

**Earthing Strip Insulation**
- 20
- 60
- 150

**Earthing Assortment**
- Assy Selection 87-3,10 or 18-5
- Assy 87-12
- Assy 103-1
- Assy 105-5
- Assy 233-5

**Earthing Assortment**
- Assy 140-6 and 141-14

**Earthing Assortment**
- Assy 104-5 or 104-1 and 5.

**Earthing Assortment**
- Assy 14-1

**Earthing Assortment**
- Assy 103-1

**Earthing Assortment**
- Assy 105-5

**Earthing Assortment**
- Assy 233-5

**Earthing Assortment**
- Assy 140-6 and 141-14

**Earthing Assortment**
- Assy 104-5 or 104-1 and 5.
Refer EARTHING Dwg. 1238

For additional earthing if required, contact local Ergon branch. Assay Selection 104-5 and 225-3.

**Construction Type**

**EBHVEMEN/RCOM**

**EAR** (Additional)

**ERA** (Additional rod)

**OVERHEAD DISTRIBUTION**

EARTHING NAILED & STEEL BUTTED WOOD POLE

HV EQUIPMENT REMOTE COMMON EARTH

TO STEEL BUTTED WOOD POLE

**DATE**: 6/2/14

**DRAWN**: L. Burton

**APPROVED**: C. Noel

**FILE**: 5 27 1910 3

**Dwg**: 1910 Sh 3

**Ergon Energy Corporation Ltd**

ABN 50 087 646 062

**HARD COPY**

**ORIGINAL ISSUE**

**UNCONTROLLED**

**Remote HV earth pit**

**Caution tape**

**Steel Butted Wood Pole**

**Bandit straps at 500 intervals on steel section**

**To HV equipment**

(e.g. Arrester/Tank/Sectionaliser)

**To LV neutral**

Assay Selection 87-3, 10 or 18-5

Assay 87-12

**To Control Cubicle**

(if required)

Assay Selection 140-6 and 141-14

Assay 105-5

Assay 233-5

**Trench sections**

Refer EARTHING Dwg. 1238

**Refer note 6 sheet 1**

Additional earthing if required. If more than 4 additional earthrods required, contact local Ergon branch. Assay Selection 104-5 and 225-3.
### MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-1</td>
<td>Earth rod additional</td>
<td>AR</td>
</tr>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
</tbody>
</table>

### MATERIAL - ADDITIONAL EARTH REMOTE

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
<tr>
<td>225-3</td>
<td>Earth rod remote HV additional</td>
<td>1</td>
</tr>
</tbody>
</table>

### NOTES:

1. Do not bond HV equipment earth (eg arrestor / tank) to steel butt.
2. Bond metal guard to steel butt.
3. The earthing electrode of other apparatus mounted on the same pole should be located at least 4.0m clear of earth mat and the conductor insulated to avoid transfer potential.
4. For wood pole attachments and foundations refer to Construction Practices.
5. Earthing to run in direction of mains. For clarity, drawing shows earth trenching transverse to mains.
6. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section
7. Attach warning sign beside remote HV earth lead.
8. A Remote earth identification pit to be installed at first remote HV earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-3
H.V. CONNECTED
H.V. Earth wire must not be broken

HV equipment earth and Metal guard earth MUST NOT BE CONNECTED

Bandit straps at 500 intervals on steel section

LV / HV Cable Guard Refer U/G Construction Manual

Assy 86-12
To Control Cubicle (if required)
Assy 238-1

Assy 105-5
(Saddles at 500 intervals)

Assy 14-1
(Saddles at 500 intervals)

METAL GUARD CONNECTED
HV equipment earth and Metal guard earth MUST NOT BE CONNECTED

Caution tape

Trench sections Refer EARTHING Dwg. 1238

4.0m Min. (Single rod)
8.0m Min. (Double rod)

Assy 103-5

Additional earthing if required. If more than 4 additional earthrods required, contact local Ergon branch. Assy Selection 104-5 or 104-1 and 5.

Construction Type

EBHVEMG
EBHVEXMG

Ergon Energy Corporation Ltd
ABN 50 087 646 062

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
HV EQUIPMENT & METAL GUARD SEPARATE EARTH TO STEEL BUTTED WOOD POLE - CONSTRUCTION

DATE 21/11/12
APPROVED C. Noel
PASSED C. Avenell
DRAWN L. Burton

FILE: 5 27 1827 1
Dwg 1827 Sh 2
NOTES:-

1. Bond metal guard / M.E.N to steel butt.
2. For wood pole attachments and foundations refer to Construction Practices.
3. Earthing to run in direction of mains. For clarity, drawing shows earth trenching traverse to mains.
4. Separation from communication equipment:
   * Provide the following minimum separation to communications manholes, pits etc:
     - Earth rod = 2.0m
     - Bare earth cable = 2.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - Earth rod = 0.3m
     - Bare earth cable = 0.3m
   For separation from other communications assets refer Standards Section
5. Attach warning sign beside remote HV earth lead
6. The L.V. neutral is to be connected to the cable guard earth.
7. A remote earth identification pit to be installed at first remote HV earth electrode position. If additional earthing is required an identification pit is to be installed at last electrode position also. Refer assy 225-3.
To HV equipment
(e.g. Arrester/Tank/Sectionaliser/Darverter)

To LV neutral
Assy Selection 87-3,10 or 18-5

To Control Cubicle
(if required)
Assy 86-12

Assy 141-14
Assy 140-6
Assy 238-1

LV / HV Cable Guard
Refer Underground
Construction Manual

Assy 14-1
(Saddles at 500 intervals)

Assy 87-12

Refer sheet 1 note 5

Strip insulation

Pole

20
60
150

HZ / HV equipment
Refer note 7 sheet 1

Remote HV
earth pit

Caution tape

Steel Butted
Wood Pole

Assy 223-3

2.0m min.

Trench sections
Refer EARTHING Dwg. 1238

Additional earthing if required.
If more than 4 additional
earthrods required,
contact local Ergon branch.
Assy Selection 104-5 and 225-3.

Construction Type
EBHVEMGMEN
EBHVEMGMENX
EAR (Additional)
ERA (Additional rod)

TO COMMON EARTH TO STEEL BUTTED WOOD POLE

HV EQUIPMENT, METAL GUARD AND M.E.N. REMOTE

Ergon Energy Corporation Ltd
ABN 50 087 646 062

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE

DATE 21/11/12
PASSED C. Avenell
DRAWN L. Burton
FILE: 5 27 1828 3

Dwg 1828 Sh 3
**MATERIAL**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth Guard LV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>103-1</td>
<td>Earth HV 35mm² to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>238-5</td>
<td>Bandit strap to steel butted wood pole</td>
<td>1</td>
</tr>
</tbody>
</table>

**MATERIAL - ADDITIONAL EARTH**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>104-1</td>
<td>Earth rod additional</td>
<td>AR</td>
</tr>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
</tbody>
</table>

**NOTES:**

1. Earthing to run in direction of mains.
2. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section
3. This construction can not be used if Telstra equipment is within 15m of pole
4. Do not bond HV operational earth to steel butted wood pole

**OVERHEAD DISTRIBUTION**

EARTHING NAILED & STEEL BUTTED WOOD POLE
OPERATION POINT - TO STEEL BUTTED WOOD POLE - CONSTRUCTION

**RESISTANCE TO GROUND**

DISCONNECTED

30 ohm
Max.

**Trench sections. Refer EARTHING Dwg. 1238**

**Caution tape**

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-5 or 104-1 and 5
4.0m Min. (Single rod)
8.0m Min. (Double rod)

**Construction Type**

EBOP
EBOPX
EA (Additional)
EAR (Additional rod)
NOTES:

1. All metalwork that passes through or into wood shall be greased for the entire length that may come into contact with the wood.
2. For wood pole attachments and foundations refer to Construction Practices.
3. A 25mm gap is required between bottom of pole top bracket and top of earth wire.
   Strip end of cable insulation approx. 10mm and place two saddles as shown in detail 'A'.
4. Gapped Bands not required on stayed poles.
5. Gapped bands are to be installed on all new intermediate SWER poles.
6. Earth leads and metal work above ground to be separated by at least 50mm.
7. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/
     cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable
     plastic sheathed / jacketed or in plastic conduit:
     - HV bare earth cable (site earth) = 1.0m
     For separation from other communications assets refer Standards Section
8. This construction can not be used if Telstra equipment is within 15m of pole.
Refer to Note 3.

Refer to Note 4.

CONSTRUCTION TYPE

EBGAP
EBGAPX

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
APPED BANDS TO STEEL BUTTED WOOD POLE - CONSTRUCTION

M A I N T A I N  a s m u c h s e p a r a t i o n a s p o s s i b l e b e t w e e n H V & LV cables & apparatus. The minimum separation shall not be less than 50 mm.

L.V. cables & apparatus shall not be less than 50 mm.

Lowest pole step 150 Min

Steel Butted Wood Pole

HV Earth

Telesla pit 300 Min Detail Top View

Telesla pit

15.0 m min.

15.0 m min.

1775

L.Burton

Dwg 1775 Sh 2

DATE 1/12/11

PASSED C. Avenell

DRAWN L. Burton

FILE: 5 27 17752

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ERGON ENERGY

ORIGINAL ISSUE 15.1.13

05.02.14

Ergon Energy Corporation Ltd
ABN 50 087 646 062
The minimum separation shall not be less than 50mm.

NOTES:
1. Earthing to run in direction of mains.
2. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section
3. Do not bond earth lead to steel butt
   Additional earthing if required.
   If more than 4 additional earthrods required, contact local Ergon branch.
   Assy selection 104-1 or 104-1 and 5

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
OVERHEAD EARTH WIRE
TO STEEL BUTTED WOOD POLE
<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>239-3</td>
<td>LV earth guard (20mm) with heat shrink insulation to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>13-10</td>
<td>Saddle (20mm) to wood pole</td>
<td>5</td>
</tr>
</tbody>
</table>

**Construction Type**

EARTHING NAILED & STEEL BUTTED WOOD POLE
NAIL TO EXISTING WOOD POLE WITH SWER TRANSFORMER / ISOLATOR EARTH ARRANGEMENT

**ASSY**

- 239-3: LV earth guard (20mm) with heat shrink insulation to wood pole
- 13-10: Saddle (20mm) to wood pole

**Notes**

- Assay 13-10
- HV heat shrink refer notes 2 & 3 sheet 2
- 2400 Min.

**Diagram Elements**

- Assay 239-3
- Nailed Wood Pole
- HV To Transformer E.R. bush. Refer note Assy 114 or 126
- H.V. To Transformer tank
- LV Neutral To Transformer

**References**

- Refer note Assy 114 or 126

**Construction**

- To Transformer E.R. bush.
- Assay 13-10
- HV heat shrink refer notes 2 & 3 sheet 2
- 2400 Min.

**Diagram Information**

- Date: 28/1/13
- Approved: C. Noel
- Passed: C. Avenell
- Drawn: L. Burton

**Company Information**

Ergon Energy Corporation Ltd
ABN 50 087 646 062

**File Information**

File: 5 27 1838 1 Dwg 1838 Sh1
NOTES
1. Do not bond earth leads to pole nail.
2. LV earth to be insulated from pole nail with HV heat shrink.
3. HV heat shrink to have 100mm coverage from any metal work of pole nail / stainless steel straps and attachment bolts.
### Notes:

1. Separation from communication equipment:
   - Provide the following minimum separation to communications manholes, pillars, pits etc:
     - Bonded Pole Nail = 2.0m
   - Provide the following minimum separation to communications cable plastic sheathed / jacketed
   - Bonded Pole Nail = 0.3m

2. The L.V. neutral is to be connected to the cable guard earth.

3. Bond HV equipment earth (e.g. arrester, tank), metal cable guard and CMEN to pole nail

### Material - Earth

<table>
<thead>
<tr>
<th>ASSY</th>
<th>Description</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>241-4</td>
<td>Metal cable guard earthed to pole nail</td>
<td>1</td>
</tr>
</tbody>
</table>

**Construction Type**

ENHVEMENMG

**OVERHEAD DISTRIBUTION**

EARTHING NAILED & STEEL BUTTED WOOD POLE
NAIL TO EXISTING WOOD POLE WITH HV EQUIPMENT,
METAL GUARD AND M.E.N COMMON EARTH
NOTES:-

1. Do NOT bond HV equipment earth (eg. arrester tank) to pole nail.

2. Bond metal guard / MEN to pole nail.

3. The HV earthing rod of other apparatus mounted on the same pole shall be located at least 4.0m clear of bonded pole nail and covered cable insulated to the first rod to avoid transfer potential.

4. Separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - HV earth rod = 15.0m, Cable guard = 0.3m
     - HV bare earth cable (site earth) = 15.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - HV bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section.

5. Bonded pole nail to be separated from insulated HV Earth downlead by 50mm if not installed in HFT conduit.

MATERIAL - SEPARATE EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>241-4</td>
<td>Metal cable guard earthed to pole nail</td>
<td>1</td>
</tr>
</tbody>
</table>

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
NAIL TO EXISTING WOOD POLE, METAL GUARD AND MEN SEPARATE EARTH

Construction Type

EN/HVEMENMG
NOTES:-

1. Separation from communication equipment:
   * Provide the following minimum separation to communications manholes, pillars, pits etc:
     - Bonded Pole Nail = 2.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - Bonded Pole Nail = 0.3m

2. Bond HV equipment earth (eg. arrester, tank), to pole nail

Material - Earth

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>234-1</td>
<td>Earth to pole nail</td>
<td>1</td>
</tr>
</tbody>
</table>

TO HV EQUIPMENT
(e.g. Arrester/Tank/Sectionaliser/Darverter)

To Control Cubicle

To HV Equipment

To LV Neutral

Construction Type

ENHVE

OVERHEAD DISTRIBUTION
EARTHING NAILED & STEEL BUTTED WOOD POLE
NAIL TO EXISTING WOOD POLE WITH
HV EQUIPMENT COMMON EARTH

File: 5 27 1911.1

Ergon Energy Corporation Ltd
ABN 50 087 646 062

Dwg 1911 Sh

A 4.4.19

Original Issue

Hard Copy

Uncontrolled

Approved C. Noel

Passed C. Avenell

Drawn L. Burton

DATE 29/1/14

FILE: 5 27 1911.1

B 119 251

Original Issue

Hard Copy

Uncontrolled
NOTES:-

1. For wood pole attachments and foundations refer to Construction Practices.

2. If metal cable guard is installed ensure guard is bonded to ABS handle.

3. ABS with insulated operating rod
   separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes
   - ABS earth rod = 1.0m
   - Bare earth cable = 1.0m
   - Metal cable guard = 1.0m
   - Pole nail = 1.0m
   Common earthed (CMEN):-
   - ABS earth rod = 2.0m
   - Bare earth cable = 2.0m
   - Metal cable guard = 2.0m
   - Pole nail = 2.0m
   Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
   - ABS bare earth (site earth) = 0.3m
   for separation from other communications assets refer standards section

4. HV equipment separate earths (e.g. arrester / tank) and pole nail to be separated by 50mm if not installed in HFT conduit

5. Bond ABS to pole nail.

MATERIAL

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>234-5</td>
<td>ABS handle to new pole nail</td>
<td>1</td>
</tr>
</tbody>
</table>

Assy 234-5

1.0m min (Separate earth)

2.0m min (Common earth)