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**OVERHEAD DISTRIBUTION EARTHING WOOD POLE INDEX**

**FILE:** 5 11 1267 1

**DATE:** 30.06.05

**PASSED:** C. Avenell

**DRAWN:** T. Borg

**APPROVED:** C. Noel
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**OPERATIONAL EARTH POINT CONSTRUCTION**

| OPERATIONAL EARTH POINT CONSTRUCTION | | |
| OPERATIONAL EARTH POINT CONSTRUCTION | | |
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**GRID UTILITY SUPPORT SYSTEM (GUSS)**

**M.E.N. EARTHING CONSTRUCTION**

**M.E.N.**

**GRID UTILITY SUPPORT SYSTEM (GUSS)**

**M.E.N. EARTHING CONSTRUCTION**

**EGUSSR**

**M.E.N. earth for grid utility support system (GUSS)**

**EA**

**Deep drilled**

**EADDC**
SINGLE AND THREE PHASE TRANSFORMER EARTHING - CONSTRUCTION CODE

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

E PT/COM/DD

EARTH TRANSFORMER SYSTEM TYPE
E PT = Pole Transformer COM = Common
SEP = Separate
RCOM = Remote common
RSEP = Remote HV separate
DD = Deep drilled
(Omit where driven rods used)

EXAMPLES:- E PT/COM/DD = Pole transformer with common earth system (CMEN), deep drilled.
E PT/RSEP = Pole transformer with remote HV separate and LV earth systems, driven rods.

SWER TRANSFORMER/REACTOR/REGULATOR EARTHING - CONSTRUCTION CODE

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

E PTS/DD

EARTH TRANSFORMER TYPE
E PTS = Pole Transformer SWER
PTS1 = Pole Transformer SWER Isolator
PREAS = Pole Reactor SWER
PREGS = Pole Regulator SWER
DD = Deep drilled
(Omit where driven rods used)

EXAMPLES:- E PTS/DD = Earth, pole transformer SWER, deep drilled.
E PREAS = Earth, pole reactor SWER, driven rods.
E PTS1 = Earth, pole transformer/isolator SWER, deep drilled.
SWER/SINGLE AND THREE PHASE RECLOSER EARTHING - CONSTRUCTION CODE

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

E ACRS/R/DD

EARTH  RECLOSER  SYSTEM  TYPE
E ACRS = Recloser SWER
ACR1 = Recloser 1 Phase
ACR3 = Recloser 3 Phase
R = Remote
(Omit for standard earth)
DD = Deep drilled
(Omit where driven rods used)

EXAMPLES:- E ACRS/DD = Earth, 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.

E HVMG/MEX/SEP/ABC

EARTH  EQUIPMENT  SYSTEM  MAINS (Neutral)
E ABS = Air Break Switch
ABSMG = Air Break Switch with metal guard
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
HVEMGEN = High Voltage Equipment and Metal Guard with connection to LV mains - New Pole
HVEMGENX = High Voltage Equipment and Metal Guard with connection to LV mains - Existing pole
OP = Operation Point - New pole
OPX = Operation Point - Existing pole
HVMEN = High Voltage Equipment with Connection to LV Mains - New Pole
HVMENX = High Voltage Equipment with Connection to LV Mains - Existing pole
SEP = Separate
COM = Common
RSEP = Remote HV Separate
RCOM = Remote Common
ABC
AL
CU
(MEN req'd)

EXAMPLES:-
E/HVMG/MEX/SEP/ABC = Earth, HV Equipment & Metal Guard with MEN on existing pole, separate earth system, connected to ABC mains neutral.
M.E.N. EARTHING - CONSTRUCTION CODE

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

E MEN/AL

EARTH

SYSTEM

MAINS

MEN = M.E.N - New Pole
MENX = M.E.N - Existing Pole
MG = Metal Guard
GUSSR = Grid Utility Support System (Rods)
GUSSDD = Grid Utility Support System (Deep Drilled)

(Omit for GUSS)

ABC = LVABC Mains
Al. = Bare Aluminium Mains
Cu. = Bare Copper Mains

EXAMPLE:- E MEN/Al = Earthing on new pole, with bare Aluminium mains.

ADDITIONAL EARTHING - CONSTRUCTION CODE

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

E AR

EARTH

ADDITIONAL TYPE

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)
RADDCC = Remote Additional deep drilled (Cable type)
AC = Additional (Single depth rod & 'C' crimp assembly)
ADDCC = Additional deep drilled (cable & 'C' crimp type)

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

OVERHEAD DISTRIBUTION

EARTHING WOOD POLE
CONSTRUCTION CODE GUIDE
M.E.N. AND ADDITIONAL

APPROVED  C. Noel
DATE  5/2/01
PASSED  C. Avenell
DRAWN  L. Burton

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE:  5  1112483
Dwg 1248  Sh 3
POLE LIGHTNING PROTECTION EARTHING - CONSTRUCTION CODE

Examples:
- E DAR = Darverter earthing on new pole
- E GAPX = Gapped bands earthing on existing pole

OVERHEAD EARTHWIRE - CONSTRUCTION CODE

Examples:
- E OHX/S = Earth Overhead On Existing Pole, Strain connection
## QUICK REFERENCE FOR DISTRIBUTION EARTH RESISTANCE

### M.E.N - SINGLE PHASE / 3 PHASE SUBSTATIONS

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<th>Connected (Ω)</th>
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### SWER Substation HV Connected (Ω)

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<th>19.1kV</th>
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### SWER Substation Deep Drilled HV Connected (Ω)

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<td>1284, 1330</td>
</tr>
<tr>
<td>Overhead Earth Wire</td>
<td>30</td>
<td></td>
<td></td>
<td>1441, 1442</td>
</tr>
</tbody>
</table>

---

**OVERHEAD DISTRIBUTION**

**EARTHING WOOD POLE**

**QUICK REFERENCE FOR DISTRIBUTION EARTH RESISTANCE**

**DRAWN**

L. Burton

**APPROVED**

C. Noel

**DATE**

21.1.09

**PASSED**

C. Avenell

**FILE**

5, 11, 1696 1

**Dwg**

1696 Sh
# Quick Reference Minimum Separations Between Ergon Earthing Systems & Telstra Plant

<table>
<thead>
<tr>
<th>Type of Earthing System</th>
<th>Telstra Plant Types</th>
<th>Telstra Cable Types</th>
<th>Telephone Exchange</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV Earth (M.E.N)</td>
<td>0.3 metres</td>
<td>0.3 metres</td>
<td>1 metre</td>
<td>1296, 1297</td>
</tr>
<tr>
<td>Pole Mounted Distribution Transformers on Wood Poles</td>
<td>15 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1241, 1311</td>
</tr>
<tr>
<td>- HV and LV Earths (separate)</td>
<td>15 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1241, 1311</td>
</tr>
<tr>
<td>Pole Mounted Distribution Transformers on Wood Poles</td>
<td>2 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1280, 1309</td>
</tr>
<tr>
<td>- HV and LV Earths (CMEN)</td>
<td>2 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1280, 1309</td>
</tr>
<tr>
<td>Pole Mounted Distribution Transformers on Conductive Poles</td>
<td>2 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1622, 1624</td>
</tr>
<tr>
<td>- HV and LV Earths (CMEN)</td>
<td>15 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1622, 1624</td>
</tr>
<tr>
<td>- HV and LV Earths (separate)</td>
<td>15 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1622, 1624</td>
</tr>
<tr>
<td>HV Poles (wood) with ABS</td>
<td>1 metre</td>
<td>0.3 metres</td>
<td>1 metre</td>
<td>1298</td>
</tr>
<tr>
<td>- Using insulated operating handle</td>
<td>1 metre</td>
<td>0.3 metres</td>
<td>1 metre</td>
<td>1298</td>
</tr>
<tr>
<td>SWER Transformers on Wood Poles</td>
<td>25 metres</td>
<td>1 metre</td>
<td>50 metre</td>
<td>1304, 1300, 1307</td>
</tr>
<tr>
<td>- Isolation Transformers</td>
<td>25 metres</td>
<td>1 metre</td>
<td>50 metre</td>
<td>1304, 1300, 1307</td>
</tr>
<tr>
<td>- Distribution Transformers</td>
<td>15 metres</td>
<td>1 metre</td>
<td>30 metre</td>
<td>1329, 1330, 1283</td>
</tr>
<tr>
<td>Poles with HV Earth</td>
<td>15 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1433, 1434, 1298</td>
</tr>
<tr>
<td>- e.g. HV cable Termination Pole, HV Recloser, Surge Diverter Earth</td>
<td>15 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1433, 1434, 1298</td>
</tr>
<tr>
<td>- Without HV Earth Bonded to CMEN</td>
<td>2 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1433, 1434, 1298</td>
</tr>
<tr>
<td>- With HV Earth Bonded to CMEN</td>
<td>2 metres</td>
<td>0.3 metres</td>
<td>15 metres</td>
<td>1433, 1434, 1298</td>
</tr>
</tbody>
</table>

---

**Overhead Distribution Earthing Wood Pole**

Quick Reference Minimum Separations Between Ergon Earthing Systems & Telstra Plant
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 two 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.
To L.V. Neutral
Connector Assy Selection
87-3 or 10 or
18-5

Assy 105-1
(500 Intervals)

2600

2400 Min.

Wood Pole

Strip insulation

Assy 105-5
(Saddles at 500 Intervals)

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 104-7 or 104-5 and 7

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

Butt earth
Minimum of 3 coils beneath base.
(strip insulation)

Construction Type
EMEN
EAC (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
M.E.N. EARTH - NEW POLE

APPROVED
C. Noel

DATE
05.12.07

PASSED
C. Avenell

DRAWN
T. Borg
MATERIAL

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
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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>15-5</td>
<td>Connector IPC 25/96mm² main to 6/35mm² tap</td>
<td>1</td>
</tr>
<tr>
<td>87-3</td>
<td>Connector PG Al/Steel-Cu.</td>
<td>1</td>
</tr>
<tr>
<td>87-10</td>
<td>Connector PG Cu/Cu.</td>
<td>1</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>
</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.
To L.V. Neutral
Connector Assy Selection
87-3 or 10 or
18-5

Assy 103-5

Strip insulation

Assy 105-5
(Saddles at 500 Intervals)

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)

Pole

2000

2200

DISCONNECTED
CONNECTED
CONNECTED
Separate System
Common System

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

EMENX
EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
M.E.N. EARTH - EXISTING POLE

FILE 5 1112972  Dwg 1297 Sh 2
### 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>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>
</tbody>
</table>

### 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 drawing 1296 and 1297.
   - Construction types EMEN or EMENX.

2. Separation from communication equipment:
   - Provide the following minimum separation to communications pillars/cabinets, cabled 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.
# MATERIAL - SEPARATE EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm² 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>
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</tbody>
</table>

# MATERIAL - REMOTE SEPARATE EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm² 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>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>
</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>

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

Assy 14-1
(500 intervals)

Assy 102-1

Strip insulation for portable earth connection

LV DISCONNECTED

10 ohm Max.

L.V. connector

To Transformer
L.V. neutral bushing

Assy 103-1

To Transformer tank

Pole

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

30 ohm Max.

2.0m

2600 2400 Min

3400

Assy 105-5
(Saddles at 500 intervals)

H.V. Earth wire

To Transformer tank

Assy 103-1

Wood pole

L.V. Earth wire

To Transformer
L.V. neutral bushing

Assy 103-1

Wood pole

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)

Trench sections
Refer EARTHING Dwg. 1238

Construction Type
EPT/SEP
EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
TRANSFORMER SEPARATE EARTH CONSTRUCTION
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. 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)

To Transformer

L.V. Neutral bushing

H.V. CONNECTED

H.V. Earth wire must not be broken

30 ohm Max.

Refer sheet 1 note 3 Assy 105-5 (Saddles at 500 Intervals)

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

Construction Type

EPT/RSEP

EAR (Additional)

ERA (Additional rod)

OVERHEAD DISTRIBUTION

EARTHING WOOD POLE

TRANSFORMER REMOTE HV SEPARATE EARTH CONSTRUCTION

To Transformer tank

Pole

Pole

Strip insulation

LV

H.V.

L.V. Neuronal bushing
### MATERIAL - SEPARATE EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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</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>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>
</tbody>
</table>

### MATERIAL - REMOTE SEPARATE EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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</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>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>224-1</td>
<td>Earth remote HV separate (35mm²) deep drilled to wood pole</td>
<td>1</td>
</tr>
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</table>

### MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>124-1</td>
<td>Earth additional - deep drilled</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>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>
</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:
     - LV earth rod or cable = 0.3m
     - HV earth rod = 15.0m
     - HV bare earth cable (site earth) = 15.0m
   * Additional earthing is required if 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. 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.**

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.
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

Assy 123-1
Assy 14-1 (500 Intervals)

2600
2400 Min

3400

2.0m

2.0m

Caution tape

Assy 105-5 (Saddles at 500 Intervals)

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

30 ohm Max.

Trench sections
Refer EARTHING Dwg. 1238

Additional earthing if required
Assy 124-1

H.V. Earthed
H.V. Neutral Bushing
To Transformer tank

L.V. Neutral Bushing
To Transformer

Strip insulation

Construction Type

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
TRANSFORMER SEPARATE EARTH
DEEP DRILLED - CONSTRUCTION

EPT/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.

Additional earthing if required

Assy 123-1
Assy 14-1 (500 Intervals)

Strip insulation for portable earth connection

LV DISCONNECTED

10 ohm Max.

Refer sheet 1 note 3
Assy 105-5 (Saddles at 500 Intervals)

Remote HV earth pit

Refer note 4 sheet 1.
Additional earthing if required Assy 225-7

Construction Type

EPT/RSEP/DD ERADDC (Additional)
### NOTES:

1. Earthing to run in direction of mains.
2. Separation from communications 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
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.

### MATERIAL - SEPARATE EARTH

<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>10</td>
</tr>
<tr>
<td>14-2</td>
<td>Saddle Cu. 13mm to suit 70mm² cable to wood pole</td>
<td>3</td>
</tr>
<tr>
<td>102-1</td>
<td>Earth LV to wood pole (35mm²)</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>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>
</tr>
</tbody>
</table>

### MATERIAL - REMOTE SEPARATE EARTH

<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>10</td>
</tr>
<tr>
<td>223-3</td>
<td>Earth remote CMEN 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>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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### MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
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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>
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</table>

### MATERIAL - ADDITIONAL EARTH REMOTE

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>225-3</td>
<td>Earth rod remote HV additional</td>
<td>1</td>
</tr>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
</tbody>
</table>
To Transformer L.V. Neutral bushing

To Transformer tank

Assy 14-1
(500 Intervals)

Assy 102-1

Assy 14-2
(500 Intervals)

L.V.

H.V.

Assy 140-14
141-18

70mm² Cu.

35mm² Cu.

1 ohm Max.

30 ohm Max.

1m

2400 Min.

2600

2.0m

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

Trench sections
Refer EARTHING Dwg. 1238

Assy 105-5

(Saddles at 500 Intervals)

Steel Butted Wood Pole

Strip insulation for portable earth connection

Construction Type

EPT/COM
EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
TRANSFORMER COMMON EARTH CONSTRUCTION

File: 5 1112802

Dwg 1280 Sh 2

Ergon Energy Corporation Ltd
ABN 50 087 646 062

DATE 6/6/12
APPROVED C. Noel
PASSED C. Avenell
DRAWN E. Newton
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 earthings is installed. Where specified resistances are 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 mainholes, 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

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.
To Transformer  
L.V. Neutral bushing  
Assy 140-14  
Assy 141-18  
To Transformer tank  

Assy 14-1  
(500 Intervals)  
Assy 123-2  

Assy 105-5  
(Saddles at 500 Intervals)  

2600  
2400  
Min.  

Additional earthing  
if required  
Assy 124-1  

Caution tape  

Strip insulation for portable earth connection  

Construction Type  
EPT/COM/DD  
EADDC (Additional)  

OVERHEAD DISTRIBUTION  
EARTHING WOOD POLE  
TRANSFORMER COMMON EARTH  
DEEP DRILLED - CONSTRUCTION  

Ergon Energy Corporation Ltd  
ABN 50 087 646 062  

DATE  
29/5/09  
PASSED  
C. Avenell  
DRAWN  
L. Burton  

FILE: 5  1113092  
Dwg 1309  Sh 2  

L. Burton  

Trench sections. Refer  
EARTHING Dwg. 1238  

Strip insulation for portable
To Transformer
L.V. Neutral bushing
Assy 140-14
141-18
To Transformer tank
Assy 14-1
(500 Intervals)
Assy 224-3

HV Earth
300 min
Telstra pit
Detail Top View

Remote HV earth pit
Telstra pit or equipment

HV Earth
Telstra pit
Detail Top View

Refer EARTHING Dwg. 1238

Trench sections
Refer note 5 sheet 1
Additional earthing if required
Refer assy 124-1 and 225-7

Refer note 7

Construction Type
EPT/RCOM/DD
EADDCC (Additional)

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
TRANSFORMER REMOTE COMMON EARTH
DEEP DRILLED - CONSTRUCTION

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 11 1309 3
Dwg 1309 Sh 3
### MATERIAL - SEPARATE EARTH

<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>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>124-1</td>
<td>Earth additional - deep drilled</td>
<td>5</td>
</tr>
<tr>
<td>125-1</td>
<td>Earth HV to wood pole - deep drilled</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>124-1</td>
<td>Earth additional - deep drilled</td>
<td>AR</td>
</tr>
</tbody>
</table>

Notes: (Continued on sheet 2)

The following conditions need to be met for concessional earthing values to be adopted.

1. RAM approval required to use this earthing system.
2. Greater than 3000Ω.m soil resistivity measured in dry conditions for surface to 1m deep.
3. Greater than 2000Ω.m soil resistivity at depth (e.g. 10m) measured in dry conditions.
4. Transformer size must be less than 63kVA. This may be extended to larger transformers subject to assessment of protection clearing times.
5. Local 11kV EDO protection must be able to clear an earth fault in less than 3 seconds and SEF (i.e. sensitive earth fault) protection must be enabled on the feeder.

6. HV earthing system should be located away from areas which could be subject to frequent presence of human activity (e.g. gates, yards, public meeting places) and a separation of at least 10m to separately earthed structures must be maintained. Installation of insulating sections in adjacent fences may be utilised to achieve this.

7. For single customer installations, the HV earth should be located on the side of the transformer pole away from the customer installation.

8. At least 3 drilled earths, minimum of 3m deep, attached to HV earthing system to ensure stable resistance, even when ground surface dries out. At least 60m of buried earthing cable for HV earthing system. Additional earth stakes may also be installed to achieve target resistance. The location of earthing system to be recorded.

9. The LV earthing system lower impedance must be less than the HV earthing system value.

10. LV earths must be located in a different direction from pole than HV earth.

11. LV underground earthing cable, drilled earths and earth stakes to be separated from HV underground earthing system by 10m. 10m PVC insulated section in LV earthing cable away from pole to ensure separation from HV earth. The location of earthing system to be recorded.

12. The LV earthing system should be located at least 2 metres away from any conductive structures (e.g. pipelines or fences).

13. At least 4 drilled earths, minimum of 3m deep, attached to LV earthing system to ensure stable resistance, even when ground surface dries out. At least 60m of buried earthing cable for LV earthing system. Additional earth stakes may also be installed to achieve target resistance.

14. An additional deep drilled MEN earth at the customer's supply pole must be installed if supply is not taken off the transformer.

15. The Customer's installation must be checked for compliance with AS3000 requirements in section 5.4.6 Structural metalwork including Conductive building materials and section 5.6 Equipotential Bonding. Particular regard should be given to the presence of any metal framed buildings, bore casings and extensive conductive fences.

16. Separation from communication equipment

*Provide the following separation to communications pillars, cabinets, cable pits/manholes, payphones or miscellaneous earths:
- LV earth rod or cable = 0.3m       - HV earth rod = 15m       - HV bare earth cable (site earth) = 15.0m
*Provide the following minimum separation s 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 to Standards Section.

17. 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.

18. 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**

19. 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.
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

90 ohm Max.

L.V. Neutral Bushing

H.V. CONNECTED

H.V. Earth wire must not be broken

100 ohm Max.

Additional earthing if required
Assy 124-1
Refer note 19

Minimum 3 additional deep drilled

Refer note 19

Additional earthing if required
Assy 124-1
Refer note 19

Minimum 2 additional deep drilled

Refer note 19

HARD COPY UNCONTROLLED

Ergon Energy Corporation Ltd
ABN 50 087 646 062

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
CONCESSION TRANSFORMER SEPARATE EARTH DEEP DRILLED - CONSTRUCTION

C. Noel
13.1.13
C. Avenell

EPT/SEP/DDC
EADDC (Additional)
### 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>30</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard LV to wood pole</td>
<td>1</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>123-1</td>
<td>Earth LV 35mm² to wood pole - deep drilled</td>
<td>1</td>
</tr>
</tbody>
</table>

### MATERIAL - ADDITIONAL EARTH LV

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>124-1</td>
<td>Earth additional - deep drilled</td>
<td>AR</td>
</tr>
</tbody>
</table>

### MATERIAL - ADDITIONAL EARTH HV

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

### ADDITIONAL EARTHING IF REQUIRED

- Assy 124-1
- Refer note 6

### ADDITIONAL EARTHING IF REQUIRED

- Assy 124-2
- Refer note 6
NOTES

1. Earthing to run in direction of mains.
2. L.V. earthing system to be connected to L.V. neutral (M.E.N. system).
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. & 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.
   - H.V 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. 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 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.
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 HV earth system and any conductive structure.
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

**L.V. DISCONNECTED**

To Transformer L.V. Neutral bushing

**H.V.**

To Transformer E.R. bush. Refer note Assy 114 or 126

**WARNING SIGN**

Strip insulation on both HV Earth downleads

**DISTRIBUTION S/STN**

<table>
<thead>
<tr>
<th>kVA</th>
<th>11kV</th>
<th>12.7kV</th>
<th>19.1kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>14Ω</td>
<td>16Ω</td>
<td>25Ω</td>
</tr>
<tr>
<td>25</td>
<td>6Ω</td>
<td>7.5Ω</td>
<td>11Ω</td>
</tr>
<tr>
<td>50</td>
<td>3.5Ω</td>
<td>4Ω</td>
<td>6Ω</td>
</tr>
<tr>
<td>100</td>
<td>2Ω</td>
<td>2.3Ω</td>
<td>3.4Ω</td>
</tr>
</tbody>
</table>

**ISOLATING S/STN**

<table>
<thead>
<tr>
<th>kVA</th>
<th>11kV</th>
<th>12.7kV</th>
<th>19.1kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>2Ω</td>
<td>2.3Ω</td>
<td>3.4Ω</td>
</tr>
<tr>
<td>200</td>
<td>1Ω</td>
<td>1.2Ω</td>
<td>1.9Ω</td>
</tr>
</tbody>
</table>

**Construction Type**

- EPTS/DD
- EPTSI/DD
- EADDCC (Additional)

**Additional LV earthing if required Assy 124-1 Refer note 6**

**Additional HV earthing if required Assy 124-2 Refer note 6**

**To Transformer tank**

Strip insulation for portable earth connection

**Caution tape**

Refer EARTHING Dwg. 1238

**EARTHING WOOD POLE**

Refer note Assy 114 or 126 To Transformer E.R. bush.
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 on both HV Earth downleads (Minimum of 3 electrodes)

L.V. DISCONNECTED

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)

Strip insulation on both HV Earth downleads

DISTRIBUTION S/STN

<table>
<thead>
<tr>
<th>kVA</th>
<th>11kV</th>
<th>12.7kV</th>
<th>19.1kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>13Ω</td>
<td>15Ω</td>
<td>22Ω</td>
</tr>
<tr>
<td>25</td>
<td>6Ω</td>
<td>7Ω</td>
<td>10Ω</td>
</tr>
<tr>
<td>50</td>
<td>3.9Ω</td>
<td>3.5Ω</td>
<td>5Ω</td>
</tr>
<tr>
<td>100</td>
<td>2Ω</td>
<td>2.3Ω</td>
<td>3.4Ω</td>
</tr>
</tbody>
</table>

H.V. CONNECTED MAX. RESISTANCE

H.V. Earth wires must not be broken (Minimum of 3 electrodes)

L.V. Neutral bushing

To Transformer E.R. bush
Refer note Assy 114

To Transformer tank
Assy 121-1

Caution tape

Trench sections
Refer EARTTHING Dwg. 1238

Construction Type
EPTS
EA (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
S.W.E.R.TRANSFORMER EARTH

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</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>cable to wood pole</td>
<td></td>
</tr>
<tr>
<td>102-1</td>
<td>Earth LV 35mm² 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>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>
</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. L.V. earthing system to be connected to L.V. neutral (M.E.N. system).
3. 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.
4. 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.
5. Customer Underground Mains are not allowed on S.W.E.R. poles carrying H.V. Earths.
6. 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.
7. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards.
8. A minimum 2.0m 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>
</tr>
<tr>
<td>121-1</td>
<td>Earth H.V. SWER (35mm²) to 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>

H.V. CONNECTED MAX. RESISTANCE

H.V. Earth wires must not be broken
(Minimum of 3 electrodes)

<table>
<thead>
<tr>
<th>REACTOR</th>
<th>kVAR</th>
<th>11kV</th>
<th>12.7kV</th>
<th>19.1kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>6Ω</td>
<td>7Ω</td>
<td>10Ω</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>3.3Ω</td>
<td>3.5Ω</td>
<td>5Ω</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REGULATOR</th>
<th>Amps</th>
<th>11kV</th>
<th>12.7kV</th>
<th>19.1kV</th>
</tr>
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<tbody>
<tr>
<td>50</td>
<td>3.5Ω</td>
<td>3.5Ω</td>
<td>3.5Ω</td>
<td></td>
</tr>
</tbody>
</table>

Strip insulation on both HV Earth downleads

Caution tape

To Transformer tank

Refer note Assy 152

Assy 14-1
(500 Intervals)

Assy 121-1

To Regulator Control Cubicle (etc)

Construction Type

EPREAS (Reactor)
EPREGS (Regulator)
EA (Additional)
EAR (Additional rod)

Trench sections
Refer EARTHING Dwg. 1238

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

H.V. Earth wires must not be broken
(Minimum of 3 electrodes)

<table>
<thead>
<tr>
<th>OVERHEAD DISTRIBUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARTHING WOOD POLE</td>
</tr>
<tr>
<td>S.W.E.R. REACTOR / REGULATOR EARTH</td>
</tr>
</tbody>
</table>

C. Noel

DATE: 13.12.00
PASSED: C. Avenell
DRAWN: L. Burton

FILE: 5/11/13701
Dwg 1307 Sh 1
NOTES:

1. Earthing to run in direction of mains.
2. 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.
3. The minimum requirements for electrodes is that they be copper clad electrodes.
4. The spacing of additional earth electrodes to be equal to twice the earth electrode length installed.
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 earth cable (site earth) = 1.0m
   For separation from other communications assets refer Standards Section
6. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards.
7. A minimum 2.0m 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>
</tr>
<tr>
<td>122-1</td>
<td>Earth H.V. SWER (35mm²) to wood pole - deep drilled</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>124-2</td>
<td>Earth HV additional - deep drilled</td>
<td>AR</td>
</tr>
</tbody>
</table>

---

**H.V. CONNECTED MAX. RESISTANCE**

<table>
<thead>
<tr>
<th></th>
<th>REACTOR</th>
<th>REGULATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kVAr 11kV 12.7kV 19.1kV</td>
<td>Amps 11kV 12.7kV 19.1kV</td>
</tr>
<tr>
<td>25</td>
<td>6Ω    7.5Ω    11Ω</td>
<td>50    4Ω    4Ω    4Ω</td>
</tr>
</tbody>
</table>

- H.V. Earth wires must not be broken
- Minimum of 3 electrodes

---

**To Transformer E.R. bush**

Refer note Assy 152

**To Transformer tank**

**Assy 14-1**

(500 Intervals)

**Assy 122-1**

**Strip insulation on both HV Earth downleads**

**Assy 105-10**

(Saddles at 500 Intervals)

**Construction Type**

EPREAS/DD (Reactor)
EPREGS/DD (Regulator)
EADDCC (Additional)

---

Additional earthing if required Assy 124-2

Refer note 5

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 WOOD POLE
S.W.E.R. REACTOR/REGULATOR EARTH
DEEP DRILLED
1. Earthing to run in direction of mains.
2. H.V. Earthing system to be connected to H.V. earth bushing and tank earth. H.V. Earth leads to run down oppositesides of the pole and must be insulated and continuous from H.V. earth bush and tank earth to first H.V. electrode.
3. 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.
   - The holes are to be refilled immediately with dry earth enhancing compound. **DO NOT ADD WATER.**
4. **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.
5. 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.
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 2.0m separation shall be maintained between the HV earth system and any conductive structure.
NOTES:

1. Earthing to run in direction of mains. For clarity, drawing shows earth trenching tranverse to mains.

2. Separation from communications 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. 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.

### MATERIAL - EARTH

<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>10</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 (20mm) HV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>140-6</td>
<td>Cable insulated annealed Cu. 35mm²</td>
<td>4</td>
</tr>
<tr>
<td>141-14</td>
<td>Lug, compression 35mm² M12</td>
<td>4</td>
</tr>
<tr>
<td>87-12</td>
<td>Connector P.G. Cu to Cu</td>
<td>1</td>
</tr>
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</table>

### MATERIAL - REMOTE EARTH

<table>
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<th>DESCRIPTION</th>
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</thead>
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<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</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>105-5</td>
<td>Earth Guard (20mm) HV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>140-6</td>
<td>Cable insulated annealed Cu. 35mm²</td>
<td>4</td>
</tr>
<tr>
<td>141-14</td>
<td>Lug, compression 35mm² M12</td>
<td>4</td>
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<tr>
<td>87-12</td>
<td>Connector P.G. Cu to Cu</td>
<td>1</td>
</tr>
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### MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<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>Depth earth rod additional</td>
<td>AR</td>
</tr>
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### MATERIAL - ADDITIONAL EARTH REMOTE

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

Trench sections. Refer EARTHING Dwg. 1238

30 ohm Max.

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)

2600
2400 Min.

Assy 103-1
Assy 87-12
Assy 14-1 (500 Intervals)

Assy 105-5 (Saddles at 500 Intervals)

Construction Type
EACR3 (3 Phase)
EA (Additional)
EAR (Additional rod)
Trench sections. Refer EARTHING Dwg. 1238

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

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

15.0m min

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

H.V. DISCONNECTED

30 ohm Max.

HV Earth

Telstra pit

Detail Top View

Caution tape

Remote HV earth pit

Telstra pit or equipment

To Aux. Supply
External V.T.

To Recloser tank

Assy 223-1

Assy 14-1
(500 Intervals)

Assy 87-12

2600

2400 Min.

Assy 140-6
141-14

H.V.

To Radio Antenna

Assy 140-6
141-14

Assy 105-5
(Saddles at 500 Intervals)

Construction Type

EACR3  (3 Phase)

EAR  (Additional)

ERA  (Additional rod)

OVERHEAD DISTRIBUTION

EARTHING WOOD POLE

3 PHASE RECLOSER REMOTE EARTH CONSTRUCTION

FILE: 5 11 1433 3

Dwg 1433 Sh 3
### MATERIAL - EARTH

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<th>DESCRIPTION</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 (20mm) HV 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>140-6</td>
<td>Cable insulated annealed Cu. 35mm²</td>
<td>4</td>
</tr>
<tr>
<td>141-14</td>
<td>Lug, compression 35mm² M12</td>
<td>4</td>
</tr>
<tr>
<td>87-12</td>
<td>Connector P.G. Cu to Cu</td>
<td>1</td>
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</table>

### MATERIAL - REMOTE EARTH

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<td>Earth guard (20mm) HV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>224-3</td>
<td>Earth HV 35mm² to wood pole - deep drilled</td>
<td>1</td>
</tr>
<tr>
<td>140-6</td>
<td>Cable insulated annealed Cu. 35mm²</td>
<td>4</td>
</tr>
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<td>4</td>
</tr>
<tr>
<td>87-12</td>
<td>Connector P.G. Cu to Cu</td>
<td>1</td>
</tr>
</tbody>
</table>

### NOTES:

1. Earthing to run in direction of mains. For clarity, drawing shows earth trenching tranverse to 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. 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. 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.**

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

Trench sections. Refer EARTHING Dwg. 1238

Additional earthing if required
Assy 124-1

Refer note 6

Strip insulation

Assy 123-2
Assy 87-12
Assy 14-1
(500 Intervals)

To Aux Supply External V.T.
To Recloser tank

H.V. DISCONNECTED

30 ohm Max.

To Control Cubicle

Construction Type
EACR3 (3 Phase)
EADDC (Additional)

EARDDC (Additional)

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
3 PHASE RECLOSER EARTH DEEP DRILLED CONSTRUCTION

C. Noel
1.6.09

C. Avenell

L. Burton

22.2.12
24.05.12
11.11.15

ABN 50 087 646 062
Ergon Energy Corporation Ltd

FILE: 1114342
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

Trench sections. Refer EARTHING Dwg. 1238

Refer note 4 sheet 1

Additional earthing if required
Assy 124-1 and 225-7

Refer note 6

Construction Type
EACR3 (3 Phase)
EADDC (Additional)
**MATERIAL**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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</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>
</tr>
<tr>
<td>121-1</td>
<td>Earth H.V. SWER (35mm²) to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>140-6</td>
<td>Cable insulated annealed Cu. 35mm²</td>
<td>6</td>
</tr>
<tr>
<td>141-14</td>
<td>Lug, compression 35mm² M12</td>
<td>8</td>
</tr>
<tr>
<td>87-12</td>
<td>Connector P.G. Cu to Cu</td>
<td>1</td>
</tr>
</tbody>
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**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>

(The minimum separation shall not be less than 50mm.)

**S.W.E.R. RECLOSER EARTH**

- **H.V. CONNECTED**
  - H.V. Earth wires must not be broken
  - (Minimum of 3 electrodes)
  - Recloser - 25 ohms max.

- **To Auxiliary Transformer**
  - E.R. bush (12.7/19.1kV)
  - H.V. bush (11kV)

- **To Auxiliary Transformer Pole bracket**
  - Assay 14-1 (500 Intervals)

- **To Recloser tank**
  - Assay 140-6
  - Assay 141-14

- **To Radio Antenna**
  - (If required)
  - Assay 87-12
  - Assay 140-6
  - Assay 141-14

- **To Control Cubicle**
  - Assay 105-10
  - (Saddles at 500 Intervals)

**Trench sections**

Refer EARTHING Dwg. 1238

**Caution tape**

**OVERHEAD DISTRIBUTION**

**EARTHING WOOD POLE**

**S.W.E.R. RECLOSER EARTH**

**Construction Type**

- **EACRS**
- **EA** (Additional)
- **EAR** (Additional rod)

**Sign**

**Warning**

**C. Noel**

**DATE**

**14.7.04**

**PASSED**

**C. Avenell**

**DRAWN**

**L. Burton**

**FILE:** 5.11.1435.1

**Dwg 1435 Sh 1**
NOTES:
1. Earthing to run in direction of mains.
2. 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.
3. The minimum requirements for electrodes is that they be copper clad electrodes.
4. The spacing of additional earth electrodes to be equal to twice the earth electrode length installed.
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 earth cable (site earth) = 1.0m
   For separation from other communications assets refer Standards Section
6. If the required separations can not be obtained between Telstra equipment and Ergon SWER earths contact Lines Standards.
7. A minimum 2.0m 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.

MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>124-2</td>
<td>Earth HV additional - deep drilled</td>
<td>AR</td>
</tr>
</tbody>
</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 5

Construction Type

EACRS

EADDC (Additional)

EADDCC (Additional)

OVERHEAD DISTRIBUTION

EARTHING WOOD POLE

S.W.E.R. RECLOSER

DEEP DRILLED

DATE 14.7.04

C. Noel

APPROVED

Ergon Energy Corporation Ltd

ABN 50 087 646 062

DRAWN L. Burton

FILE: 5 11 1436.1

Dwg 1436 Sh 1
NOTES:
1. Earthing to run in direction of mains.
2. 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.
3. 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].
4. 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.
5. 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.
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 2.0m separation shall be maintained between the HV earth system and any conductive structure.
EARTH MAT PLAN

May be reduced to 0.5m in urban areas to avoid other services.

Assy 120-1

Earth mat
Refer plan

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

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy selection 104-6 or 104-1 and 5

1. For wood pole attachments and foundations refer to Construction Practices.
2. ABS with insulated operating rod separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes
   for telephones or miscellaneous earths:
     - ABS earth rod = 1.0m
     - ABS bare earth cable (site earth) = 1.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed
     or in plastic conduit:
     - ABS bare earth cable (site earth) = 0.9m
   For separation from other communications assets refer Standards Section

Earth cable supplied with switch.
Connected between downrod pipe, handle and mounting bracket.

ASSY DESCRIPTION QTY
105-5 Earth guard HV/LV to wood pole 1
120-1 Earth air break switch to wood pole 1

ASSY DESCRIPTION QTY
104-1 Earth rod additional AR
104-5 Earth rod additional depth AR

NOTES:-

EARTING WOOD POLE
SEPARATE EARTH ARRANGEMENT

ERGON ENERGY

FILE 5 1112981 Dwg 1298 Sh 1
**MATERIAL**

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<thead>
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<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>5</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>120-1</td>
<td>Earth air break switch to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>140-6</td>
<td>Cable insulated hard drawn Cu. 35mm²</td>
<td>3</td>
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<tr>
<td>141-14</td>
<td>Lug, compression 35mm² M12</td>
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**MATERIAL - ADDITIONAL EARTH**

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<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
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<tbody>
<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>
</tr>
</tbody>
</table>

**NOTES:-**

1. For wood pole attachments and foundations refer to Construction Practices.
2. ABS with insulated operating rod
   separation from communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes
   payphones or miscellaneous earths:
   - ABS earth rod = 1.0m.
   - ABS bare earth cable (site earth) = 1.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
   - ABS bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section

---

**OVERHEAD DISTRIBUTION**

**EARTHING WOOD POLE**

**AIR BREAK SWITCH & METAL CABLE GUARD**

**SEPARATE EARTH ARRANGEMENT**
MATERIAL

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<thead>
<tr>
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<tbody>
<tr>
<td>105-5</td>
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<td>2</td>
</tr>
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<th>DESCRIPTION</th>
<th>QTY</th>
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</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. For wood pole attachments and foundations refer to Construction Practices.

2. ABS with insulated operating rod separation from communication equipment:
   * Provide the following minimum separation to communications poles/cabinets, cable pits/manholes,
     payphones or miscellaneous earths:
     - ABS earth rod = 2.0m
     - ABS bare earth cable (site earth) = 2.0m
   * Provide the following minimum separation to communications cable plastic sheathed/jacketed
     or in plastic conduit:
     - ABS bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section

3. If 2.0m separation can not be achieved separate HV equipment earth and install remote earth.
   Refer Earthing Wood Pole dwg 1331.
   This will achieve a 1.0m minimum separation.

OVERHEAD DISTRIBUTION

EARTHING WOOD POLE AIR BREAK SWITCH COMMON EARTH ARRANGEMENT
MATERIAL

<table>
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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</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>cable to wood pole</td>
<td></td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>2</td>
</tr>
<tr>
<td>120-1</td>
<td>Earth air break switch to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>140-6</td>
<td>Cable insulated hard drawn 35mm²</td>
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<tr>
<td>141-14</td>
<td>Lug, compression 35mm² M12</td>
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MATERIAL - ADDITIONAL EARTH

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

NOTES:-

1. For wood pole attachments and foundations refer to Construction Practices.
2. ABS with insulated operating rod other communication equipment:
   * Provide the following minimum separation to communications pillars/cabinets, cable pits/manholes, payphones or miscellaneous earths:
     - ABS earth rod = 2.0m
     - ABS bare earth cable (site earth) = 2.0m
   * Provide the following minimum separation to communications cable plastic sheathed / jacketed or in plastic conduit:
     - ABS bare earth cable (site earth) = 0.3m
   For separation from other communication assets refer Standards Section
3. If 2.0m separation cannot be achieved separate HV equipment earth and install remote earth. Refer Earthing Wood Pole dwg 1331. This will allow a 1.0m minimum separation.

OVERHEAD DISTRIBUTION

EARTHING WOOD POLE
AIR BREAK SWITCH & METAL CABLE GUARD
COMMON EARTH ARRANGEMENT

EABS MG
**MATERIAL - SEPARATE EARTH**

<table>
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</thead>
<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<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>
</tbody>
</table>

**MATERIAL - REMOTE SEPARATE EARTH**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
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</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>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>
<td>1</td>
</tr>
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**MATERIAL - ADDITIONAL EARTH**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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<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>
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**MATERIAL - ADDITIONAL EARTH REMOTE**

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<th>DESCRIPTION</th>
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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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</table>

**NOTES:-**

1. Earth leads and metal work above ground to be separated by at least 50mm.

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

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

30 ohm Max.

No specified resistance for Darverter

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
EHVEX

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
HV EQUIPMENT EARTH ARRANGEMENT
EXISTING POLE - CONSTRUCTION
Refer EARTHING Dwg. 1238

To HV equipment (e.g. Arrester/Tank/Sectionaliser/Darverter)
Assy 223-1
To Regulator Control Cubicle (etc)
Assy 14-1
(Saddles at 500 intervals)
Assy 105-5
(Saddles at 500 Intervals)

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

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

30 ohm Max.

No specified resistance for Darverter

Refer sheet 1 note 6

Telstra pit
Detail Top View

HV Earth
300 min

Assy 87-12

Pole

Strip Insulation

150
20

HV EQUIPMENT REMOTE EARTH ARRANGEMENT

To HV equipment (e.g. Arrester/Tank/Sectionaliser/Darverter)
### OVERHEAD DISTRIBUTION

**EARTHING WOOD POLE**

**HV EQUIPMENT EARTH ARRANGEMENT**

**NEW POLE - MATERIAL**

<table>
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<tr>
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<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>105-1</td>
<td>Earth butt HV/LV 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>
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### MATERIAL - ADDITIONAL EARTH

<table>
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<th>DESCRIPTION</th>
<th>QTY</th>
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<tbody>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
</tr>
<tr>
<td>104-7</td>
<td>Earth rod additional</td>
<td>AR</td>
</tr>
</tbody>
</table>

### NOTES:

1. Earth leads and metal work above ground to be separated by at least 50mm.

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. If Telstra equipment is within 15m of butt earth this structure can not be used.
   Use Earthing Wood Pole dwg 1294.
H.V. CONNECTED
H.V. Earth wire must not be broken

30 ohm Max.

To HV equipment
(e.g. Arrester/Tank/Sectionaliser/Darverter)

Assy 105-1
To Regulator Control Cubicle (etc)

Assy 14-1
(Saddles at 500 intervals)

Assy 105-5
(Saddles at 500 intervals)

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 104-7 or 104-5 and 7

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

Butt earth
Minimum of 3 coils beneath base.
(strip insulation)

Construction Type
EHVE
EAC (Additional)
EAR (Additional rod)

Trench sections
Refer EARTHING Dwg. 1238

Caution tape

HARD COPY UNCONTROLLED

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
HV EQUIPMENT EARTH ARRANGEMENT
NEW POLE - CONSTRUCTION

ERGON ENERGY CORPORATION LTD
ABN 50 087 646 062
### MATERIAL - SEPARATE EARTH

<table>
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<tr>
<th>ASSY</th>
<th>DESCRIPTION</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>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
<td>1</td>
</tr>
<tr>
<td>103-1</td>
<td>Earth 35mm² to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>105-1</td>
<td>Earth butt HV/LV 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>
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<tr>
<td>87-12</td>
<td>Connection P.G. Cu-Cu</td>
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### MATERIAL - ADDITIONAL EARTH CABLE GUARD

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<td>AR</td>
</tr>
<tr>
<td>104-7</td>
<td>Earth rod additional</td>
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### MATERIAL - REMOTE SEPARATE EARTH

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<tbody>
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<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</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>105-1</td>
<td>Earth butt HV/LV 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>
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### MATERIAL - ADDITIONAL EARTH LV

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<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>
<tr>
<td>104-7</td>
<td>Earth rod additional</td>
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### MATERIAL - ADDITIONAL EARTH REMOTE

<table>
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<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. Earth leads and metal work above ground to be separated by at least 50mm.
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. Metal cable guard associated with HV cable only, must be changed to a polymeric guard if located within 15m of Telstra equipment. Refer U/G Construction Manual assy 531.
   LV metal cable guard is acceptable.
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

Trench sections
Refer EARTHING Dwg. 1238

Assy 103-1
Butt earth
Minimum of 3 coils beneath base.
(strip insulation)

3.0m Min.
(Refer Note 2 on sheet 1)

Assy 105-5
(Saddles at 500 intervals)

2400
2600

Assy 86-12

Assy 14-1
(Saddles at 500 intervals)

To Control Cubicle
(if required)

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

LV / HV Cable Guard
Refer U/G Construction Manual

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

Assy 105-1

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy Selection 104-7 or 104-5 and 7.

Construction Type
EHVEMG
EAC (Additional)
EAR (Additional Rod)

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

To HV equipment
(e.g. Arrester/Tank/Sectionaliser/Darverter)

3.0m Min.
Clear to other earth
(Refer Note 2 on sheet 1)

30 ohm Max.

150
20

60

Strip insulation

Wood Pole

Additional earthing if required.
Assy Selection 104-1 or
104-1 and 5.

20
60

150

20

60

Strip insulation

Wood Pole

Additional earthing if required.
Assy Selection 104-1 or
104-1 and 5.

20
60

150

20

60

Strip insulation

Wood Pole

Additional earthing if required.
Assy Selection 104-1 or
104-1 and 5.

20
60

150

20

60

Strip insulation

Wood Pole

Assy 103-1

Butt earth
Minimum of 3 coils beneath base.
(strip insulation)

3.0m Min.
(Refer Note 2 on sheet 1)

Assy 105-5
(Saddles at 500 intervals)

2400
2600

Assy 86-12

Assy 14-1
(Saddles at 500 intervals)

To Control Cubicle
(if required)

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

LV / HV Cable Guard
Refer U/G Construction Manual

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

Assy 105-1

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy Selection 104-7 or 104-5 and 7.

Construction Type
EHVEMG
EAC (Additional)
EAR (Additional Rod)
H.V. CONNECTED
H.V. Earth wire must not be broken
HV equipment earth and Metal guard earth MUST NOT BE CONNECTED

HV Earth wire must not be broken
30 ohm Max.

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

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

HV Earth wire must not be broken
30 ohm Max.

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

HV Earth wire must not be broken
30 ohm Max.

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

HV Earth wire must not be broken
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HV Earth wire must not be broken
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HV Earth wire must not be broken
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HV Earth wire must not be broken
30 ohm Max.

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HV Earth wire must not be broken
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HV Earth wire must not be broken
30 ohm Max.

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

HV Earth wire must not be broken
30 ohm Max.
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<tbody>
<tr>
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<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
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</tr>
<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
<td>1</td>
</tr>
<tr>
<td>103-1</td>
<td>Earth 35mm² to wood pole</td>
<td>2</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>Connector P.G. Cu-Cu</td>
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### MATERIAL - REMOTE SEPARATE EARTH

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<tr>
<td>223-1</td>
<td>Earth remote HV separate 35mm² to wood pole</td>
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<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
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### MATERIAL - ADDITIONAL EARTH REMOTE

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<th>DESCRIPTION</th>
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<td>104-5</td>
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</tr>
<tr>
<td>225-3</td>
<td>Earth rod remote HV additional</td>
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</tr>
</tbody>
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### NOTES:

1. Earth leads and metal work above ground to be separated by at least 50mm.
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. Metal cable guard associated with HV cable only, must be changed to a polymeric guard if located within 15m of Telstra equipment. Refer U/G Construction Manual assy 531. LV metal cable guard is acceptable.
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
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

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.

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

To HV equipment (e.g. Arrester/Tank/Sectionaliser/Darverter)
Assay 103-1

3.0m Min.
Clear to other earth
(Refer Note 2 on sheet 1)

To Control Cubicle (If required)
Assay 86-12

2800

2400

Assay 14-1
(Saddles at 500 intervals)
LV / HV Cable Guard
Refer U/G Construction Manual

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

30 ohm Max.

Hard Copy
UNCONTROLLED

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
HV EQUIPMENT AND METAL GUARD EARTH
ARRANGEMENT EXISTING POLE - CONSTRUCTION
Maintain as much separation as possible between HV & LV earthwire down leads, LV cables & apparatus. The minimum separation shall not be less than 60mm.

To HV equipment (e.g. Arrester/Tank/Sectionaliser/ Darveter): Assy 87-12

To Control Cubicle (if required): Assy 88-12

Assy 105-6 (Saddles at 500 intervals)

HV equipment earth and Metal guard earth 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

EHVEMG
EAR (Additional)
ERA (Additional rod)

Refer Sheet 1 Note 6

Refer Note 8 Sheet 1

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

EHVEMG
EAR (Additional)
ERA (Additional rod)

Refer Sheet 1 Note 6

Refer Note 8 Sheet 1

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

EHVEMG
EAR (Additional)
ERA (Additional rod)

Refer Sheet 1 Note 6

Refer Note 8 Sheet 1

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

EHVEMG
EAR (Additional)
ERA (Additional rod)

Refer Sheet 1 Note 6

Refer Note 8 Sheet 1

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

EHVEMG
EAR (Additional)
ERA (Additional rod)

Refer Sheet 1 Note 6

Refer Note 8 Sheet 1

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

EHVEMG
EAR (Additional)
ERA (Additional rod)

Refer Sheet 1 Note 6

Refer Note 8 Sheet 1

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

EHVEMG
EAR (Additional)
ERA (Additional rod)

Refer Sheet 1 Note 6

Refer Note 8 Sheet 1

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

EHVEMG
EAR (Additional)
ERA (Additional rod)
### MATERIAL - SEPARATE EARTH

<table>
<thead>
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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>20</td>
</tr>
<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
<td>1</td>
</tr>
<tr>
<td>18-5</td>
<td>Connector I.P.C. 25/95mm² main to 6/35mm² tap</td>
<td>1</td>
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<tr>
<td>87-3</td>
<td>Connection P.G. Al./Steel - Cu. (PG2)</td>
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<td>87-10</td>
<td>Connection P.G. Cu. - Cu. (PG4)</td>
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<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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<td>105-1</td>
<td>Earth butt HV/LV to wood pole</td>
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</tr>
<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
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</tr>
<tr>
<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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### MATERIAL - REMOTE SEPARATE EARTH

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<tr>
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<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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<td>87-3</td>
<td>Connection P.G. Al./Steel - Cu. (PG2)</td>
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<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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<td>223-1</td>
<td>Earth remote HV separate 35mm² to wood pole</td>
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<tr>
<td>105-1</td>
<td>Earth butt HV/LV to wood pole</td>
<td>1</td>
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<tr>
<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
<td>1</td>
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<tr>
<td>140-6</td>
<td>Cable, insulated hard drawn Cu. 35mm²</td>
<td>6m</td>
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<tr>
<td>141-14</td>
<td>Lug, compression Cu. 35mm² M12</td>
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</table>

### NOTES:-

1. Earth leads and metal work above ground to be separated by at least 50mm.
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 traverse 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, 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
5. 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.
8. The L.V. neutral is to be connected to the cable guard earth.
H.V. CONNECTED

H.V. Earth wire must not be broken

30 ohm Max.

HV equipment earth and Metal guard earth MUST NOT BE CONNECTED

Trench sections Refer EARTHING Dwg. 1238

Additional earthing if required.
Assy Selection 104-1 or 104-1 and 5.

Butt earth
Minimum of 3 coils beneath base.
(strip insulation)

3.0m Min.
(Refer Note 2 on sheet 1)

Wood Pole

Assy 105-5
(Saddles at 500 intervals)

2600

2400

Assy 105-1

LV / HV Cable Guard Refer U/G Construction Manual

Assy 141-14
Assy 140-6
Assy 14-1
(Saddles at 500 intervals)

Caution tape

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy Selection 104-7 or 104-5 and 7.

Assy 105-1

4.0m Min. (Single rod)

8.0m Min. (Double rod)

M.E.N. SYSTEM

RESISTANCE TO GROUND

DISCONNECTED

CONNECTED

LV earthwire downleads, LV cables & apparatus.
The minimum separation shall not be less than 50mm

Construction Type

EHVEMGMEN

EAC (Additional)

EAR (Additional rod)

MUST NOT BE CONNECTED

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

3.0m Min.
Clear to other earth
(Refer Note 2 on sheet 1)

EARTHING WOOD POLE

OVERHEAD DISTRIBUTION

EARHING WOOD POLE

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

EARTH ARRANGEMENT NEW POLE - CONSTRUCTION
**HENN SYSTEM**

**RESISTANCE TO GROUND**

<table>
<thead>
<tr>
<th>DISCONNECTED</th>
<th>CONNECTED</th>
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<tr>
<td>30 ohm Max.</td>
<td>10 ohm Max.</td>
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**CONSTRUCTION TYPE**

- **EHVEMGMEN**
- **EAC** (Additional)
- **EAR** (Additional)
- **ERA** (Additional rod)

---

**OVERHEAD DISTRIBUTION**

**EARTHING WOOD POLE**

*HV EQUIPMENT, METAL GUARD AND M.E.N. REMOTE SEPARATE EARTH ARRANGEMENT NEW POLE - CONSTRUCTION*

---

**REFER EARTHING Dwg. 1238**

**Trench sections**

**Legal**

**Refer Note 2 on sheet 1**

---

**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

**Telstra pit**

Refer note 7 sheet 1

---

**H.V. CONNECTED**

H.V. Earth wire must not be broken

HV equipment earth and Metal guard earth **MUST NOT BE CONNECTED**

---

**HV Earth**

300 min

**Telstra pit**

**Detail Top View**

**223-1**

**Assy 87-12**

---

**20**

**30 ohm Max.**

**3 coils beneath base. (strip insulation)**

Butt earth minimum of

**2600**

**Wood Pole**

**2400**

---

**Caution tape**

**Trench sections**

Refer EARTHING Dwg. 1238

---

**Construction Type**

**EHVEMGMEN**

**EAC** (Additional)

**EAR** (Additional)

**ERA** (Additional rod)
### MATERIAL - SEPARATE EARTH

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<tbody>
<tr>
<td>14-1</td>
<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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<tr>
<td>18-5</td>
<td>Connector I.P.C. 25/95mm² main to 6/35mm² tap</td>
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</tr>
<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>103-1</td>
<td>Earth 35mm² to wood pole</td>
<td>2</td>
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<td>105-5</td>
<td>Earth guard HV/LV to wood pole</td>
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</tr>
<tr>
<td>140-6</td>
<td>Cable, insulated hard drawn Cu. 35mm²</td>
<td>6m</td>
</tr>
<tr>
<td>141-14</td>
<td>Lug, compression Cu. 35mm² M12</td>
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### MATERIAL - ADDITIONAL EARTH

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

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<tr>
<td>104-5</td>
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</tr>
<tr>
<td>225-3</td>
<td>Earth rod remote HV additional</td>
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</table>

**NOTES:-**

1. Earth leads and metal work above ground to be separated by at least 50mm.
2. The earthing electrode of other apparatus mounted on the same pole should be located at least 0.3m 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 traverse 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, 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
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.
8. The L.V. neutral is to be connected to the cable guard earth.

---

**OVERHEAD DISTRIBUTION**

**EARTHING WOOD POLE**

HV EQUIPMENT, METAL GUARD AND MLEN SEPARATE EARTH ARRANGEMENT EXISTING POLE - MATERIAL
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 50mm.

**H.V. CONNECTED**

H.V. Earth wire must not be broken

- 30 ohm Max.

**HV equipment earth and Metal guard earth 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

**Trench sections Refer EARTHING Dwg. 1238**

- 30 ohm Max.

**Assy 103-1**

- 150 20

- Pole

- Strip insulation

- 60

- Caution tape

- 0.5m

- 3.0m Min.

**Assy 105-5** (Saddles at 500 intervals)

- To HV equipment (e.g. Arrester/Tank/Sectionaliser/Varistor)

- To LV neutral

- Assy Selection 87-3, 10 or 87-5

- 3.0m Min.

**Assy 87-12**

- 2400

- Pole

- Wood Pole

**Assy 86-12**

- 2800

**Assy 141-14**

**Assy 140-6**

**Assy 14-1** (Saddles at 500 intervals)

**Assy 103-1**

**Assy 105-1**

**Assy 104-6**

**Assy 103-1**

- 2600

**LV / HV Cable Guard Refer U/G Construction Manual**

**Additional earthing if required.**

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

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

**M.E.N. SYSTEM RESISTANCE TO GROUND**

- CONNECTED

- DISCONNECTED

- 10 ohm Max.

- 30 ohm Max.

**EARTHING WOOD POLE**

HV EQUIPMENT, METAL GUARD AND M.E.N. SEPARATE EARTH ARRANGEMENT EXISTING POLE - CONSTRUCTION

**OVERHEAD DISTRIBUTION**

EARTHING WOOD POLE

HV EQUIPMENT, METAL GUARD AND M.E.N. SEPARATE EARTH ARRANGEMENT EXISTING POLE - CONSTRUCTION
**OVERHEAD DISTRIBUTION**

**EARTHING WOOD POLE**

HV EQUIPMENT, METAL GUARD AND M.E.N. REMOTE SEPARATE EARTH ARRANGEMENT EXISTING POLE - CONSTRUCTION

**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.

**M.E.N. SYSTEM**
- RESISTANCE TO GROUND
  - DISCONNECTED
    - 30 ohm Max.
  - CONNECTED
    - 10 ohm Max.

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

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

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

**Construction Type**
- EHVEMGMEX
- EAR (Additional)
- ERA (Additional rod)

**To HV equipment**
- (e.g. Arrester/Tank/Sectionaliser)
- 3.0m Min. Clear to other earth
  - (Refer Note 2 on sheet 1)

**To LV neutral**
- Assy Selection 87-3,10 or 18-5
- Assy 103-1

**To Control Cubicle**
- (if required)
- Assy 86-12
- Assy 141-14
- Assy 140-6

**Assy 14-1**
- (Saddles at 500 intervals)
- Assy 105-5

**Assy 103-1**
- (Saddles at 500 intervals)

**LV / HV Cable Guard Refer U/G Construction Manual**

**Refer EARTHING Dwg. 1238**

**Selected Points**
- Pole
- Telstra pit or equipment
- HV Earth
- 300 min

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

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

Ergon Energy Corporation Ltd
ABN 50 087 646 062

**DATE** 9.7.09
**APPROVED** C. Noel
**PASSED** C. Avenell
**DRAWN** L. Burton

**FILE:** 5 11 1447 3

**Dwg 1447 Sh 3**
### MATERIAL - EARTH

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<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
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<td>20</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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<td>1</td>
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<tr>
<td>87-3</td>
<td>Connection P.G. Al./Steel - Cu. (PG2)</td>
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<td>Connection P.G. Cu. - Cu. (PG5)</td>
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<td>Earth 35mm² to wood pole</td>
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<td>105-1</td>
<td>Earth butt HV/LV to wood pole</td>
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<td>Cable guard 20mm HV/LV to wood pole</td>
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<td>Lug, compression Cu. 35mm² M12</td>
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### MATERIAL - ADDITIONAL EARTH

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### MATERIAL - ADDITIONAL EARTH REMOTE

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

1. Earth leads and metal work above ground to be separated by at least 50mm.
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.
7. Install butt earth on new pole.
To HV equipment
(e.g. Arrester/Tank/Sectionaliser)
To LV neutral
Assy Selection 87-3, 10 or 18-5

To Control Cubicle
(if required)
Assy Selection 140-6 and 141-14

Assy 105-5
(500 intervals)

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

Assy 103-1
(Existing pole)

Butt Earth
Minimum of 3 coils beneath base. (Strip insulation).

Additional earthing if required.
If more than 4 additional earthrods required, contact local Ergon branch.
Assy Selection 104-7 or 104-5 and 7.

Disconnected

CONNECTED

1 ohm
Max.

30 ohm
Max.

Trench sections
Refer EARTHING Dwg. 1238

EARTHING WOOD POLE
HV EQUIPMENT COMMON EARTH ARRANGEMENT
CONSTRUCTION

Construction Type
EHVEMEN/COM
EHVEMENX/COM
EAC (Additional)
EAR (Additional rod)

OVERHEAD DISTRIBUTION
ERGON ENERGY CORPORATION LTD
ABN 50 087 646 062

DATE 24/1/14
PASSED C. Avenell
DRAWN L. Burton

FILE: 5 11 19092 Dwg 1909 Sh 2
Construction Type

EARTHING WOOD POLE

OVERHEAD DISTRIBUTION

EHVEMEN/RCOM
EHVEMENX/RCOM
EAR (Additional)
ERA (Additional rod)

Refer EARTHING Dwg. 1238

WARNING

Refer note 6 sheet 1

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

CONSTRUCTION

Trench sections

HV EQUIPMENT REMOTE COMMON EARTH

ARRANGEMENT - CONSTRUCTION

To HV equipment (e.g. Arrester/Tank/Sectionaliser)

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

To Control Cubicle (if required)

Assy Selection 140-6 and 141-14

Assy 87-12

Refer sheet 1 note 5

Assy 14-1 (500 intervals)

Assy 105-5 (500 intervals)

Pole

Strip insulation

Wood Pole

Assy 223-1

2.0m min.

1 ohm Max.

30 ohm Max.

300 min.

Caution tape

Remote HV earth pit

Telstra pit or equipment

HV Earth

- To Control Cubicle

- To LV neutral

- To HV equipment

(500 intervals)

(500 intervals)

Assy Selection

(Additional)

(Additional rod)
## NOTES:-

1. Earth leads and metal work above ground to be separated by at least 50mm.

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. If Telstra equipment is within 2m of butt earth this structure can not be used.
   Use Earthing Wood Pole dwg 1451.

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

---

### 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>
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<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
<td>1</td>
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<tr>
<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>
<td>1</td>
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<tr>
<td>87-10</td>
<td>Connection P.G. Cu. - Cu. (PG4)</td>
<td>2</td>
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<tr>
<td>87-12</td>
<td>Connection P.G. Cu. - Cu. (PG5)</td>
<td>2</td>
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<tr>
<td>105-1</td>
<td>Earth butt HV/LV to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>140-6</td>
<td>Cable, insulated hard drawn Cu. 35mm²</td>
<td>6m</td>
</tr>
<tr>
<td>141-14</td>
<td>Lug, compression Cu. 35mm² M12</td>
<td>3</td>
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### MATERIAL - ADDITIONAL EARTH

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<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>104-5</td>
<td>Earth rod additional depth</td>
<td>AR</td>
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<tr>
<td>104-7</td>
<td>Earth rod additional</td>
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Ergan Energy Corporation Ltd
ABN 50 087 646 062

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
HV EQUIPMENT, METAL GUARD AND M.E.N.
COMMON EARTH ARRANGEMENT NEW POLE - MATERIAL

DATE: 10/12/04
APPROVED: C. Noel
PASSED: C. Avenell
DRAWN: L. Burton

FILE: 5 11 1450 1 Dwg 1450 Sh 1

---
### MATERIAL - EARTH

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<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>20</td>
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<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 26 S/S</td>
<td>1</td>
</tr>
<tr>
<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>
<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>103-1</td>
<td>Earth 35mm² to wood pole</td>
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<tr>
<td>140-6</td>
<td>Cable, insulated hard drawn Cu. 35mm²</td>
<td>6m</td>
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<tr>
<td>141-14</td>
<td>Lug, compression Cu. 35mm² M12</td>
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### MATERIAL - REMOTE EARTH

<table>
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<tr>
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<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>20</td>
</tr>
<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 26 S/S</td>
<td>1</td>
</tr>
<tr>
<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>
<td>87-10</td>
<td>Connection P.G. Cu. - Cu. (PG4)</td>
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<tr>
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<td>Connection P.G. Cu. - Cu. (PG5)</td>
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<td>223-1</td>
<td>Earth remote HV separate 35mm² to wood pole</td>
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<td>140-6</td>
<td>Cable, insulated hard drawn Cu. 35mm²</td>
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<tr>
<td>141-14</td>
<td>Lug, compression Cu. 35mm² M12</td>
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### OVERHEAD DISTRIBUTION

#### MATERIAL - ADDITIONAL EARTH REMOTE

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

### NOTES:

1. Earth leads and metal work above ground to be separated by at least 50mm.
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.
7. The L.V. neutral is to be connected to the cable guard earth.
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

LV / HV Cable Guard
Refer Underground Construction Manual

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
EHV/MOMEX

...
**MATERIAL**

<table>
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<tr>
<th>ASSY</th>
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<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
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<tr>
<td>105-5</td>
<td>Earth Guard LV to wood pole</td>
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<tr>
<td>127-5</td>
<td>Earth Operation point to new wood pole</td>
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**MATERIAL - ADDITIONAL EARTH**

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<tr>
<td>104-7</td>
<td>Earth rod additional</td>
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</tr>
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</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
3. This construction can not be used if Telstra equipment is within 15m of pole

**RESISTANCE TO GROUND**

- HV Earth
- Telstra pit

**NOTE:**

- HV Earth: 30 ohm Max.
- Telstra pit: 300 min

**OVERHEAD DISTRIBUTION**

**EARTHING WOOD POLE**

**OPERATION POINT - NEW POLE**
### MATERIAL

<table>
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<tr>
<th>ASSY</th>
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<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>127-1</td>
<td>Earth Operation point to existing pole</td>
<td>1</td>
</tr>
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### MATERIAL - ADDITIONAL EARTH

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<tr>
<th>ASSY</th>
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</tr>
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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>
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</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.

---

**OVERHEAD DISTRIBUTION**

**EARTHING WOOD POLE**

**OPERATION POINT - EXISTING POLE**

**CONSTRUCTION TYPE**

**EOPX**

**EA**  (Additional)

**EAR**  (Additional rod)
# OVERHEAD DISTRIBUTION

## EARTHING WOOD POLE

### MATERIAL

<table>
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<tr>
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<th>DESCRIPTION</th>
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<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
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<tr>
<td>88-1</td>
<td>12.7/18.1kV Darverter to wood pole</td>
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<tr>
<td>105-1</td>
<td>Earth butt HV/LV 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>
</tbody>
</table>

### 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. Darverter 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 communications 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.
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 80mm (Saddles at 500 intervals).

Assy 105-1
Assy 105-5
(Saddles at 500 intervals)

Refer Note 4.

Assy 55-1
Refer Note 4.

Detail Top View
HV Earth
300 min
Telstra pit
Detail Top View
Butt earth Minimum of 3 coils beneath base (strip insulation)

Construction Type
EDAR

OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
DARVERTER NEW POLE CONSTRUCTION

APPROVED: C. Noel
DATE: 24.4.02
PASSED: C. Avenell
DRAWN: C. Lindsay
### 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 are 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.

### MATERIAL

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<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
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<td>12.7/19.1kV Lightning protection gapped bands to wood pole</td>
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<td>105-1</td>
<td>Earth butt HV/LV 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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Refer Note 4.

Assy 105-5

(Saddles at 500 intervals)

Refer Note 3.

Assy 55-5

Refer Detail 'A'

Lowest pole step

150 Min

500

Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 60mm.

100

45

Band (Half Wildlife guard)

Band Attachment Detail

(3 Screws per Band)

Butt earth. Minimum of 3 coils beneath base, (strip insulation)

Telstra pit

Telstra pit

Minimum of 3 coils beneath base, (strip insulation)

Wood Pole

Construction Type

EGAP

15.0m Min.

Minimum of 3 coils beneath base, (strip insulation)

13.7.09

C. Avenell

C. Noel

DATE 24.4.02

PASSED C. Asenell

ERGON ENERGY

OVERHEAD DISTRIBUTION

EARTHING WOOD POLE

GAPPED BANDS NEW POLE CONSTRUCTION

Ergon Energy Corporation Ltd

ABN 50 087 646 062

A

A

DATE

PASSED

DRAWN

FILE: 5

Dwg 1330 Sh 2

ORIGINAL ISSUE

26.7.08

06.12.07

13.7.09

27.2.12

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20000

2400

3000 Min

150 Min

300 Min

25

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150 Min

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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 Detail 'A'

Assy 55-5
Refer Note 4.

Refer Note 3.

Assy 14-1
(Saddles at 500 intervals)

Assy 233-1

Lowest pole step

150 Min

900

Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 60mm

C. Noel

C. Avenell

L. Burton

Ergon Energy Corporation Ltd
ABN 50 087 646 062

DATE
1/12/11

PASSED

DRAWN

FILE: 5 1117752

Dwg 1775 Sh 2

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OVERHEAD DISTRIBUTION
EARTHING WOOD POLE
GAPPED BANDS NEW REBUTTED POLE
CONSTRUCTION

Construction Type
EGARP

15.0m min.

3000 Min

150 Min
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. Darverter 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. Earthing to run in direction of mains. For clarity, drawing shows earth trenching traverse to mains.

8. 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

9. If Telstra equipment is within 15m of butt earth this structure can not be used.
   Use Earthing Wood Pole dwg 1294.
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. The minimum separation shall not be less than 300mm.

Refer Detail 'A':
- Assy 55-1
- Assy 103-1
- Assy 14-1
- Assy 105-5 (Saddles at 500 intervals)

Refer Note 3.

Refer Note 4.

Refer Detail 'A':
- Assy 55-1
- Assy 105-5 (Saddles at 500 intervals)

Refer Note 3.

Refer Detail 'A':
- Assy 55-1
- Assy 105-5 (Saddles at 500 intervals)

Refer Note 3.

Refer Detail 'A':
- Assy 55-1
- Assy 105-5 (Saddles at 500 intervals)

Refer Note 3.
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. Earthing to run in direction of mains. For clarity, drawing shows earth trenching traverse to mains.

8. 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.

9. If Telstra equipment is within 15m of butt earth this structure can not be used.
   Use Earthing Wood Pole dwg 1294.
**MATERIAL**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>MATERIAL - ADDITIONAL EARTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-1</td>
<td>Saddle Cu. 10mm to suit 35mm² cable to wood pole</td>
<td>20</td>
<td>ADDITIONAL EARTH</td>
</tr>
<tr>
<td>87-1</td>
<td>Connector PG Al/Steel-Cu. (PG1)</td>
<td>1</td>
<td>QTY</td>
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<tr>
<td>105-1</td>
<td>Earth Butt to wood pole</td>
<td>1</td>
<td>ASSY</td>
</tr>
<tr>
<td>105-5</td>
<td>Earth guard to wood pole</td>
<td>1</td>
<td>104-5</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. If Telstra equipment is within 15m of butt earth this structure can not be used. Use Earthing Wood Pole dwg 1294.
   Additional earthing if required. If more than 4 additional earthrods required, contact local Ergon branch. Assy selection 104-7 or 104-5 and 7.

**OVERHEAD DISTRIBUTION**

OVERHEAD EARTH WIRE SYSTEM
RESISTANCE TO GROUND

**OVERHEAD DISTRIBUTION**

EARTHING WOOD POLE
OVERHEAD EARTH WIRE
NEW POLE

* Provide the following minimum separation to
- HV bare earth cable (site earth) = 15.0m
- HV earth rod = 15.0m
- HV bare earth cable (site earth) = 0.3m

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

**Construction Type**

EOH
EAC (Additional)
EAR (Additional rod)
Maintain as much separation as possible between HV & LV earthwire downleads, LV cables & apparatus. 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
     - HV bare earth cable (site earth) = 0.3m
   For separation from other communications assets refer Standards Section
3. If Telstra equipment is within 15m of butt earth this structure cannot be used.
Use Earthing Wood Pole dwg 1294.

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 WOOD POLE
OVERHEAD EARTH WIRE
EXISTING POLE
MATERIAL

<table>
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<tr>
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<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
<td>4</td>
</tr>
<tr>
<td>103-5</td>
<td>Earth MEN to wood pole</td>
<td>1</td>
</tr>
<tr>
<td>141-14</td>
<td>Lug compression Cu. 35mm² M12</td>
<td>6</td>
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MATERIAL - ADDITIONAL EARTH

<table>
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<tr>
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<th>DESCRIPTION</th>
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<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>
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</tr>
</tbody>
</table>

NOTES:

1. Earthing can be installed either end of precast concrete panels.
2. Cable guard to be earthed to precast concrete panel earth point.
3. GUSS skid to be earthed to concrete panels 1 & 4.
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.

Additional earthing if required:
- If more than 4 additional earthing rods required, contact local Ergon branch. Assy Selection 104-5 or 104-1 and 5.
- Separation from communication equipment:
  - LV earth rod or cable = 0.3m
  - Other communications cables:
    - LV earth rod or cables = 0.3m

Separation from communications cable pits/manholes:
- LV earth rod or cables = 0.3m
- For separation from other communications assets refer Standards Section.

Construction Type

EGUSSR
EA (Additional)
EAR (Additional rod)
MATERIAL

<table>
<thead>
<tr>
<th>ASSY</th>
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<th>QTY</th>
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<tbody>
<tr>
<td>86-12</td>
<td>Setscrew fixing M12 x 25 S/S</td>
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</tr>
<tr>
<td>123-1</td>
<td>Earth LV 35mm² to wood pole - deep drilled</td>
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</tr>
<tr>
<td>141-14</td>
<td>Lug compression Cu. 35mm² M12</td>
<td>6</td>
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</tbody>
</table>

MATERIAL - ADDITIONAL EARTH

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>124-1</td>
<td>Earth additional - deep drilled</td>
<td>AR</td>
</tr>
</tbody>
</table>

NOTES:
1. Earthing can be installed either end of precast concrete panels.
2. Cable guard to be earthed to precast concrete panel earth point.
3. GUSS skid to be earthed to concrete panels 1 & 4.
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. 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.**
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.