

OVERHEAD CONSTRUCTION MANUAL

Section 8 – Construction Practices

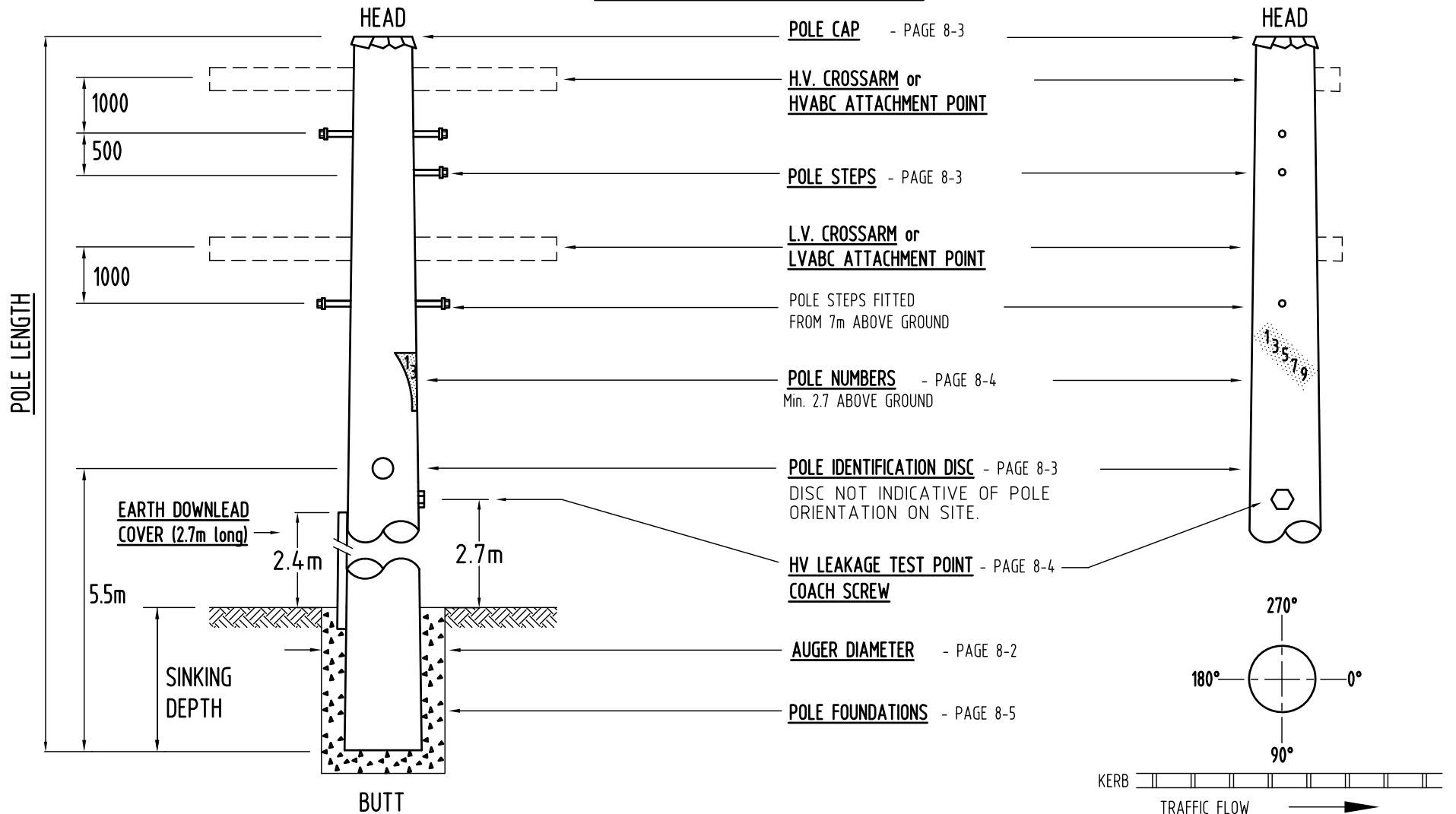
Approved by: C Noel

| CU | | DESCRIPTION | | | PAGE | DWG.No. | CU | DESCRIPTION | | | PAGE | DWG.No. | |
|------|-----------------------------------|----------------------------------|------------------------------|-----|-----------|---------------------|---|---|---|------|------------|------------|------------|
| | | <u>CONSTRUCTION PRACTICE</u> | | | | | | <u>CONDUCTOR FITTINGS</u> | | | | | |
| | | <u>WOOD POLES</u> | | | | | | General Arrangements | | | 8-21 | 4920-A4-21 | |
| | | General Arrangements | | | 8-1 | 4920-A4-1 | CUTT LVTTS,LVTTT LVSTS,LVSTT HVTTS,HVTTT HVSTS,HVSTT | Copper Top Tie | | | 8-23 | 4920-A4-23 | |
| | | Wood Pole Data and Material List | | | 8-2 | 4920-A4-2 | | LV Top Tie - Slack or Tight | | | | | |
| | | Wood Pole Attachments | | | 8-3 | 4920-A4-3 | | LV Side Tie - Slack or Tight | | | | | |
| | | Wood Pole Attachments | | | 8-4 | 4920-A4-4 | | HV Top Tie - Slack or Tight | | | | | |
| | | Pole Foundations - Types | | | 8-5 | 4920-A4-5 | | HV Side Tie - Slack or Tight | | | | | |
| | | Mixed Concrete Pad Footing | | | 8-6 | 4920-A4-6 | | Suspension Straight - Slack or Tight (2M) | | | 8-24 | 4920-A4-24 | |
| | | MCPF | Precast Concrete Pad Footing | | | | | SSS3M,SST3M | Suspension Straight - Slack or Tight (3M) | | | | |
| | | PCPF | Natural Earth Foundation | | | | | SAS2MA,SAT2MA | Suspension Angle - Slack or Tight (2MA) | | | | |
| | | NAEF | Road Base Gravel Foundation | | | | | SAS3MA,SAT3MA | Suspension Angle - Slack or Tight (3MA) | | | | |
| | | RBGF | Concrete Collar Foundation | | | | | LVTR HVT FBSC,FBST | LV Termination - Reel | | | 8-25 | 4920-A4-25 |
| CCF | Maximum Depth Concrete Foundation | | | | | HV Termination | | | | | | | |
| MDCF | King Bolt Spacings - 33kV to 11kV | | | 8-7 | 4920-A4-7 | 4 Bolt Strain Clamp | | | | | | | |
| | | King Bolt Spacings - 11kV to LV | | | 8-8 | | Conductor Spreaders & Bird Deterrents | | | 8-26 | 4920-A4-26 | | |
| | | <u>POLE STAYS</u> | | | | | 11kV Powerline Flag Markers | | | 8-27 | 4920-A4-27 | | |
| | | General Arrangements | | | 8-11 | 4920-A4-11 | CCTWC | Port Handle dimensions | | | | | |
| | | Material List | | | 8-12 | 4920-A4-12 | | CCT Wedge Clamp | | | | | |
| WSA | | Wrap Stay Attachment | | | | | | Vibration Dampers | | | 8-28 | 4920-A4-28 | |
| ASA | | Anchor Stay Attachment | | | | | | | | | | | |
| ESA | | Eyebolt Stay Attachment | | | | | | | | | | | |
| ASAE | | Anchor (Eyenut) Stay Attachment | | | 8-13 | 4920-A4-13 | | | | | | | |
| GLA | | Ground Log Anchor | | | | | | | | | | | |
| MCA | | Mass Concrete Anchor | | | | | | | | | | | |
| RA | | Rock Anchor | | | | | | | | | | | |
| SA | | Screw Anchor | | | 8-14 | 4920-A4-14 | | | | 8-31 | 4920-A4-31 | | |
| SI2 | | Stay Insulator (GY2) | | | | | Conductor & Staywire Configuration | | | 8-32 | 4920-A4-32 | | |
| SI3 | | Stay Insulator (GY3) | | | | | General Requirements & Jointing Procedures | | | 8-33 | 4920-A4-33 | | |
| SI4 | | Stay Insulator (GY4) | | | | | Bolted Connectors | | | 8-34 | 4920-A4-34 | | |
| SWB | | Side Walk Bracket | | | 8-15 | 4920-A4-15 | Insulation Piercing Connectors (overhead mains to service mains) | | | 8-35 | 4920-A4-35 | | |
| GPS | | Guy Protector (Small) | | | | | Insulation Piercing Connectors (service mains to consumers mains) | | | 8-36 | 4920-A4-36 | | |
| GPGS | | Guy Protector Guard (Small) | | | | | Full Tension Shear-Off Splices | | | 8-37 | 4920-A4-37 | | |
| GPL | | Guy Protector (Large) | | | | | Conductor Fittings | | | 8-38 | 4920-A4-38 | | |
| GPGL | | Guy Protector Guard (Large) | | | 8-16 | 4920-A4-16 | Conductor Fittings - open wire termination | | | 8-39 | 4920-A4-39 | | |
| | | | | | | | Conductor Fittings - open wire intermediate | | | | | | |
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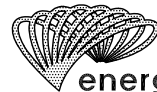
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| | | <u>CROSSARMS</u> Crossarm Stockcodes | | | | 8-52 | 4920-A4-52 | ADE | <u>EARTHING</u> Additional Earthing | | | | 8-101 | 4920-A4-101 | | | | | | | | | |
| | | <u>STATUTORY REQUIREMENTS</u> Statutory Requirements | | | | 8-91 | 4920-A4-91 | | | | | | | | | | | | | | | | |
| | | <u>WILDLIFE PROTECTION</u> HV Open Wire Bridging Pole Guard HV Poles Indicative Position of Wildlife Proofing HV Poles. Transformer Stations. UG Pole Terminations. | | | | 8-92 8-93 8-94 8-95 8-96 | 4920-A4-92 4920-A4-93 4920-A4-94 4920-A4-95 4920-A4-96 | | <u>Bushfire/Coastal Considerations</u> Requirements for Bushfire and Coastal Zones 11kV Vs Manually Operated LBS Selection | | | | 8-121 8-122 | 4920-A4-121 4920-A4-122 | | | | | | | | | |
| | | <u>BROADBAND</u> Clearance to broadband cable at poles. | | | | 8-97 | 4920-A4-97 | | | | | | | | | | | | | | | | |
| | | <u>ADSS</u> Clearance to ADSS cable at poles. | | | | 8-98 | 4920-A4-98 | | | | | | | | | | | | | | | | |
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WOOD POLE

POLE DATA AND MATERIAL LIST - PAGE 8-2



| | | | | | | | | | |
|---|----------------|------------|------|------------|-----|-----------|-----|-----------|---------------------------------------|
| A | ORIGINAL ISSUE | | APPD | R. ENGLISH | CKD | J. TUNNEY | DRN | J. TUNNEY | Earth download cover detail added. |
| E | DATE | 11-03-2011 | | | | | | | |



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OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

WOOD POLE DATA AND MATERIAL LIST

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|-------|---------------|--------------|------|---------|
| APP'D | C. Williamson | TECH STDS | | AUTOCAD |
| DATE | 31-08-89 | 4920-A4 | | E |
| REC'D | R.Cavill | SECT | PAGE | |
| CKD | G.Hubner | 8 | 1 | |
| | | SHEET 1 OF 1 | | |
| DWN | M.Welsh | FILE: | | |


WOOD POLE DATA

MATERIAL LIST


| POLE LENGTH (m) | STRENGTH RATING (LST kN) | MINIMUM SINKING DEPTH (m) | AUGER DIAMETER (mm) | APPROXIMATE MASS (kg) |
|-----------------|--------------------------|---------------------------|---------------------|-----------------------|
| 8 | 22 | 1.4 | 460 | 500 |
| 9.5 | 9 | 1.55 | 460 | 380 |
| | 14 | | | 520 |
| | 22 | | 560 | 680 |
| 11 | 9 | 1.7 | 460 | 490 |
| | 14 | | 560 | 670 |
| | 22 | | | 890 |
| 12.5 | 9 | 1.85 | 460 | 620 |
| | 14 | | 560 | 840 |
| | 22 | | | 1110 |
| 14 | 9 | 2.0 | 460 | 750 |
| | 14 | | 560 | 1010 |
| | 22 | | | 1350 |
| | 36 | | 660 | 1900 |
| 15.5 | 14 | 2.15 | 560 | 1220 |
| | 22 | | 610 | 1600 |
| | 36 | | 660 | 2260 |
| 17 | 14 | 2.3 | 560 | 1430 |
| | 22 | | 610 | 1870 |
| | 36 | | 660 | 2630 |
| 18.5 | 14 | 2.45 | 560 | 1670 |
| | 22 | | 610 | 2190 |
| | 36 | | 660 | 3080 |
| 20 | 14 | 2.6 | 560 | 1900 |
| | 22 | | 610 | 2470 |
| | 36 | | 760 | 3520 |
| 21.5 | 14 | 2.75 | 560 | 2150 |
| | 22 | | 610 | 2810 |
| | 36 | | 760 | 4000 |
| 23 | 14 | 2.9 | 610 | 2350 |
| | 22 | | 660 | 3160 |
| | 36 | | 760 | 4490 |
| STAY | 8 | 1.4 | 460 | 500 |
| | 9.5 | 1.55 | 560 | 680 |

| C.U. I.D. | POLE STOCK CODE | POLE CAP & NAILS STOCK CODE | | TEST POINT C'SCREW | POLE STEPS (02600) (QTY) |
|-------------|-----------------|-----------------------------|--------|--------------------|--------------------------|
| | | CAP | NAILS | | |
| P8/12-22 | 15022 | 05880 | 114-30 | 00689 | 2 |
| P9.5/5-9 | 15023 | 05879 | | | 3 |
| P9.5/8-14 | 15024 | 05880 | | | |
| P9.5/12-22 | 15025 | 05881 | | | |
| P11/5-9 | 15026 | 05879 | | | 5 |
| P11/8-14 | 15027 | 05880 | | | |
| P11/12-22 | 15028 | 05881 | | | |
| P12.5/5-9 | 15029 | 05879 | | | 7 |
| P12.5/8-14 | 15030 | 05880 | | | |
| P12.5/12-22 | 15031 | 05881 | | | |
| P14/5-9 | 15032 | 05879 | | | 9 |
| P14/8-14 | 15033 | 05880 | | | |
| P14/12-22 | 15034 | 05881 | | | |
| P14/20-36 | 20895 | 05882 | | | 11 |
| P15.5/8-14 | 15035 | 05880 | | | |
| P15.5/12-22 | 15036 | 05881 | | | |
| P15.5/20-36 | 15037 | 05882 | | | 13 |
| P17/8-14 | 15038 | 05880 | | | |
| P17/12-22 | 15039 | 05881 | | | |
| P17/20-36 | 15040 | 05882 | | | |
| P18.5/8-14 | 15041 | 05880 | | | 15 |
| P18.5/12-22 | 15042 | 05881 | | | |
| P18.5/20-36 | 15043 | 05882 | | | |
| P20/8-14 | 15044 | 05880 | | | 17 |
| P20/12-22 | 15045 | 05881 | | | |
| P20/20-36 | 15046 | 05882 | | | |
| P21.5/8-14 | 15047 | 05881 | | | 19 |
| P21.5/12-22 | 15048 | 05882 | | | |
| P21.5/20-36 | 15049 | 05882 | | | |
| P23/8-14 | 15050 | 05881 | | | 21 |
| P23/12-22 | 15051 | 05882 | | | |
| P23/20-36 | 15052 | 05882 | | | |
| SP8/12-22 | 15022 | 05880 | | | 2 |
| SP9.5/12-22 | 15025 | 05881 | | | 3 |


- NOTES :
- Wood poles are required by law to be sunk to at least the minimum sinking depth. (Works Plan sinking depths are usually greater).
 - Add 200mm to minimum sinking depth for poles used for transformer stations.
 - Minimum sinking depth reduced by 10% in rock.
 - POLE MARKINGS

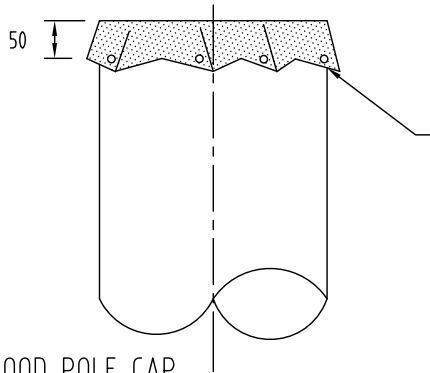


One diagonal painted stripe
POLE SUSPECT



One painted cross
POLE CONDEMNED
 - For each x-arm, add 50kg to pole mass.

| | | | | | | | | | | | | | | | | | | | | | |
|----------------|------|---------|------|----------|-----|---------|-----|---------|---|--|--|----------------------------------|--|-------|--|-----------|--|---------|--|---|--|
| ORIGINAL ISSUE | DATE | 21/9/18 | APPD | F. ZAINI | CKD | P. RELF | DRN | P. RELF | UPDATE STRENGTH RATING TO LST UPDATE CU's TO LST | | <div></div> <div>© COPYRIGHT 2016 ENERGEX</div> <div>This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL | | APP'D | | TECH STDS | | AUTOCAD | | | |
| | | | | | | | | | | | | CONSTRUCTION PRACTICE | | DATE | | 4920-A4 | | | | E | |
| | | | | | | | | | | | | WOOD POLE DATA AND MATERIAL LIST | | REC'D | | SECT | | PAGE | | | |
| | | | | | | | | | | | | | | CKD | | 8 | | 2 | | | |
| | | | | | | | | | | | | | | DWN | | SHEET | | 1 OF 1 | | | |
| | | | | P.T. | | FILE: | | | | | | | | | | | | | | | |



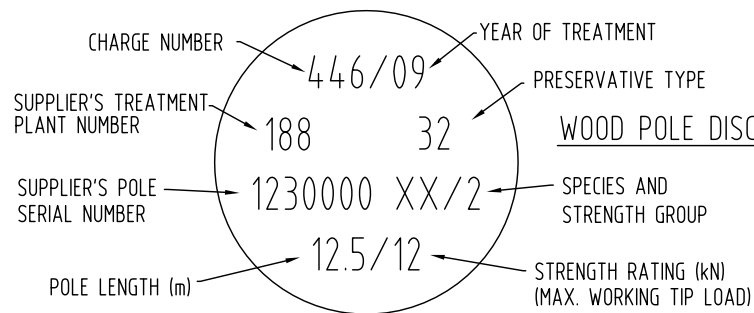
NAILS 11430
or
SCREWS 22517

NOTES :

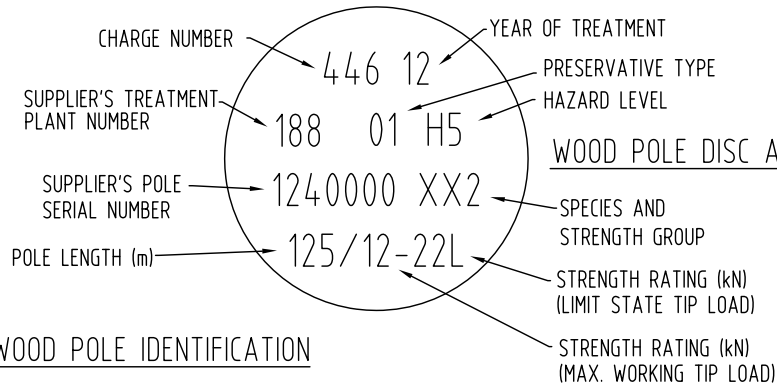
1. Allow 50mm turn down around pole.
2. 450mm pole caps used with oversized or odd shaped poles.

WOOD POLE CAP

| POLE CAPS | |
|-----------|------------|
| DIA. (mm) | STOCK CODE |
| 300 | 05879 |
| 350 | 05880 |
| 400 | 05881 |
| 450 | 05882 |



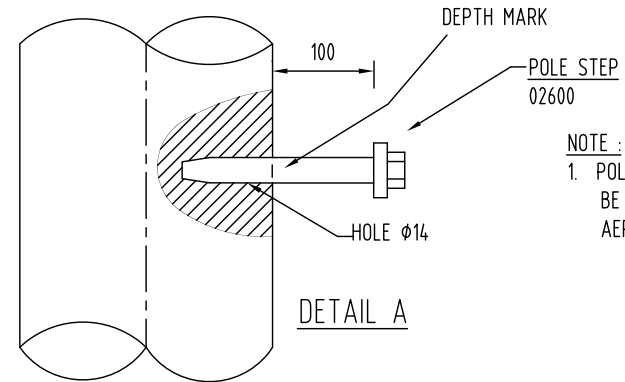
WOOD POLE DISC TO 2011



WOOD POLE DISC AFTER 2011

WOOD POLE IDENTIFICATION

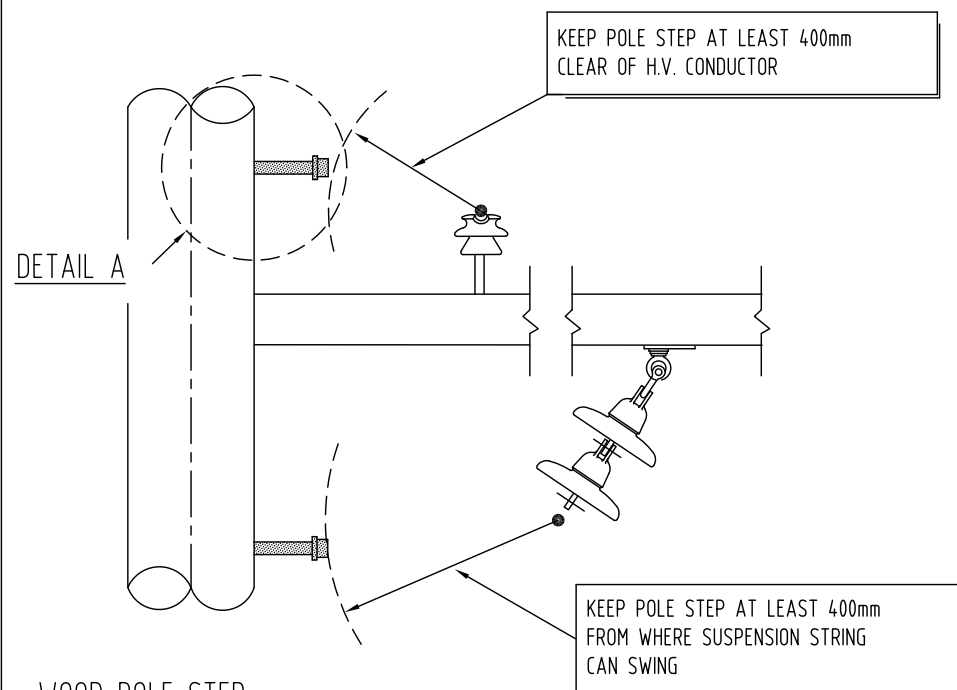
(VACUUM PRESSURE IMPREGNATED POLE)



NOTE :

1. POLE STEPS NOT TO BE INSTALLED UNDER AERIAL BUNDLED CABLE.

DETAIL A



DETAIL A

WOOD POLE STEP

KEEP POLE STEP AT LEAST 400mm FROM WHERE SUSPENSION STRING CAN SWING



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OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

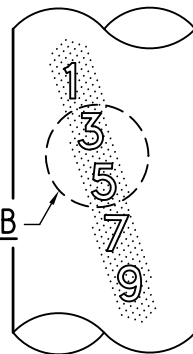
WOOD POLE ATTACHMENTS

| | | | | | |
|-------|--|-----------|--|--------------|---|
| APP'D | | TECH STDS | | AUTOCAD | |
| DATE | | 4920-A4 | | | E |
| REC'D | | SECT | | PAGE | |
| CKD | | 8 | | 3 | |
| DWN | | M.W | | SHEET 1 OF 1 | |
| | | FILE: | | | |

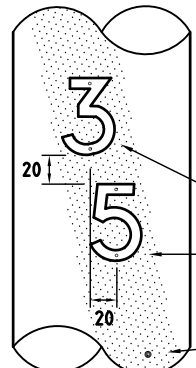
NOTE :

1. This practice used for the attachment of :

- Pole numbers.
- Transformer numbers.
- A.B.S. numbers.
- Streetlight numbers.



DETAIL B



DETAIL B

POLE NUMBERS

NAILS
11430

BLACK PAINT
03910

WOOD POLE NUMBERS

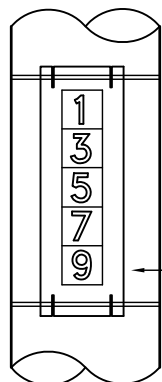
POLE NUMBERS

| NUMBER | STOCK CODE |
|--------|------------|
| 1 | 05957 |
| 2 | 05958 |
| 3 | 05959 |
| 4 | 05960 |
| 5 | 05961 |
| 6 | 05962 |
| 7 | 05963 |
| 8 | 05964 |
| 9 | 05962 |
| 0 | 05950 |
| S | 05953 |
| P | 05951 |
| X | 15393 |

NOTE :

1. This practice used for the attachment of :

- Pole numbers.
- Transformer numbers.
- A.B.S. numbers.
- Streetlight numbers.



**KOLANA BRONZE
ALUMINIUM PLATE**
11685

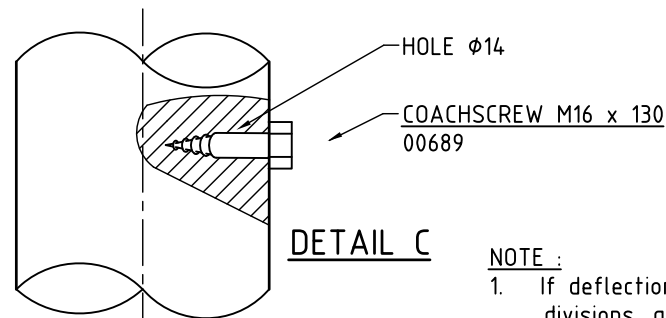
BANDIT 13mm
02475

BUCKLE
02482

CONCRETE POLE NUMBERS

POLE NUMBERS

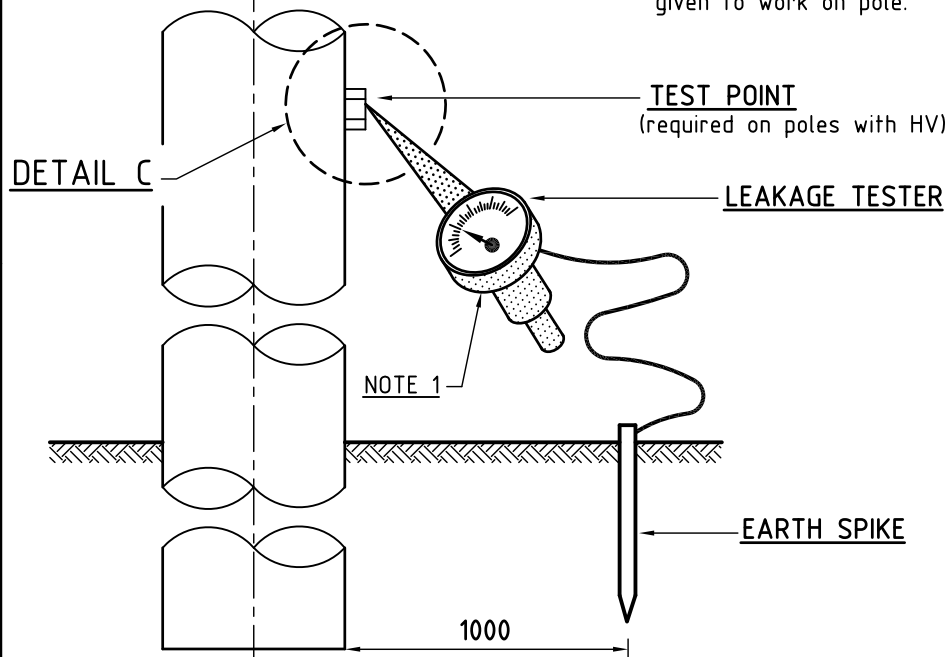
| NUMBER | STOCK CODE |
|--------|------------|
| 1 | 15820 |
| 2 | 15821 |
| 3 | 15822 |
| 4 | 15823 |
| 5 | 15824 |
| 6 or 9 | 15825 |
| 7 | 15826 |
| 8 | 15827 |
| 0 | 15819 |
| S | 22481 |
| P | 22482 |
| X | 22483 |



DETAIL C

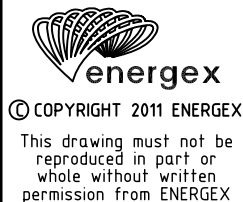
NOTE :

1. If deflection greater than 4 divisions, at test point, engineering investigation required before approval is given to work on pole.



WOOD POLE HV LEAKAGE TEST POINT

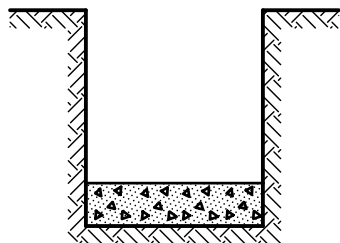
| | | | | | |
|----------------|-----------------|------------------|---------------|---------------|------------------------------|
| ORIGINAL ISSUE | DATE 23-03-2011 | APP'D R. ENGLISH | CKD J. TUNNEY | DRN J. Tunney | Concrete pole numbers added. |
| A | E | | | | |



OVERHEAD CONSTRUCTION MANUAL CONSTRUCTION PRACTICE

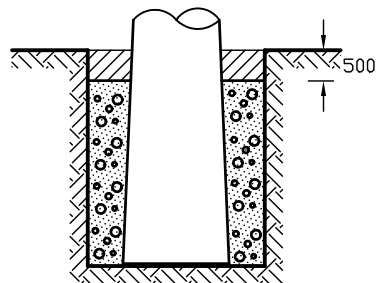
POLE ATTACHMENTS

| | | |
|------------------|--------------|---------|
| APP'D PAT PEARL | TECH STDS | AUTOCAD |
| DATE 10/11/93 | 4920-A4 | E |
| REC'D | SECT 8 | PAGE 4 |
| CKD D. MacKENSIE | SHEET 1 OF 1 | |
| DWN MW | FILE: | |



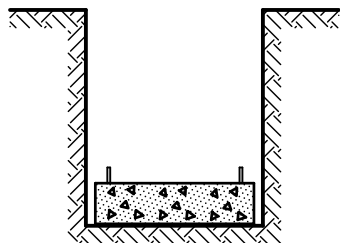
Footing comprising of 1 part cement mixed with 10 parts of clean river gravel or crushed rock and sand may be used or bagged premixed concrete. Mixed concrete pad only required in poor soil.

MCPF -MIXED CONCRETE PAD FOOTING



Material comprising decomposed granite and gravels which incorporate binding materials may be used. Addition of water may be necessary if material has dried out before ramming.

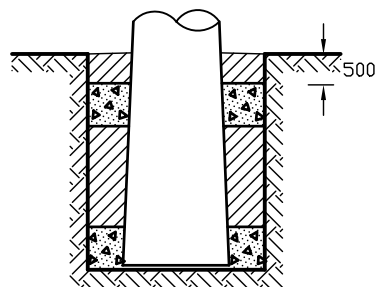
RBGF -ROAD BASE GRAVEL FOUNDATION



Precast concrete pad selection
1. Unstayed pole - as per auger size.
2. Stayed pole - 600mm pad with 7/2.75 or 19/2.00 stays or 850mm pad with 19/2.75 stays.

Precast concrete pad only required in poor soil.

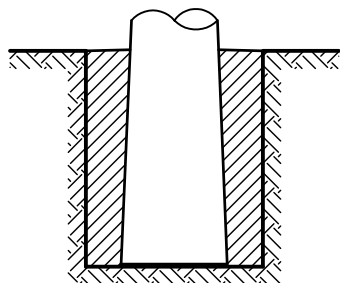
PCPF -PRECAST CONCRETE PAD FOUNDATION



Collars may be bagged ready-mix; or cement, clean river gravel or crushed rock mixed at a ratio of 10:1. Add only sufficient water to enable ramming. Sustained loads may then be applied immediately.

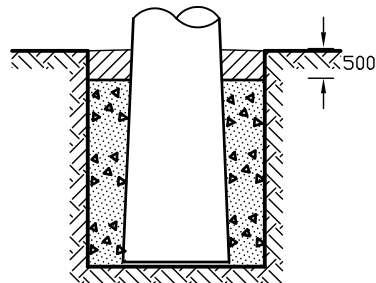
Note : If poured ready-mix is used allow three days to elapse before applying sustained load. Do not use in poor soil (soft clay or loam, loose fill or loose sand).

CCF -CONCRETE COLLAR FOUNDATION



Natural excavated material may be used as a backfill provided it is of good quality, alternatively good quality backfill may be imported. Sustained load may be applied immediately.


NAEF -NATURAL EARTH FOUNDATION



Backfill may be bagged ready-mix; or cement, clean river gravel or crushed rock mixed at a ratio of 10:1. Add only sufficient water to enable ramming. Sustained loads may then be applied immediately.

Note : If poured ready-mix is used allow three days to elapse before applying sustained load.

MDCF -MAXIMUM DEPTH CONCRETE FOUNDATION

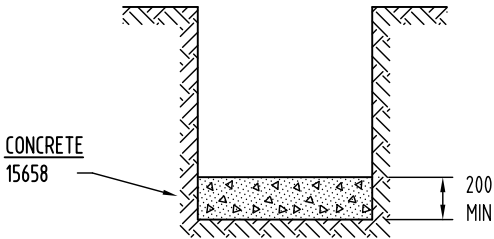
| | | | | | | | | | | | | | |
|---|----------------|------|-------------|------------------|--|--|------------------------------|-----------------------|----------|--------------|--------------|------|---------|
| A | ORIGINAL ISSUE | | G. JAYAWERA | TEMPLATE CHANGED | |  ©COPYRIGHT 2007 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX | OVERHEAD CONSTRUCTION MANUAL | | APP'D | PAT PEARL | TECH STDS | | AUTOCAD |
| | D | DATE | | | | | 2103.07 | DATE | 10/11/93 | 4920-A4 | | D | |
| | | APPD | | | | | K.NUTTALL | | REC'D | | SECT | PAGE | |
| | | CKD | | | | | J.TUNNEY | | CKD | D. MacKENZIE | 8 | 5 | |
| | | DRN | | | | | | | DWN | MW | SHEET 1 OF 1 | | |
| | | | | | | | | POLE FOUNDATION TYPES | | FILE: | | | |

CONSTRUCTION PRACTICE

POLE FOUNDATION TYPES

MATERIAL

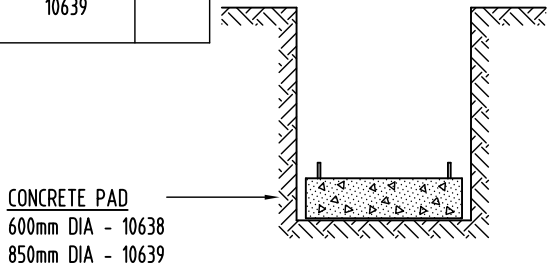
| STOCK CODE | QTY |
|------------|-----|
| 15658 | 3 |



MCPF - MIXED CONCRETE PAD FOOTING

MATERIAL

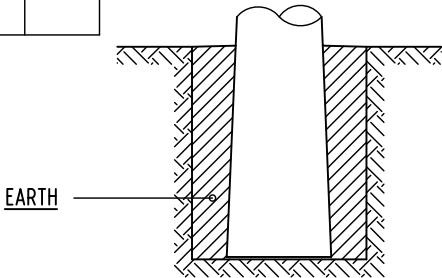
| STOCK CODE | QTY |
|----------------------|-----|
| 10638 or 10639 | 1 |



PCPF - PRECAST CONC. PAD FOOTING

MATERIAL

| STOCK CODE | QTY |
|------------|-----|
| - | - |

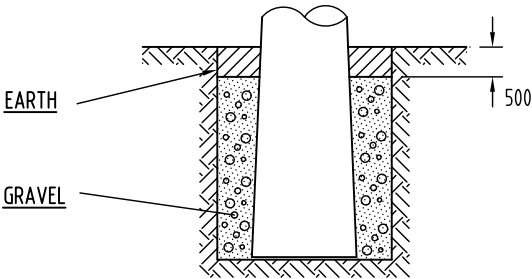


NAEF - NATURAL EARTH FOUNDATION

RAMMING - HYDRAULICALLY RAM ALL FOUNDATION TYPES AT 500mm INTERVALS

MATERIAL

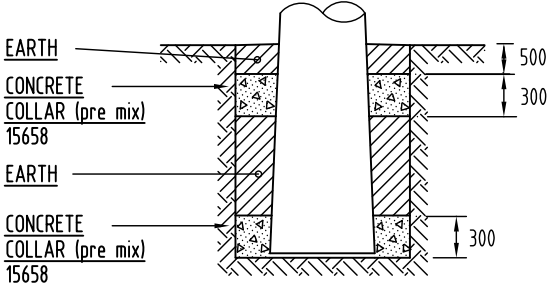
| STOCK CODE | QTY |
|------------|-----|
| - | - |



RBGF - ROAD BASE GRAVEL FOUNDATION

MATERIAL

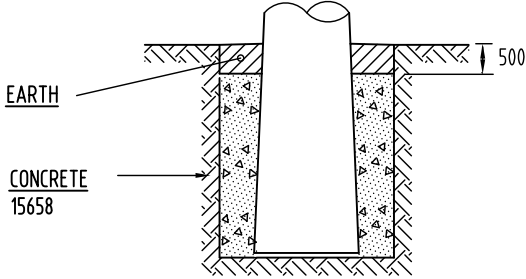
| STOCK CODE | QTY |
|------------|-----|
| 15658 | 10 |



CCF - CONCRETE COLLAR FOUNDATION

MATERIAL

| STOCK CODE | QTY |
|------------|-----|
| 15658 | 20 |



MDCF - MAXIMUM DEPTH CONC. FOUND'N

| | | | | | |
|----------------|---------------|---------------|--------------|-------------|--|
| ORIGINAL ISSUE | DATE 07/02/13 | APPD F. ZAINI | CKD J. CHUNG | DRN P. RELF | CCF/MDCF CONCRETE QUANTITIES CORRECTED |
| C | H | | | | |



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OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

POLE FOUNDATION - TYPES

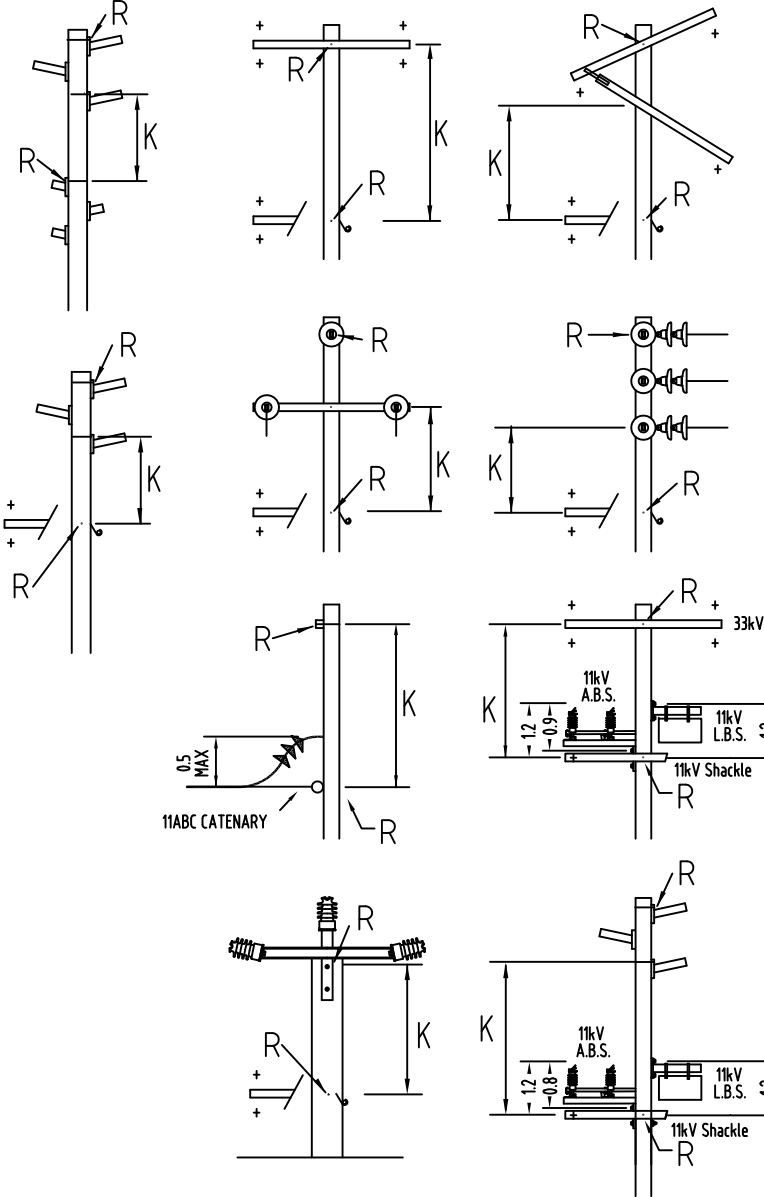
| | | |
|-----------------|--------------|---------|
| APP'D PAT PEARL | TECH STDS | AUTOCAD |
| DATE 24/07/98 | 4920-A4 | H |
| REC'D J. TUNNEY | SECT 8 | PAGE 6 |
| CKD J. TUNNEY | SHEET 1 OF 1 | |
| DWN R.W | FILE: | |


33kV/11kV - MINIMUM KINGBOLT SPACINGS 'K'

Based on stringing tensions no tighter than T220.

| 33kV SUPER 11kV SUB | ALL 33kV PINS 33TD | 33kV FLAT TERM'N/ SHACKLE | 33VS 33VT | 33VA | 33SU 33SUA 33SUAH | 33W 33WA | 33VDR 33VOR |
|-----------------------------------|-----------------------------|------------------------------------|--------------|------|-------------------------|-------------|----------------|
| ALL 11kV PINS (eg 11P) | 2.0 | 2.4 | 2.4 | 2.7 | 3.0 | 3.7 | 2.2 |
| 11kV POST (eg 11A) | 2.1 | 2.5 | 2.5 | 2.8 | 3.1 | 3.8 | 2.3 |
| 11kV TERM'N/SHACKLE (without ABS) | 1.8 | 2.2 | 2.2 | 2.7 | 2.8 | 3.5 | 2.2 |
| 11kV SHACKLE (with mid pole ABS) | 2.3 | 2.7 | 2.7 | - | 3.1 | 3.8 | 2.7 |
| 11kV SHACKLE (with mid pole LBS) | 2.3 | 2.7 | 2.7 | - | 3.1 | 3.8 | 2.7 |
| 11ABC/S,T | 2.2 | 2.6 | 2.7 | 3.2 | 3.1 | 3.7 | 2.6 |
| 11kV SHACKLE (TRANSPOS'N) | 2.5 | 2.9 | 2.9 | 3.3 | 3.9 | 4.5 | 2.8 |
| 11SUA, 11SUAH | 1.4 | 2.2 | 1.6 | 2.7 | 2.4 | 2.7 | 1.7 |
| 11SU | 1.2 | 2.1 | 1.6 | 2.6 | 2.4 | 2.7 | 1.7 |
| 11VDR, 11VOR | 2.0 | 2.2 | 2.2 | 2.7 | 2.6 | 3.2 | 2.1 |

1. The Reference Kingbolt (R) for each construction is always the highest through-pole bolt attachment for the construction.
2. The Kingbolt Spacing (K) as shown on the drawings opposite provides the minimum required vertical separation between constructions.
3. In all cases, (K) is from one of the supercircuit through-pole bolt attachments to the subcircuit reference kingbolt (R). (K) is not always the same as the distance between the supercircuit (R) and the subcircuit (R) due to construction configurations.
4. Mid pole air break switches (ABS) are installed above the 11kV shackle construction. (R) is the top through-pole mounting bracket hole installed at 100-200mm above the shackle kingbolt.
5. Mid pole load break switches (LBS) may be installed above or below the 11kV shackle construction. (R) is the top through-pole mounting bracket hole installed at either 1.2m above or 450mm below the shackle kingbolt. (Refer section 7 for "below" example.)



| | | | | | | | | | | | | | | | | | |
|---|----------------|------------|------|----------|-----|---------|-----|-----------------------------------|--|---|--|---------|-----------|--------------|--|---------|--|
| A | ORIGINAL ISSUE | | APPD | F. ZAINI | CKD | P. RELF | DRN | ADD LBS MID MOUNTED ABOVE 11kV | | <div> energex ©COPYRIGHT 2015 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL CONSTRUCTION PRACTICE REFERENCE KING BOLTS KING BOLT SPACINGS 33kV to 11kV | APP'D | PAT PEARL | TECH STDS | | AUTOCAD | |
| | DATE | 29/03/2016 | | | | | | | | | | 4920-A4 | | D | | | |
| | | | | | | | | | | | | REC'D | J.TUNNEY | SECT | | PAGE | |
| | | | | | | | | | | | | CKD | J.TUNNEY | 8 | | 7 | |
| | | | | | | | | | | | | DWN | R.W | SHEET 1 OF 1 | | | |
| | | | | | | | | | | | | FILE: | | | | | |

11kV/11kVABC and 11kV/LV - KINGBOLT SPACING

For stringing tensions
no tighter than T220

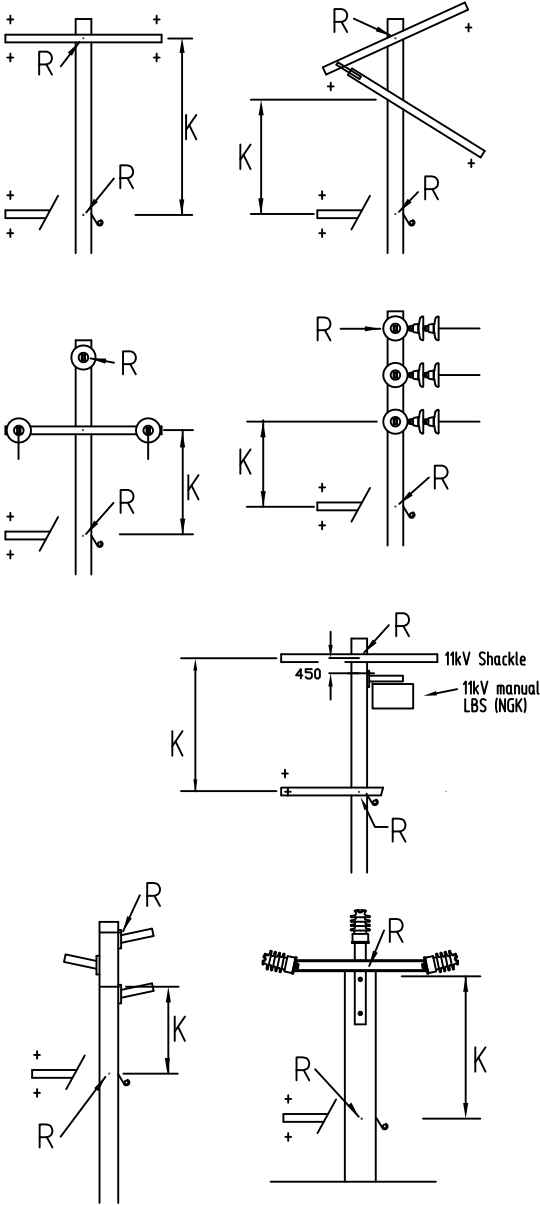
| SUB CIRCUIT \ 11kV SUPER CIRCUIT | FLAT/TRIDENT | | | VERTICAL | SUSPENSION | | WISHBONE | ABC | VERTICAL |
|---|------------------|--------------------------|------------------------------------|----------|------------|--------------|----------|----------|----------------------|
| | ALL 11kV PIN 11A | ALL 11kV TERM'N, SHACKLE | ALL 11kV SHACKLE WITH MID POLE LBS | 11VA | 11SU | 11SUA 11SUHA | 11W 11WA | 11kV ABC | 11VDR 11VOR (NOTE 1) |
| ALL L.V. PINS, ANGLES (EXC. SUA) | 2.0 | 2.2 | Note 3 | 2.6 | 3.0 | 3.2 | 3.6 | 2.2 | 2.2 |
| ALL L.V. SHACKLES TERMINATIONS INCL. LVABC & 11kV ABC PILOT | 1.8 | 2.0 | Note 3 | 2.4 | 2.8 | 3.0 | 3.4 | 2.0 | 2.1 |
| LVSUA, LVU, LVABC AND 11kVABC SUSPENSION & ANGLE | 1.6 | 1.8 | Note 3 | 2.2 | 2.6 | 2.8 | 3.2 | 1.8 | 1.9 |
| 11kV TEE OFF OR CROSS CHECK SAME CIRCUIT SHACKLE OR TERMINATION | 0.65 | 0.85 | - | 1.25 | 1.65 | 1.85 | 2.25 | 0.6 | 0.85 |


33kV/11kVABC and 33kV/LV - KINGBOLT SPACING

| SUB CIRCUIT \ 33kV SUPER CIRCUIT | ALL 33kV PINS | 33kV FLAT TERM'N, SHACKLE | 33VA | 33SU 33SUA 33SUHA | 33W 33WA | 33VDR 33VOR (NOTE 1) |
|---|---------------|---------------------------|------|-------------------|----------|----------------------|
| ALL L.V. PINS, ANGLES (EXC. SUA) | 2.0 | 2.2 | 2.6 | 3.2 | 3.8 | 2.2 |
| ALL L.V. SHACKLES & TERMINATIONS INCL. LVABC, 11kV ABC, PILOT | 1.8 | 2.2 | 2.4 | 3.0 | 3.6 | 2.1 |
| LVSUA, LVU, LVABC AND 11kVABC SUSPENSION & ANGLE | 1.6 | 2.0 | 2.2 | 2.8 | 3.0 | 1.9 |
| 33kV TEE OFF - SAME CIRCUIT SHACKLE OR TERMINATION | 0.65 | 0.85 | 1.25 | 1.85 | 2.45 | 0.85 |

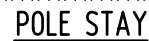
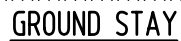
1. KBS to subcircuit from VDR & VOR constructions is from the top gainbase bolt of the lowest phase insulator.
2. KBS to LV circuit from MDO constructions is 2.4m
3. See OHCM section 7 for individual spacing's for different LBS

4. Mid pole mounted load break switches (LBS) may be mounted above or below the 11kV shackle construction. (R) for the load break switch is the top through-pole mounting bracket hole. When installing the LBS below, locate this hole at 450mm below the shackle kingbolt.



| | | | | | | | | | | | | | | | | |
|---|----------------|----------|---------------|---------|---------|----------------------------------|---|-------------------------------|----------------------|-----------|-----------|--|---------|--|--|--|
| A | ORIGINAL ISSUE | | APPD F. ZAINI | P. RELF | P. RELF | ADD NEW NOTE 3 FOR DIFFERENT LBS | <div> ©COPYRIGHT 2017 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL | APP'D | K.NUTTALL | TECH STDS | | AUTOCAD | | | |
| | DATE | 18/09/18 | | | | | | | DATE | 21.03.07 | 4920-A4 | | E | | | |
| | REC'D | | | | | | | | SECT | | PAGE | | | | | |
| | CKD | J.TUNNEY | | | | | | | 8 | | 8 | | | | | |
| | DWN | J.T. | | | | | | | SHEET 1 OF 1 | | FILE: | | | | | |
| | | | | | | | | CONSTRUCTION PRACTICE | REFERENCE KING BOLTS | | | | | | | |
| | | | | | | | | KING BOLT SPACINGS 11kV to LV | | | | | | | | |

MATERIAL LIST - PAGE 8-12



PAGE 8-13



PAGE 8-15



PAGE 8-15




PAGE 8-14



PAGE 8-13



PAGE 8-16

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----------------------|-------|---|-------|----------|------|-----------|-----|----------|-----|--------------|------------------|--|--|------------------------------|--|--------|-------|-----|-------|-----------|--|---------|--|
| B | ORIGINAL | ISSUE | C | DATE | 210307 | APPD | K.NUTTALL | CKD | J.TUNNEY | DRN | G. JAYAWEERA | TEMPLATE CHANGED | | <div> ©COPYRIGHT 2007 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL | | | APP'D | PAT | PEARL | TECH STDS | | AUTOCAD | |
| | CONSTRUCTION PRACTICE | | | DATE | 24/07/98 | | | | | | | | | | 4920-A4 | | | C | | | | | | |
| | POLE STAYS | | | REC'D | J.TUNNEY | | | | | | | | | | SECT | | PAGE | | | | | | | |
| | GENERAL ARRANGEMENT | | | CKD | J.TUNNEY | | | | | | | | | | 8 | | 11 | | | | | | | |
| | | | | DWN | R.W | | | | | | | | | | SHEET | | 1 OF 1 | | | | | | | |
| | | | | | | | | | FILE: | | | | | | | | | | | | | | | |

NOTE : STAY POLES MUST BE BOOKED SEPARATELY

POLE STAY CODE

GS

E

39

/

SA

D10

STAY TYPE

GS - GROUND STAY
PS - POLE STAY
SS - SIDEWALK STAY

POLE ATTACHMENT

W - WRAP ATTACHMENT
E - EYEBOLT ATTACHMENT

STAYWIRE SIZE

39 - 7/2.75 GZ
55 - 19/2.00 GZ
108 - 19/2.75 GZ

ANCHOR TYPE

(AS REQUIRED)

MCA - MASS CONCRETE
RA - ROCK
SA - SCREW

SCREW ANCHOR

(AS REQUIRED)

D10 - DOUBLE HELIX (100mm)
S20 - SINGLE HELIX (200mm)
S25 - SINGLE HELIX (250mm)
D25 - DOUBLE HELIX (250mm)
S30 - SINGLE HELIX (300mm)

STAYPOLE SIZE


(AS REQUIRED)

SP8 - SP8/12-22
SP9.5 - SP9.5/12-22

EXAMPLE : GSE39/SAD10 = GROUND STAY, EYEBOLT ATTACHMENT, 7/2.75 STAYWIRE / SCREW ANCHOR, DOUBLE HELIX 100mm.

| MATERIAL | | POLE STAY CODE | | GSE55/MCA | GSE108/MCA | GSW55/MCA | GSW108/MCA | GSE39/RA | GSE55/RA | GSE108/RA | GSW39/RA | GSW55/RA | GSW108/RA | GSE39/SA | GSE55/SA | GSE108/SA | GSW39/SA | GSW55/SA | GSW108/SA | PSW39/SP8 | PSW39/SP9.5 | PSW55/SP8 | PSW55/SP9.5 | PSW108/SP8 | PSW108/SP9.5 | PSE39/SP8 | PSE39/SP9.5 | SSE55/MCA | SSE108/MCA | SSW55/MCA | SSW108/MCA | SSE39/RA | SSE55/RA | SSE108/RA | SSW39/RA | SSW55/RA | SSW108/RA | SSE39/SA | SSE55/SA | SSE108/SA | SSW39/SA | SSW55/SA | SSW108/SA | | | | |
|--------------------------|--|------------------|--------------------|-----------|------------|-----------|------------|----------|----------|-----------|----------|----------|-----------|----------|----------|-----------|----------|----------|-----------|-----------|-------------|-----------|-------------|------------|--------------|-----------|-------------|-----------|------------|-----------|------------|----------|----------|-----------|----------|----------|-----------|----------|----------|-----------|----------|----------|-----------|---|---|---|---|
| | | SP8/12 | SP9.5/12 | | | | | | | | | | | | | | | | | | 1 | | 1 | | 1 | | 1 | | | | | | | | | | | | | | | | | | | | |
| STAY POLES (AS REQUIRED) | | SP8/12 | SP9.5/12 | | | | | | | | | | | | | | | | | 1 | | 1 | | 1 | | 1 | | | | | | | | | | | | | | | | | | | | | |
| STAY GUARDS | | or GPS or GPL | or GPGS or GPGI | 1 | | 1 | | 1 | 1 | | 1 | 1 | | 1 | 1 | | 1 | 1 | | | | | | | | | | | 1 | | 1 | | 1 | | | | 1 | 1 | | 1 | 1 | | 1 | 1 | | | |
| SIDEWALK BKT | | SWB | | | 1 | | | | | 1 | | | 1 | | | 1 | | | 1 | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| STAY INSULATORS | | SI2 | | | | | 1 | | | 1 | | | 1 | | 1 | | 1 | | | 1 | | | | | | | | | | 1 | | | | | 1 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| | | SI3 | 1 | | 1 | | | | 1 | | | | 1 | | | | | 1 | | | | | | | | | | | | 1 | | 1 | | | | | 1 | | | | 1 | 1 | 1 | 1 | 1 | 1 | |
| | | SI4 | | 1 | | 1 | | | | 1 | | | 1 | | | 1 | | | 1 | | | | | | | | | | | | 1 | | | | | | 1 | | | | 1 | 1 | 1 | 1 | 1 | 1 | |
| GROUND ANCHORS | | MCA | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | |
| | | RA | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | 1 | | | 1 | 1 | 1 | | | | | | | | |
| | | SA | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| STAYWIRE ATTACHMENTS | | WSA | | | 1 | 1 | | | | | 1 | 1 | 1 | | | | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | | | | | 1 | 1 | | | | 1 | 1 | 1 | | | | | | | 1 | 1 | 1 | 1 |
| | | ESA | 1 | 1 | | | | 1 | 1 | 1 | | | | 1 | 1 | 1 | | | | | | | | | | 2 | 2 | | 1 | 1 | | | 1 | 1 | 1 | | | | | 1 | 1 | 1 | | | | | |
| | | ASA | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | | | | | | | | | | | |
| | | ASAE | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | 1 | 1 | | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| | | | | | | | | | | | | | | | |
|---|----------------|--|---|-----------------|--|------|----------|--|-----|---------|--|-----|---------|--|---------------------------------|
| B | ORIGINAL ISSUE | | D | DATE 29/03/2016 | | APPD | F. ZAINI | | CKD | P. RELF | | DRN | P. RELF | | UPDATED TO AS7000 LST VALUES |
| | | | | | | | | | | | | | | | |



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OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

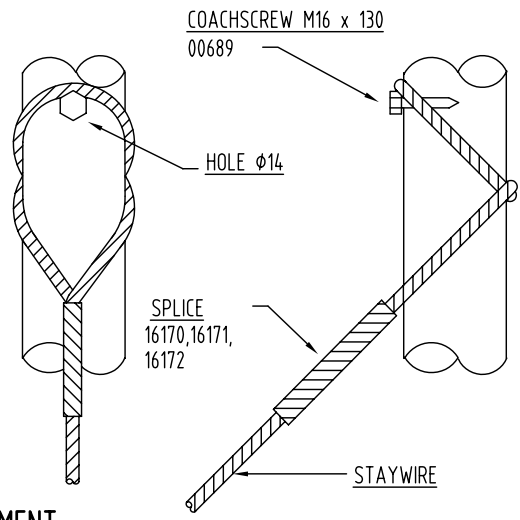
POLE STAYS

MATERIAL LIST

| | | | | | |
|-------|--|-----------|--|---------|---|
| APP'D | | TECH STDS | | AUTOCAD | |
| DATE | | 4920-A4 | | | D |
| REC'D | | SECT | | PAGE | |
| CKD | | 8 | | 12 | |
| DWN | | SHEET | | 1 OF 1 | |
| M.W | | FILE: | | | |

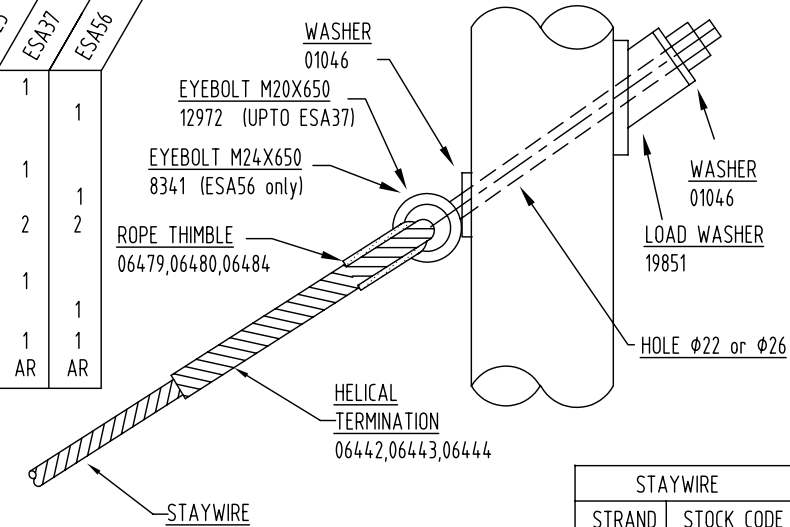
| MATERIAL | WSA25 | WSA37 | WSA56 |
|------------|-------|-------|-------|
| STOCK CODE | | | |
| 00689 | 1 | 1 | 1 |
| STAYWIRE | AR | AR | AR |
| 16170 | 1 | | |
| 16171 | | 1 | |
| 16172 | | | 1 |

| STAYWIRE | |
|----------|------------|
| STRAND | STOCK CODE |
| 7/2.75 | 06496 |
| 19/2.00 | 06493 |
| 19/2.75 | 06494 |



WSA -WRAP STAY ATTACHMENT

| MATERIAL | ESA25 | ESA37 | ESA56 |
|------------|-------|-------|-------|
| STOCK CODE | | | |
| 12972 | 1 | 1 | |
| 8341 | | | 1 |
| 06479 | 1 | | |
| 06480 | | 1 | |
| 06484 | | | 1 |
| 01046 | 2 | 2 | 2 |
| 06442 | 1 | | |
| 06443 | | 1 | |
| 06444 | | | 1 |
| 19851 | 1 | 1 | 1 |
| STAYWIRE | AR | AR | AR |

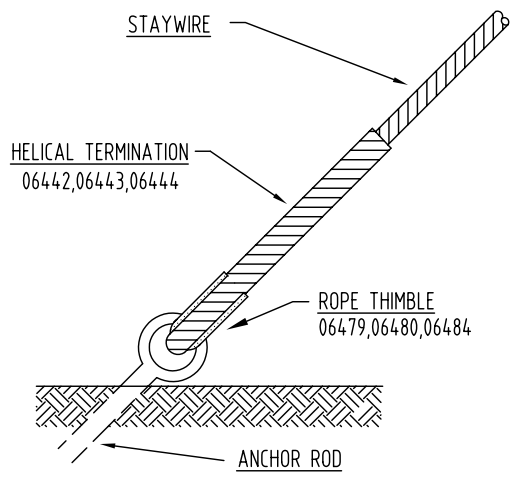


ESA -EYEBOLT STAY ATTACHMENT

| STAYWIRE | |
|----------|------------|
| STRAND | STOCK CODE |
| 7/2.75 | 06496 |
| 19/2.00 | 06493 |
| 19/2.75 | 06494 |

| MATERIAL | ASA25 | ASA37 | ASA56 |
|------------|-------|-------|-------|
| STOCK CODE | | | |
| STAYWIRE | AR | AR | AR |
| 06442 | 1 | | |
| 06443 | | 1 | |
| 06444 | | | 1 |
| 06479 | 1 | | |
| 06480 | | 1 | |
| 06484 | | | 1 |

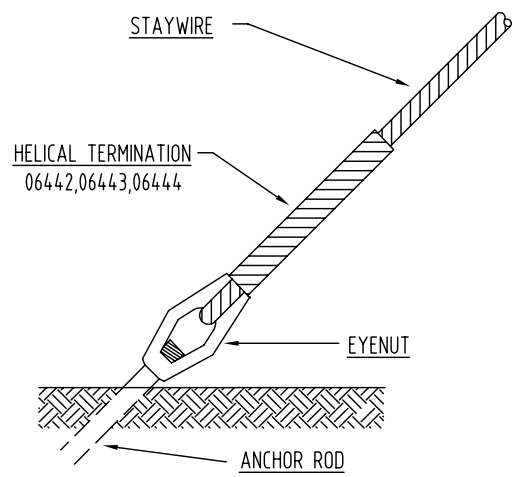
| STAYWIRE | |
|----------|------------|
| STRAND | STOCK CODE |
| 7/2.75 | 06496 |
| 19/2.00 | 06493 |
| 19/2.75 | 06494 |



ASA -ANCHOR STAY ATTACHMENT


| MATERIAL | ASAE25 | ASAE37 | ASAE56 |
|------------|--------|--------|--------|
| STOCK CODE | | | |
| STAYWIRE | AR | AR | AR |
| 06442 | 1 | | |
| 06443 | | 1 | |
| 06444 | | | 1 |

| STAYWIRE | |
|----------|------------|
| STRAND | STOCK CODE |
| 7/2.75 | 06496 |
| 19/2.00 | 06493 |
| 19/2.75 | 06494 |



ASAE -ANCHOR (EYENUT) STAY ATTACHMENT

| | | |
|---|----------------|--------------|
| B | ORIGINAL ISSUE | |
| C | DATE | 210307 |
| | APPD | K.NUTTALL |
| | CKD | J.TUNNEY |
| | DRN | G. JAYAVEERA |
| TEMPLATE CHANGED M24 BOLT ONLY REQ'D FOR ESA56. | | |



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OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

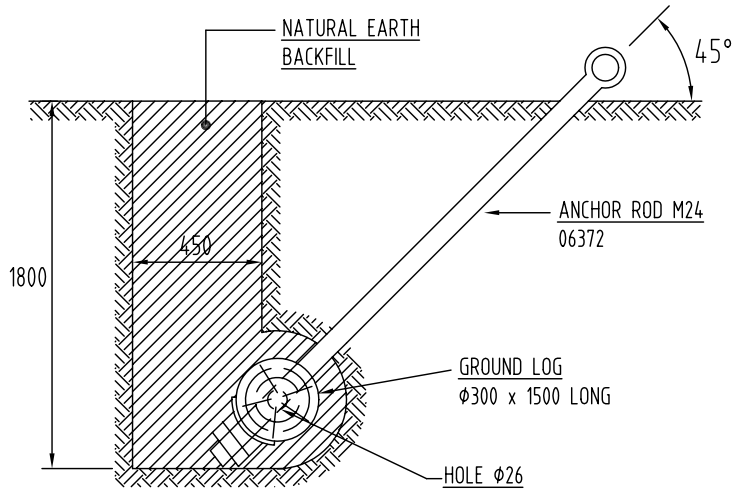
POLE STAYS

STAYWIRE ATTACHMENTS

| | | | | |
|-------|-----------|--------------|------|---------|
| APP'D | PAT PEARL | TECH STDS | | AUTOCAD |
| DATE | 24/07/98 | 4920-A4 | | C |
| REC'D | J.TUNNEY | SECT | PAGE | |
| CKD | J.TUNNEY | 8 | 13 | |
| DWN | R.W | SHEET 1 OF 1 | | |
| | | FILE: | | |

MATERIAL

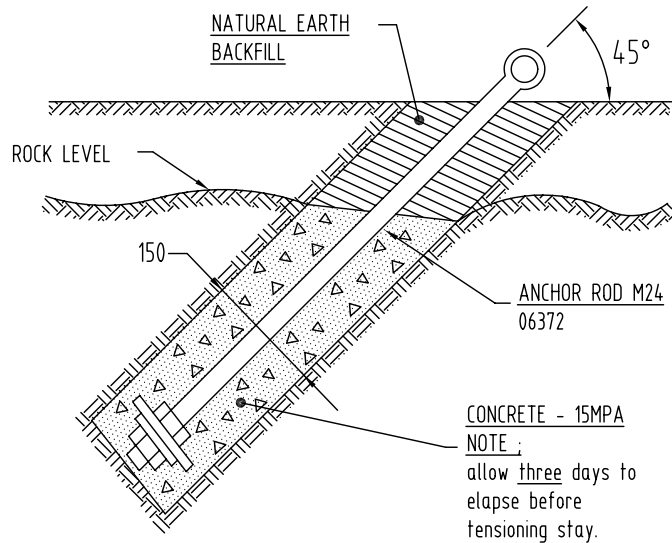
| STOCK CODE | QTY |
|------------|-----|
| 06372 | 1 |
| GROUND LOG | AR |



GLA -GROUND LOG ANCHOR

MATERIAL

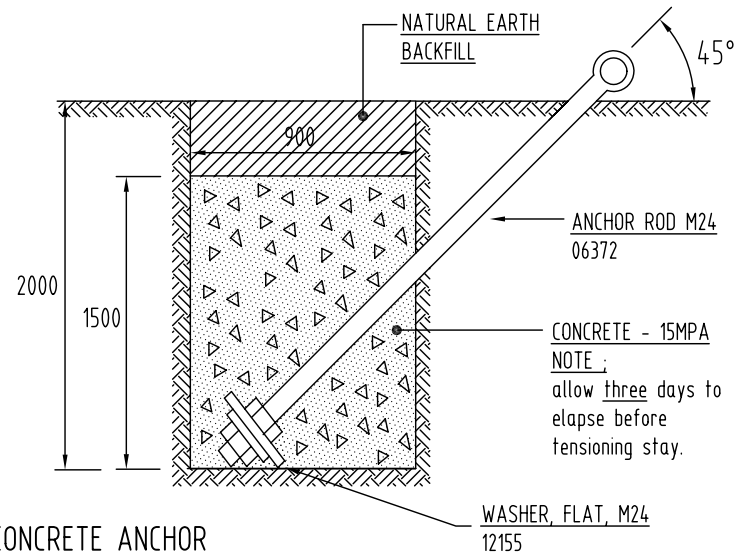
| STOCK CODE | QTY |
|------------|-----|
| 06372 | 1 |
| 01010 | 1 |
| CONCRETE | AR |



RA -ROCK ANCHOR

MATERIAL

| STOCK CODE | QTY |
|------------|-----|
| 06372 | 1 |
| 12155 | 1 |
| CONCRETE | AR |



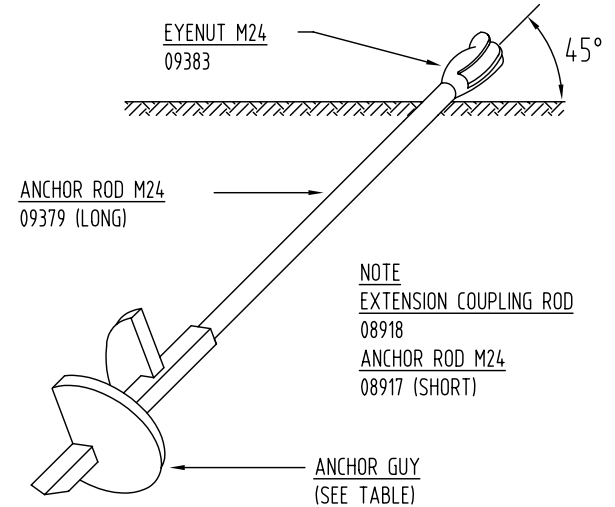
MCA -MASS CONCRETE ANCHOR

MATERIAL

| STOCK CODE | QTY |
|------------|-----|
| 09379 | 1 |
| 09383 | 1 |
| ANCHOR GUY | AR |

ANCHOR GUY SELECTION

| DIA (mm) | SINGLE HELIX | DOUBLE HELIX |
|----------|--------------|--------------|
| 100 | - | 09377 |
| 200 | 09373 | - |
| 250 | 09374 | 09376 |
| 300 | 09375 | - |



SA -SCREW ANCHOR

| ORIGINAL ISSUE | DATE | APPD | CKD | DRN | TEMPLATE CHANGED |
|----------------|---------|-----------|----------|------------|------------------|
| 1 | 2103.07 | K.NUTTALL | J.TUNNEY | G.JAYAWERA | |



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OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

GROUND ANCHORS

| APP'D | TECH STDS | AUTOCAD |
|-------|-----------|--------------|
| DATE | 4920-A4 | D |
| REC'D | SECT | PAGE |
| CKD | 8 | 14 |
| DWN | M.W | SHEET 1 OF 1 |
| | FILE: | |


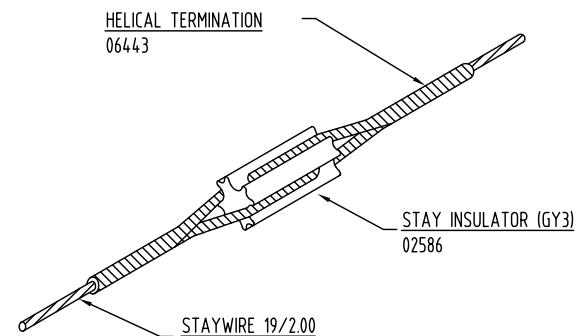


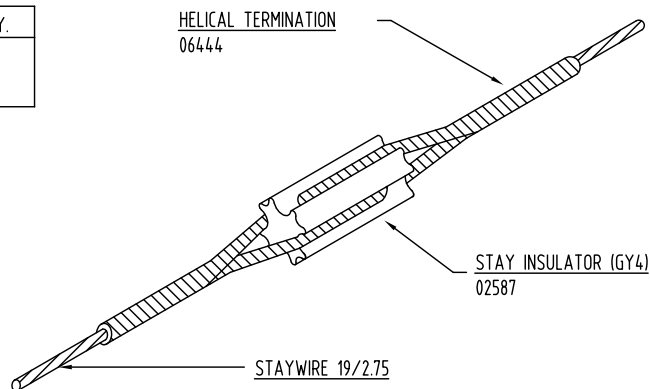
Diagram illustrating the Helical Termination assembly. The components shown are:

- HELICAL TERMINATION 06442
- STAY INSULATOR (GY2) 02585
- STAYWIRE 7/2.75

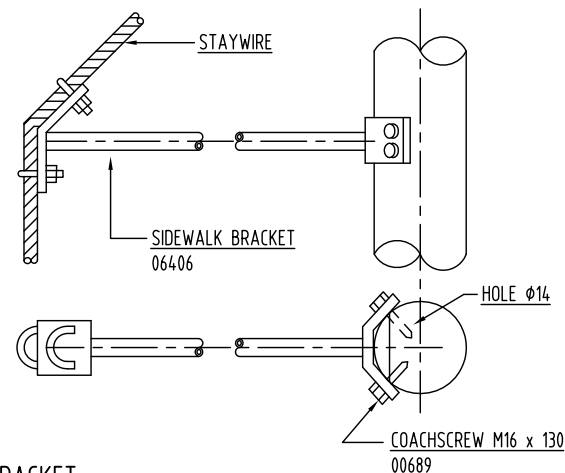
| MATERIAL | |
|------------|------|
| STOCK CODE | QTY. |
| 02586 | 1 |
| 06443 | 2 |



| MATERIAL | |
|------------|------|
| STOCK CODE | QTY. |
| 02587 | 1 |
| 06444 | 2 |




| MATERIAL | |
|------------|------|
| STOCK CODE | QTY. |
| 00689 | 4 |
| 06406 | 1 |



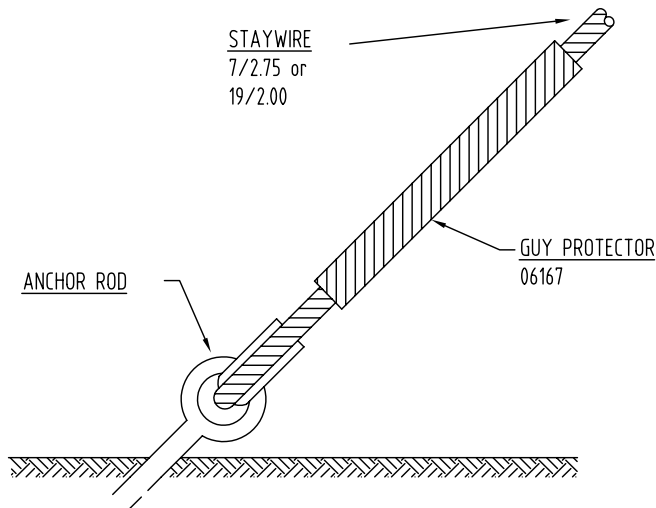
NOTE

1. WHERE A STAYWIRE PASSES THROUGH DIFFERENT CIRCUITS, A STAY INSULATOR MUST BE INSTALLED
2. A STAY INSULATOR MUST BE INSTALLED BETWEEN ANY VOLTAGE AND EARTH, AT LEAST 3m ABOVE GROUND

| | | | | | | | | | | | | | | | | | |
|---|----------------|--|---|---------------|--|------------------|----------------|-----------------|-------------|---|---|------------|--|-----------|--|---------|--|
| B | ORIGINAL ISSUE | | D | DATE 30/07/13 | | APPD F. ZAINI | CKD P. RELF | IDRN P. RELF | NOTES ADDED | <div><p>energex</p><p>©COPYRIGHT 2007 ENERGEX</p><p>This drawing must not be reproduced in part or whole without written permission from ENERGEX</p></div> | OVERHEAD CONSTRUCTION MANUAL <u>CONSTRUCTION PRACTICE</u> STAY INSULATORS AND SIDEWALK STAY | APP'D | | TECH STDS | | AUTOCAD | |
| | DATE | | | 4920-A4 | | | | | | | | D | | | | | |
| | REC'D | | | SECT 8 | | | | | | | | PAGE 15 | | | | | |
| | CKD | | | SHEET 1 OF 1 | | | | | | | | | | | | | |
| | DWN | | | M.W | | | | | | | | FILE: | | | | | |
| | | | | | | | | | | | | | | | | | |

MATERIAL

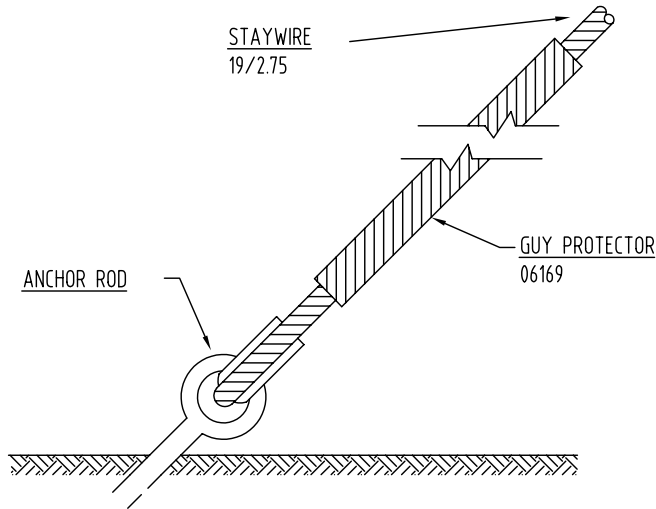
| STOCK CODE | QTY. |
|------------|------|
| 06167 | 1 |



GPS -GUY PROTECTOR (SMALL)

MATERIAL

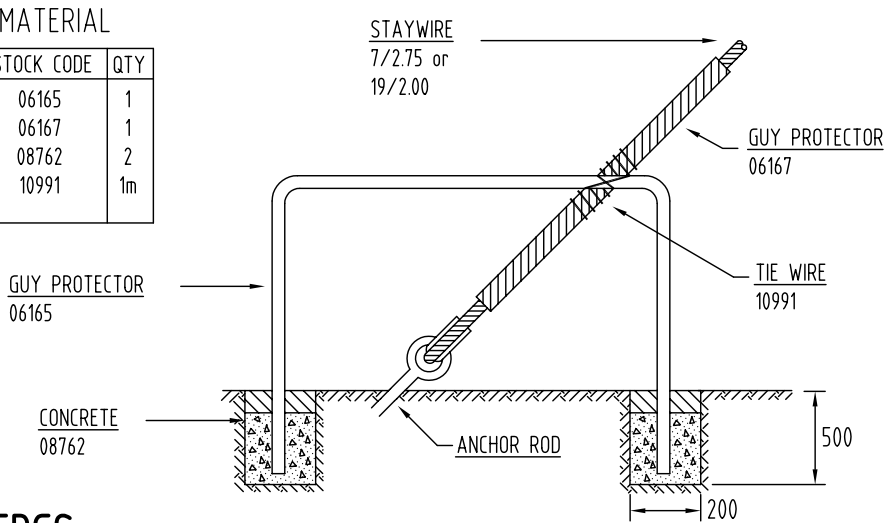
| STOCK CODE | QTY. |
|------------|------|
| 06169 | 1 |



GPL -GUY PROTECTOR (LARGE)

MATERIAL

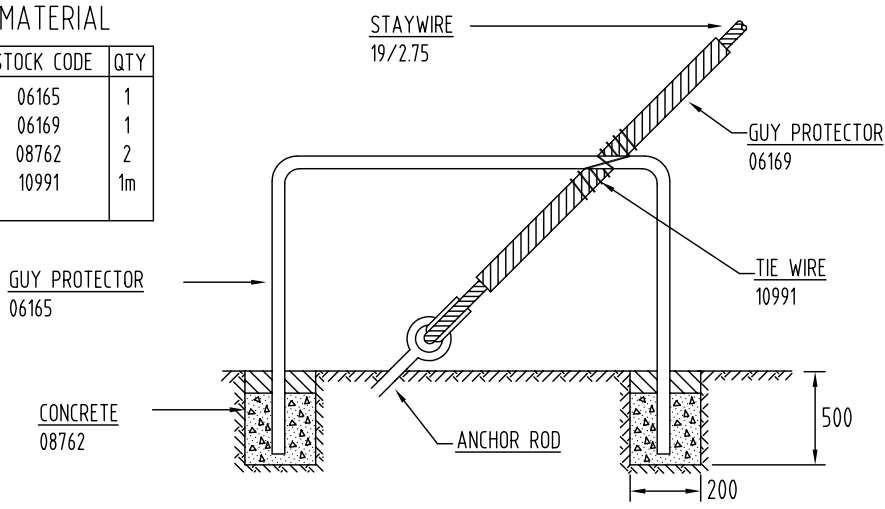
| STOCK CODE | QTY |
|------------|-----|
| 06165 | 1 |
| 06167 | 1 |
| 08762 | 2 |
| 10991 | 1m |




GPGS -GUY PROTECTOR GUARD (SMALL)

MATERIAL

| STOCK CODE | QTY |
|------------|-----|
| 06165 | 1 |
| 06169 | 1 |
| 08762 | 2 |
| 10991 | 1m |



GPGL -GUY PROTECTOR GUARD (LARGE)

| | | | | | | | | | | | | | | | | |
|---|---|-----------------------|--|-------------------|-----------------|-------------------|------------------|--|---|------------------------------|---------|-------|-----------|--------------|---------|--|
| B | C | ORIGINAL ISSUE | | APPD K.NUTTALL | CKD J.TUNNEY | DRN G.JAYAWERA | TEMPLATE CHANGED | | <div> energex ©COPYRIGHT 2007 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL | | APP'D | TECH STDS | | AUTOCAD | |
| | | CONSTRUCTION PRACTICE | | | | | | | | DATE | 4920-A4 | | C | | | |
| | | STAY GUARDS | | | | | | | | REC'D | SECT | | PAGE | | | |
| | | | | | | | | | | CKD | 8 | | 16 | | | |
| | | | | | | | | | | DWN | | M.W | | SHEET 1 OF 1 | | |
| | | | | | | | | | | FILE: | | | | | | |

CONDUCTOR FITTINGS

MATERIAL LIST - PAGE 8-22

L.V. TIES
PAGE 8-23

H.V. TIES
PAGE 8-23

L.V. TERMINATION
PAGE 8-25

H.V. TERMINATION
PAGE 8-25

L.V. TIES
PAGE 8-23


HELICAL SPACER
PAGE 8-26

SUSPENSION CLAMP
PAGE 8-24

SPIRAL VIBRATION DAMPER
PAGE 8-26

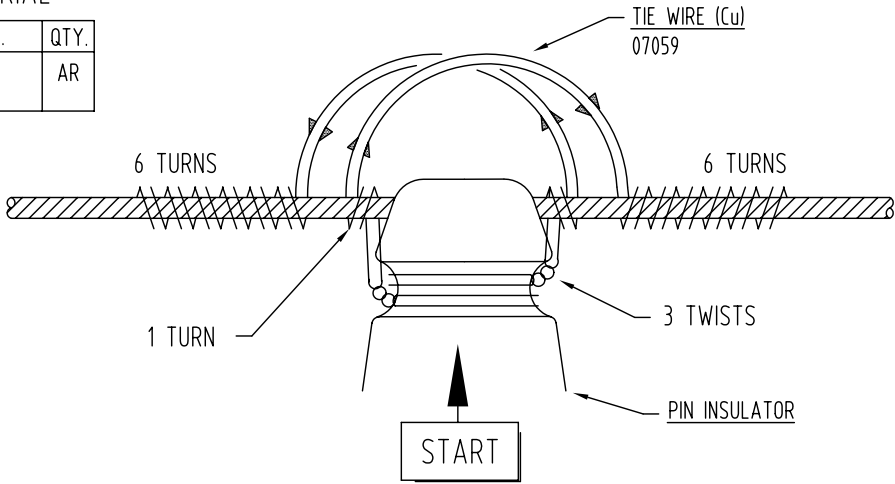
LOW
VOLTAGE

HIGH
VOLTAGE

| | | | | | | | | | | | | | | | | | | | |
|---|----------------|----------------------|------|-----------|-------|----------|-----|------------|------------------|--|---|------------------------------|-----------------------|------|-------|-----------|---------|---------|---|
| B | ORIGINAL ISSUE | | APPD | K.NUTTALL | CKD | J.TUNNEY | DRN | G.JAYAWERA | TEMPLATE CHANGED | | <div> ©COPYRIGHT 2007 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL | | | APP'D | TECH STDS | | AUTOCAD | |
| | C | DATE | | | | | | | | | | 2103.07 | CONSTRUCTION PRACTICE | | | DATE | 4920-A4 | | C |
| | | CONDUCTOR FITTINGS | | | | | | | | | | REC'D | SECT | PAGE | | | | | |
| | | GENERAL ARRANGEMENTS | | | | | | | | | | CKD | 8 | 21 | | | | | |
| | | | | | | | | | | | | DWN | SHEET 1 OF 1 | | | | | | |
| | | | M.W | | FILE: | | | | | | | | | | | | | | |

MATERIAL

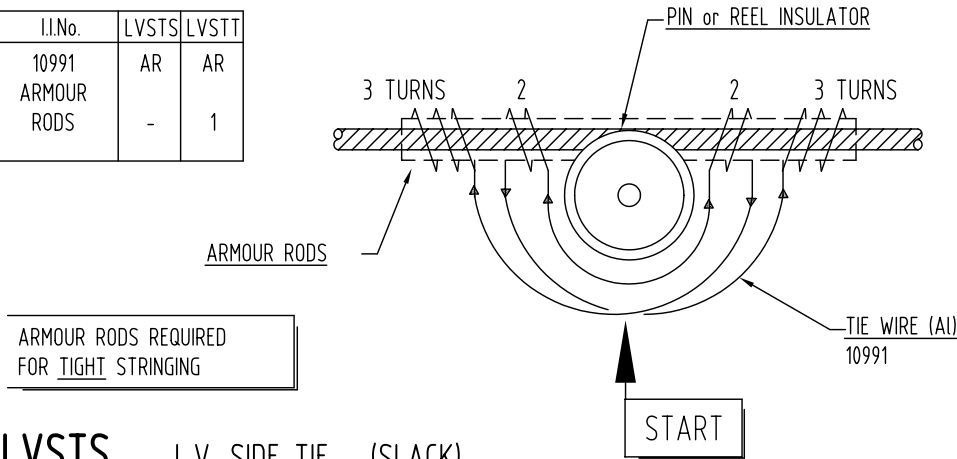
| I.I.No. | QTY. |
|---------|------|
| 07059 | AR |



CUTT -COPPER TOP TIE

MATERIAL

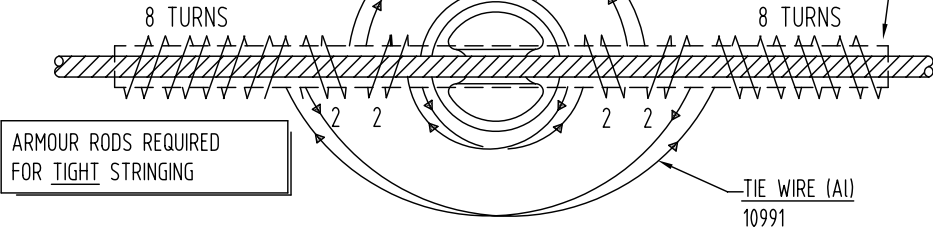
| I.I.No. | LVSTS | LVSTT |
|-------------|-------|-------|
| 10991 | AR | AR |
| ARMOUR RODS | - | 1 |



LVSTS -L.V. SIDE TIE - (SLACK)
LVSTT -L.V. SIDE TIE - (TIGHT)

MATERIAL

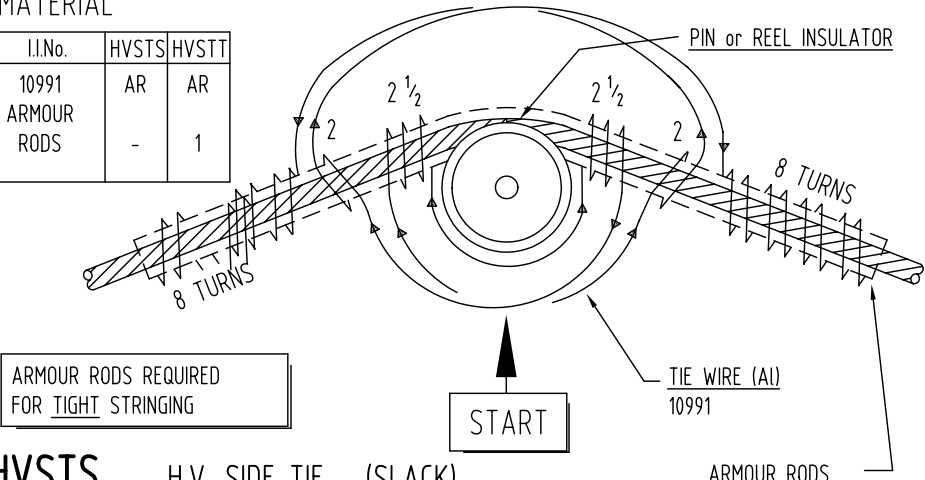
| I.I.No. | LVTTS HVTTS | LVTTT HVTTT |
|-------------|----------------|----------------|
| 10991 | AR | AR |
| ARMOUR RODS | - | 1 |



LVTTS,HVTTS -L.V. or H.V. TOP TIE - (SLACK)
LVTTT,HVTTT -L.V. or H.V. TOP TIE - (TIGHT)

MATERIAL

| I.I.No. | HVSTS | HVSTT |
|-------------|-------|-------|
| 10991 | AR | AR |
| ARMOUR RODS | - | 1 |



HVSTS -H.V. SIDE TIE - (SLACK)
HVSTT -H.V. SIDE TIE - (TIGHT)

| ORIGINAL ISSUE | DATE | APPD | CKD | DRN | NEW TEMPLATE |
|----------------|---------|-----------|----------|--------------|--------------|
| C | 2103.07 | K.NUTTALL | J.TUNNEY | G.JAYAWEEERA | |

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OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

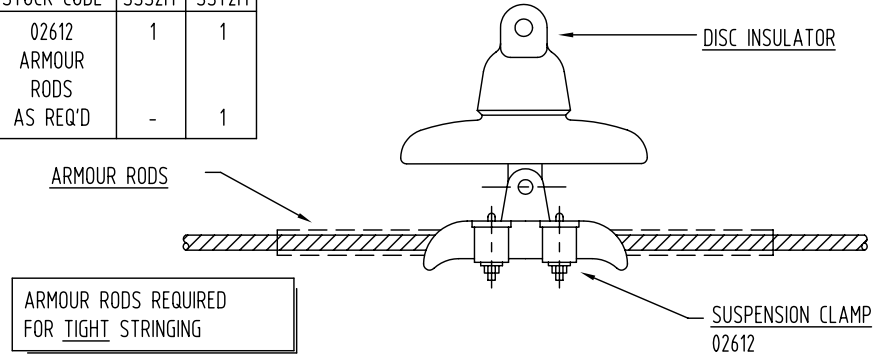
CONDUCTOR FITTINGS

MATERIAL LIST

| | | | |
|-------|--------------|-----------|---------|
| APP'D | C.Williamson | TECH STDS | AUTOCAD |
| DATE | 31/08/89 | 4920-A4 | D |
| REC'D | R.Cavill | SECT | PAGE |
| CKD | G.Hubner | 8 | 23 |
| DWN | P.T. | SHEET | 1 OF 1 |

MATERIAL

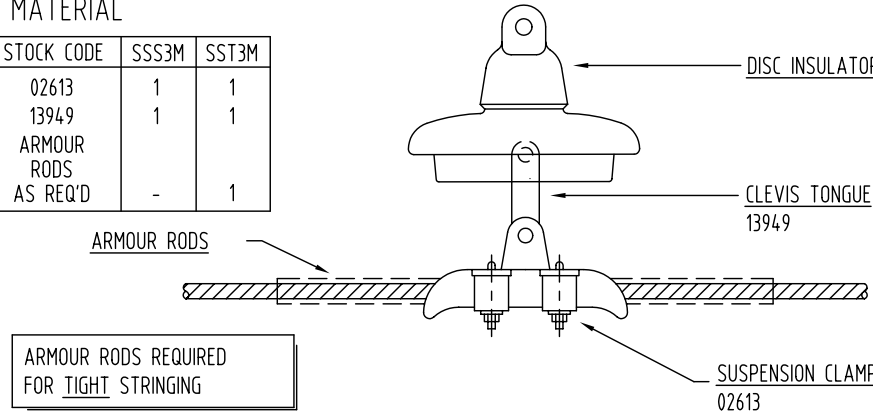
| STOCK CODE | SSS2M | SST2M |
|-------------|-------|-------|
| 02612 | 1 | 1 |
| ARMOUR RODS | | |
| AS REQ'D | - | 1 |



- SSS2M -SUSPENSION STRAIGHT (SLACK) -2M CLAMP
- SST2M -SUSPENSION STRAIGHT (TIGHT) -2M CLAMP

MATERIAL

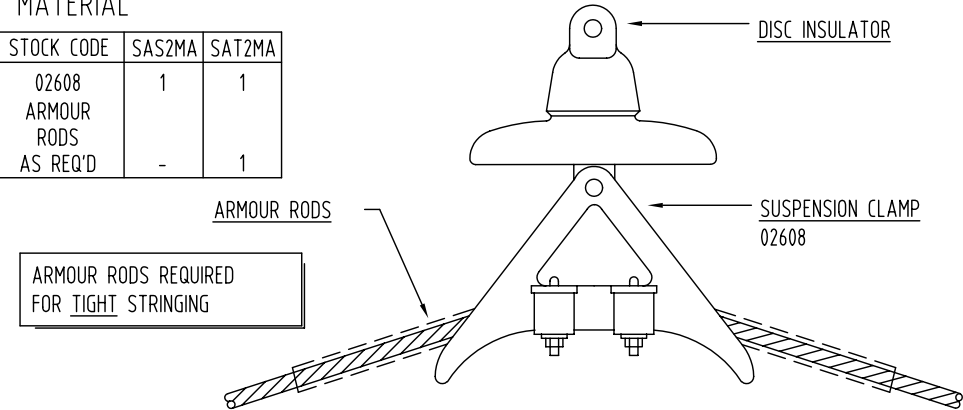
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|-------------|-------|-------|
| 02613 | 1 | 1 |
| 13949 | 1 | 1 |
| ARMOUR RODS | | |
| AS REQ'D | - | 1 |



- SSS3M -SUSPENSION STRAIGHT (SLACK) -3M CLAMP
- SST3M -SUSPENSION STRAIGHT (TIGHT) -3M CLAMP

MATERIAL

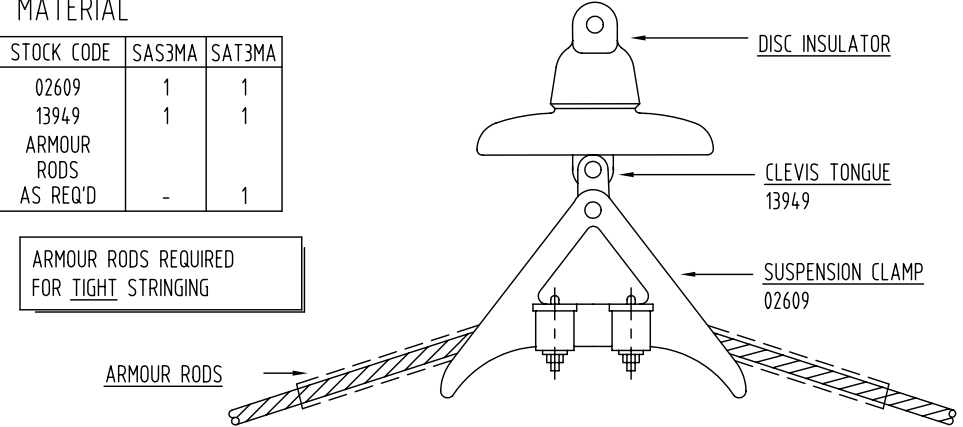
| STOCK CODE | SAS2MA | SAT2MA |
|-------------|--------|--------|
| 02608 | 1 | 1 |
| ARMOUR RODS | | |
| AS REQ'D | - | 1 |



- SAS2MA -SUSPENSION ANGLE (SLACK) -2MA CLAMP
- SAT2MA -SUSPENSION ANGLE (TIGHT) -2MA CLAMP

MATERIAL

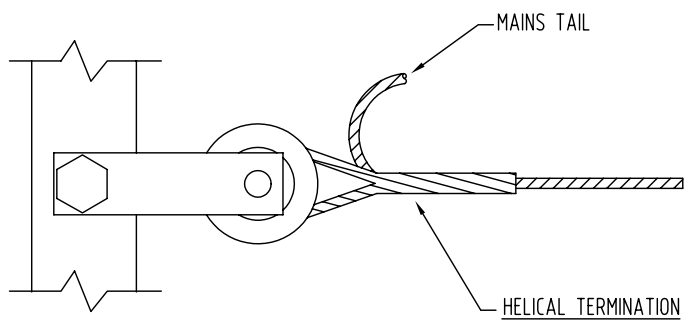
| STOCK CODE | SAS3MA | SAT3MA |
|-------------|--------|--------|
| 02609 | 1 | 1 |
| 13949 | 1 | 1 |
| ARMOUR RODS | | |
| AS REQ'D | - | 1 |



- SAS3MA -SUSPENSION ANGLE (SLACK) -3MA CLAMP
- SAT3MA -SUSPENSION ANGLE (TIGHT) -3MA CLAMP

MATERIAL

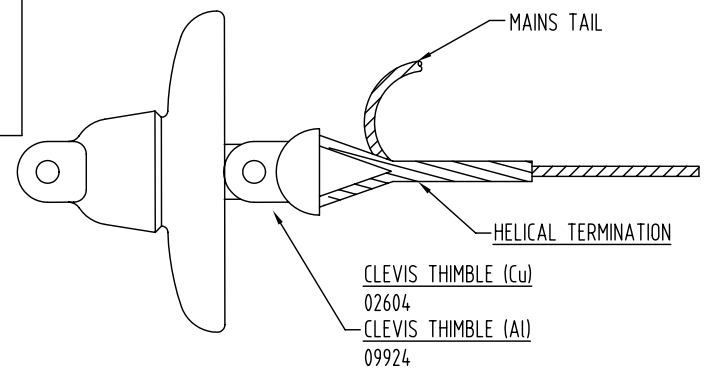
| STOCK CODE | QTY. |
|-------------------------|------|
| HELICAL TERM'N AS REQ'D | 1 |



LVTR -L.V. TERMINATION - REEL

MATERIAL

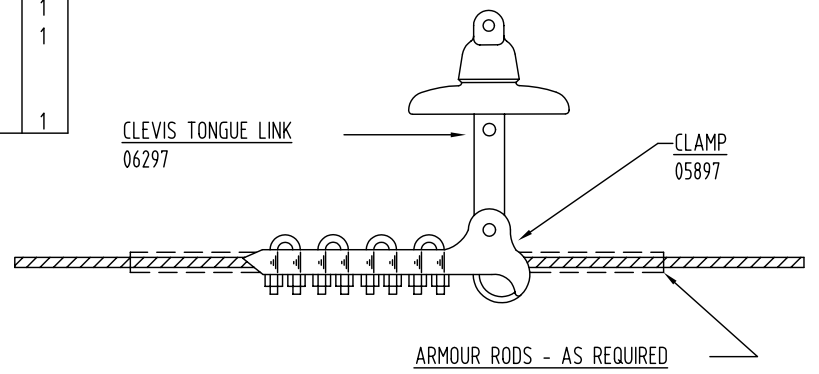
| STOCK CODE | HVTA | HVTC |
|-------------------------|------|------|
| 09924 | 1 | - |
| 02604 | - | 1 |
| HELICAL TERM'N AS REQ'D | 1 | 1 |



HVTA -H.V. TERMINATION (ALUMINIUM)
HVTC -H.V. TERMINATION (COPPER)

MATERIAL

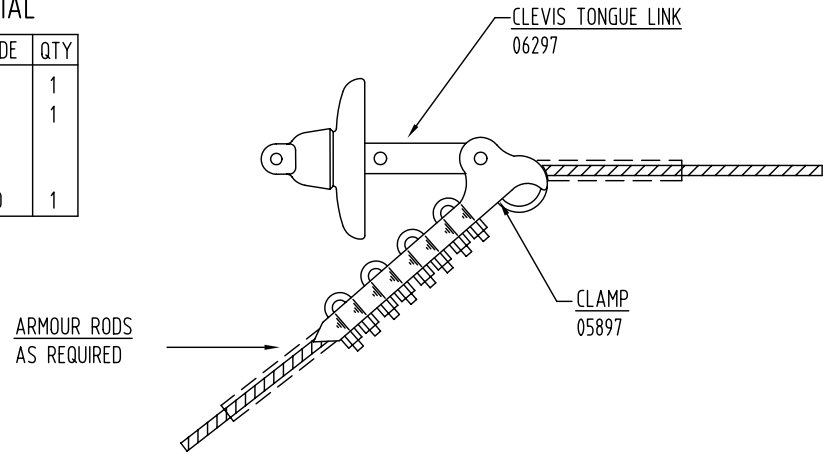
| STOCK CODE | QTY |
|----------------------|-----|
| 05897 | 1 |
| 06297 | 1 |
| ARMOUR RODS AS REQ'D | 1 |



FBSC -FOUR BOLT STRAIN CLAMP - (SUSPENSION)

MATERIAL

| STOCK CODE | QTY |
|----------------------|-----|
| 05897 | 1 |
| 06297 | 1 |
| ARMOUR RODS AS REQ'D | 1 |



FBSC -FOUR BOLT STRAIN CLAMP - (TERMINATION)

4 Wire Spreader 2.7m long PVC Rod & Clips

PVC Rod stock code : 19490

Clips stock code : 19491 (ea)

FOR USE IN AREAS PRONE TO CONDUCTOR CLASHING

Up to 40m span, install 1 spacer mid-span.

Between 40-80m, install at one spacer at 1/3 & another at 2/3 along span.

Rod may be cut to suit where distance to outside wires is less than 2.7m.

CONDUCTOR SPREADERS

MATERIAL

| STOCK CODE | CONDUCTOR DIA. RANGE (mm) | Spreader with integral insulator For use up to 33kV Coupling length 1000mm Bi-metallic conductor fittings |
|------------|---------------------------|--|
| 18969 | 9-21 | |

FOR USE IN AREAS PRONE TO CONDUCTOR CLASHING

Up to 300m span, install mid-span, A-B, B-C phases. Install 1m apart at Bph.

Over 300m span, install at 1/3 & 2/3 along span as above.

For "Moon" and smaller Al conductors fit A/Rods where spreaders installed.

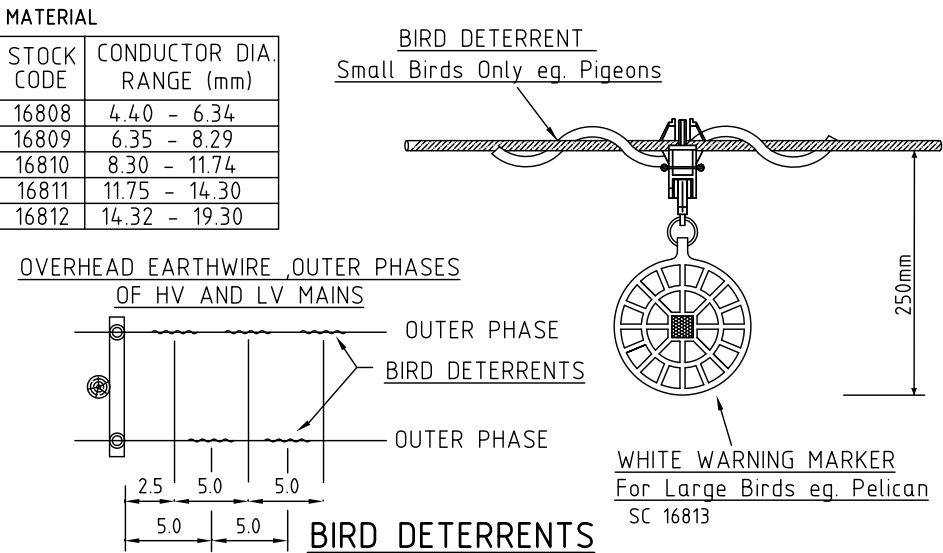
For all Cu conductors use repair splices.

For use on Narrow Trident in bushfire areas spreader at 50m centres

FOR RETO-FIT SITUATIONS ONLY

NOT TO BE USED ON NEW CONSTRUCTIONS

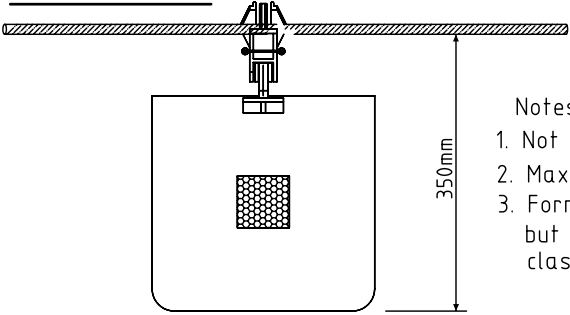
CONDUCTOR SPREADERS



MATERIAL

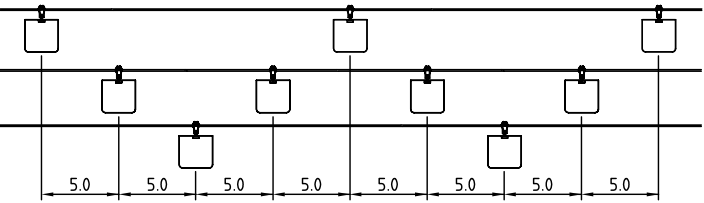
| STOCK CODE | DESCRIPTION |
|------------|---|
| 21702 | Orange Flag Marker, for use in ground based operations. |
| 21703 | White Flag Marker, for use in aerial based operations. |
| 21705 | Application tool |
| 21704 | Removal tool |

FLAG MARKER

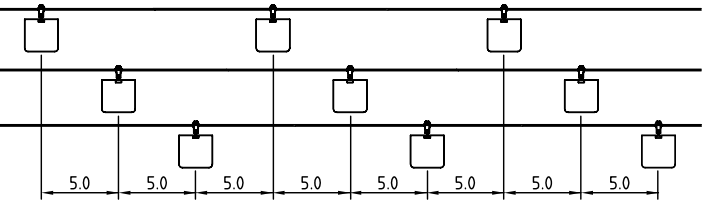


- Notes.
- 1. Not for installation on 33kV.
 - 2. Max. 4 flags per conductor/span.
 - 3. Formation and spacing may vary but scoper must ensure conductor clashing is avoided.

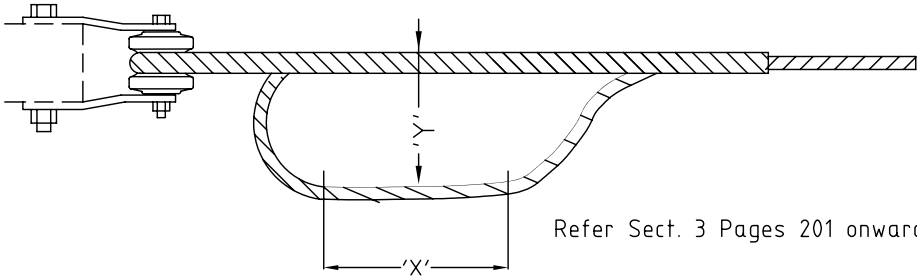
ZIG ZAG FORMATION



PARALLEL FORMATION



POWER LINE FLAG MARKERS



Refer Sect. 3 Pages 201 onwards

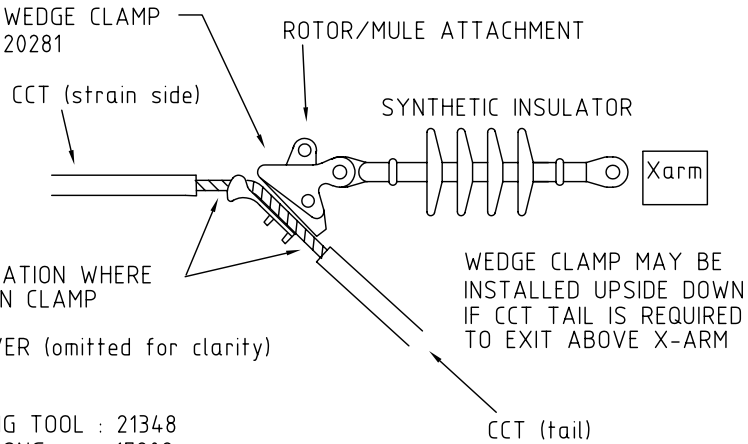
Flat side of Port Handle

- "X" = approx. 400mm for all conductors except
7/.080 Cu = approx. 300mm
(measured across flat side of Port Handle)
- "Y" = approx. 100mm for all conductors.
(measured top to top)

PORT HANDLE / CONDUCTOR STIRRUP DIMENSIONS

MATERIAL

| STOCK CODE | QTY |
|------------|-----|
| 20281 | 1 |
| 20282 | 1 |



STRIP INSULATION WHERE
INSTALLED IN CLAMP

WILDLIFE COVER (omitted for clarity)
20282

CCT STRIPPING TOOL : 21348
CCT COME-ALONG : 17802

CCTWC -CCT WEDGE CLAMP - (TERMINATION)

OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

POWER LINE FLAG MARKER
PORT HANDLE DIMENSIONS, CCT WEDGE CLAMP

| | | | |
|-------|-------------|-----------|---------|
| APP'D | R. English | TECH STDS | AUTOCAD |
| DATE | 17.11.08 | 4920-A4 | B |
| REC'D | | SECT | PAGE |
| CKD | D. Park | 8 | 27 |
| DWN | Josip Sokac | SHEET | 1 OF 1 |
| FILE: | | | |



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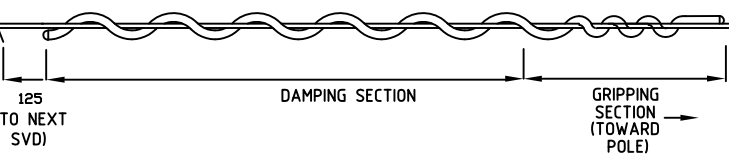
MATERIAL

| SVD STOCK CODE | COLOUR CODE | DIAMETER RANGE (mm) | CONDUCTOR |
|----------------|-------------|---------------------|-------------------------------------|
| 18024 | RED | 4.42 - 6.34 | 3/12 STEEL, 7/.080 |
| 05913 | BLUE | 6.35 - 8.29 | 7/.104, RAISIN |
| 05914 | BLACK | 8.30 - 11.74 | 19/.083, MARS, BANANA, APPLE, LIBRA |
| 05915 | YELLOW | 11.75 - 14.30 | MOON, CHERRY, DOG |
| 05910 | GREEN | 14.31 - 19.30 | PLUTO, NEON, WOLF |
| 20674 | YELLOW | 11.75 - 14.30 | ADSS ONLY |
| 19824 | BLACK | 8.30 - 11.74 | OPGW LH LAY ONLY |

| SPAN LENGTH | SVD QTY PER SPAN |
|-------------|------------------|
| 200-244m | 2 |
| 245-488m | 4 |
| 489-732m | 6 |
| 733-976m | 8 |

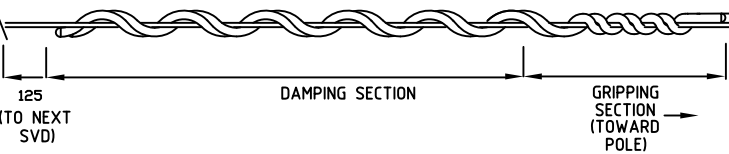
FOR ADSS, INSTALL 2 SVD'S PER SPAN REGARDLESS OF STRINGING TENSION AND TERRAIN ON ALL SPANS OVER 75m

SINGLE SVD



SUBSET OF 2 SINGLE SVD's

A subset is formed by wrapping 2 single SVD's within each other and is functionally equivalent to 2 single SVD's placed side by side with less conductor space occupied and reduced installation time.

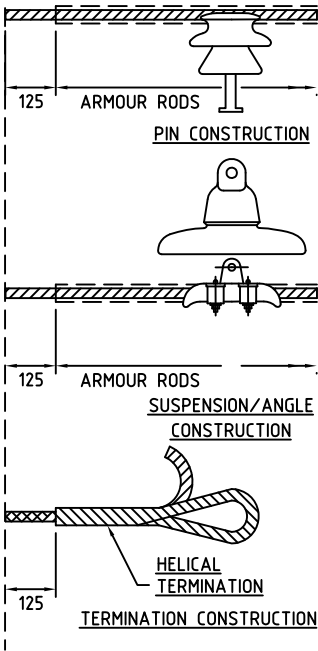


- (FOR 4 SVD's PER SPAN, SUBSET 2 EACH END)
- (FOR 6 SVD's PER SPAN, SUBSET 2 AND 1 SINGLE EACH END)
- (FOR 8 SVD's PER SPAN, SUBSET 2 x 2 EACH END)

- (1) For spans which require 2 SVD's per span, it is acceptable to install a single SVD at both ends, or one subset of 2 at one end.
- (2) For spans which require 6 or more SVD's and installation of the second set of SVD's is difficult (due to access), it is acceptable to install 4 SVD's per span.

SPIRAL VIBRATION DAMPERS (SVD'S)

SPACING OF CONDUCTOR CONSTRUCTIONS TO SVD's




CONDUCTOR & STAYWIRE CONFIGURATION

| CONDUCTOR TYPE | A A C (ALL ALUMINIUM CONDUCTOR) | | | | A C S R (ALUMINIUM CONDUCTOR STEEL REINFORCED) | | | | G Z (GALVANISED STEEL) | | | A B C (AERIAL BUNDLED CABLE) | | | CCT COVERED CONDUCTOR THICK | |
|-------------------------|------------------------------------|--------|--------|---------|--|----------|----------|---------------|---------------------------|---------|---------|---------------------------------|--|-------------------------|-----------------------------------|----------------------------|
| CONDUCTOR CONFIGURATION | | | | | | | | | | | | NEUTRAL FULLY RIBBED | | 19/2.00 CATENARY | | |
| CODE NAME | LIBRA | MARS | MOON | PLUTO | RAISIN | APPLE | BANANA | CHERRY | - | - | - | LVABC (LOW VOLTAGE) | | HVABC (HIGH VOLTAGE) | | CCT |
| STRANDING | 7/3.00 | 7/3.75 | 7/4.75 | 19/3.75 | 3/4/2.5 | 6/1/3.00 | 6/1/3.75 | 6/4.75+7/1.60 | 7/2.75 | 19/2.00 | 19/2.75 | COMPACTED | | COMPACTED | | 7/4.75AAC(1350) |
| OVERALL DIA. (mm) | 9 | 11.25 | 14.25 | 18.75 | 7.5 | 9 | 11.25 | 14.3 | 8.25 | 10 | 13.75 | 42 | | 55 | 61 | 22.15 |
| AREA (mm ²) | 49.5 | 77.3 | 124 | 209.9 | 34.4 | 49.5 | 77.3 | 120.4 | 41.6 | 59.7 | 112.9 | 95 | | 35 | 70 | 124 |
| STOCK CODE | 07325 | 07326 | 07327 | 07328 | 07311 | 07312 | 07313 | 07315 | 06496 | 06493 | 06494 | 11927 | | 12770 | 12780 | 20279 20714 See note |

LEGEND : ○ - ALUMINIUM STRAND ● - STEEL STRAND

NOTE
CCT 20279 is supplied on 100m drum
CCT 20714 is supplied on 600m drum

| | | | | | | | | | | | | | | |
|---|----------------|------------------------------------|--------------|---------------|--------------|--------------|---|---|------------------------------|----------------------------------|------------------|------|--|---------|
| A | ORIGINAL ISSUE | | DATE 27-7-09 | APPD R.ENGUSH | CKD J.TUNNEY | DRN J.TUNNEY | CCT DETAILS UPDATED NEW TITLE BLOCK. | <div> ©COPYRIGHT 2009 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL | | APP'D P.Rainbird | S&SD | | AUTOCAD |
| | F | CONSTRUCTION PRACTICE | | | | | | | DATE 31-05-96 | 4920-A4 | | F | | |
| | | CONDUCTOR & STAYWIRE CONFIGURATION | | | | | | | REC'D J.Tunney | SECT 8 | PAGE 31 | | | |
| | | | | | | | | | CKD | SHEET 1 OF 1 | | | | |
| | | | | | | | | | DWN M.Welsh | FILE:DWG_OH\4920A4\58\CP8-31.DWG | | | | |

JOINTING

1.0 CONDUCTOR PREPARATION

1.1 Scratch brush conductor surface.



| SCRATCH BRUSH | | | |
|---------------|---------|-----------|---------|
| CONDUCTOR | | ALUMINIUM | COPPER |
| STOCKCODE | | 1811169 | 1811177 |
| COLOUR | MACLEAN | WHITE | BLACK |
| | TYCO | BLUE | ORANGE |
| | PLP | WHITE | BLACK |

1.2 Apply correct grease.

- Shell Alvania R3 (2.5kg Tin SC14834)
- Karl Pfisterer P1 (100ml Tube SC14835)
- Dulmison Alvan R3(225g Tube SC16256)

1.3 When preparing 11kV Covered Conductor (CCT) for jointing ensure all insulation and water blocking material is removed.

1.4 Apply Fitting. i.e. Connector, Compression Sleeve, Helical Splice, Lug or 'C'-clamp.

2.0 COMPRESSION FITTINGS - PAGE 8-35

2.1 Prepare conductor ends. (See Note 1)

2.2 Ensure conductor & compression die being used match details listed on fitting.

2.3 Compress fitting working from centre barrier outwards.(Overlap compressions)

2.4 Compression die halves must close completely.

2.5 Cease compressions 5mm from end of fitting.

2.6 Remove all sharp edges & burrs from completed joint.

2.7 When jointing 11kV Covered Conductor (CCT) the completed joint must be covered using Scotch 2228 Tape (SC18156) and cold shrink tubing (SC18157).

2.8 Compression sleeves are to be used on 11kV and 33kV feeders- except where compression sleeves are unable to be used due to operational and/or physical constraints. In these instances, such as the need to frequently break bridges or connect different types and sizes of conductor, parallel groove clamps may be used.

3.0 HELICAL SPLICES - PAGE 8-35

3.1 Prepare conductor ends. (See Note 1)

3.2 Ensure conductor & helical splice being used match details listed on fitting.

3.3 Tape conductor ends with one layer of vinyl tape.

3.4 Place one conductor end at the centre mark of one of the subsets. (If each subset does not have the same quantity of rods, start with one containing the greatest number of rods). Hold securely & apply by wrapping the subset around the conductor completely.

3.5 Position other taped conductor end so that both ends are 1mm apart & wrap on subset completely.

3.6 Align second subset mark with the first & wrap subset on one or two pitch lengths on each side of mark.

3.7 Apply remaining subset(s) as described in 3.6, then wrap subsets simultaneously to within one or two pitch lengths of completion.

3.8 Complete fitting by wrapping each leg of subsets on completely.

4.0 BOLTED CONNECTORS - PAGE 8-33

4.1 Prepare conductor ends. (See Note 1)

4.2 Ensure connector type & range suits conductors to be jointed.

4.3 Orientate connector correctly & apply to, conductors. (Bi-metal conductors, Ensure Cu conductor is below Al. conductor).

4.4 Using a torque wrench tighten bolts evenly to value stamped on connector.

4.5 When preparing 11kV Covered Conductor (CCT) for connection ensure all insulation and water blocking material is removed.

4.6 When using 3 bolt clamps SC 22547 and 22548, only one clamp per active phase is required (not applicable for neutral connections).

4.7 Transformer LV neutrals must be double clamped

4.8 LV neutrals in coastal areas must be double clamped

5.0 INSULATION PIERCING CONNECTORS (IPC) - PAGE 8-34


5.1 For use with Low Voltage Aerial Bundled cables ONLY.

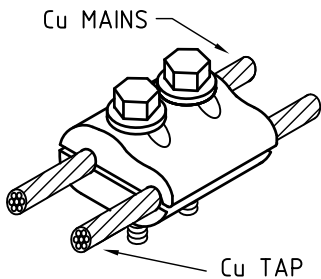
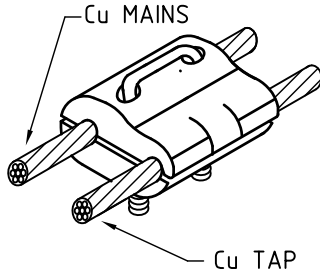
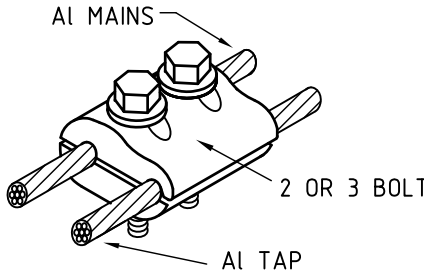
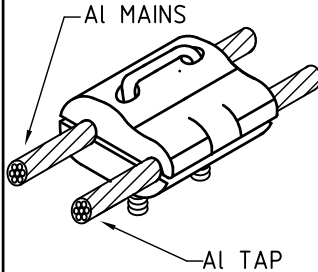
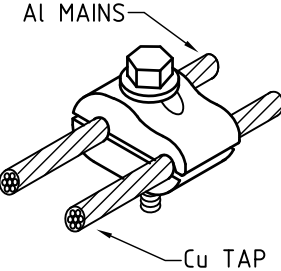
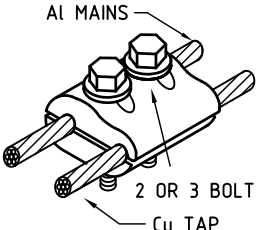
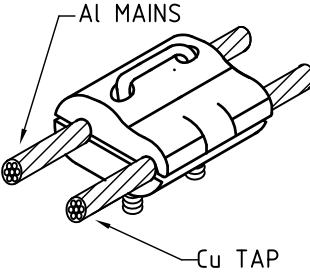
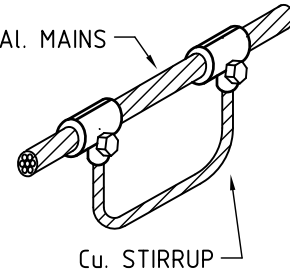
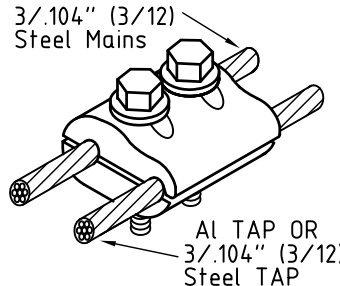
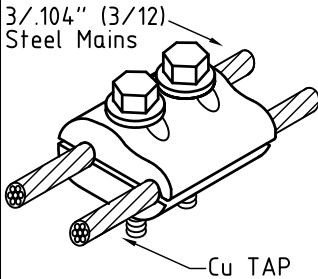

5.2 Ensure connector type & range suits conductors to be jointed.

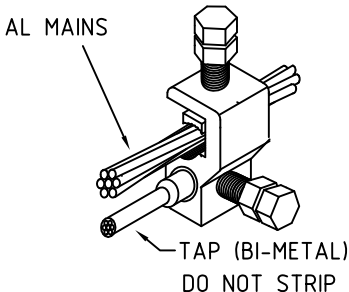
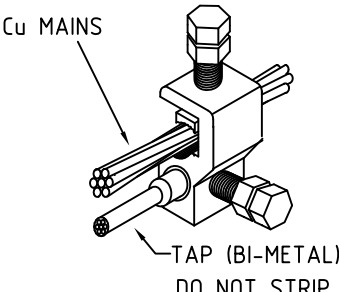
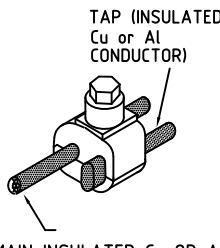
5.3 Select required core & position IPC teeth centrally over core.

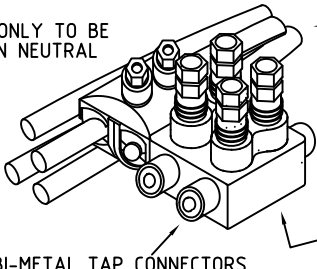
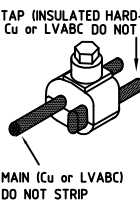
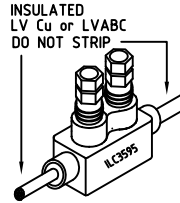
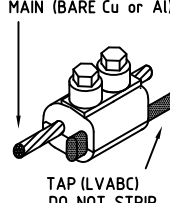
5.4 Tighten bolts evenly until bolt heads shear.

5.5 LV neutrals in coastal areas must be double clamped

| ORIGINAL ISSUE | DATE | F.ZAINI | P.PREF | P.PREF | NOTE 11 UPDATED TO INCLUDE NEW SCRATCH BRUSHES |  ©COPYRIGHT 2019ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX | OVERHEAD CONSTRUCTION MANUAL | | APP'D | P.Rainbird | TECH STDS | | AUTOCAD |
|----------------|------|---------|--------|--------|--|---|------------------------------|--|-------|------------|--------------|------|---------|
| | | | | | | | | | DATE | 31-05-96 | 4920-A4 | | K |
| A | K | APPD | CKD | DRN | | | CONSTRUCTION PRACTICE | | REC'D | J.Tunney | SECT | PAGE | |
| | | | | | | | | | CKD | | 8 | 32 | |
| | | | | | | | JOINTING | | DWN | M.Welsh | SHEET 1 OF 1 | | |
| | | | | | | | | | | | FILE: | | |


| | | | | | | | | | | | | | |
|--|-----------------|--|--|---|---|---|---|----------|---|------------|--------------|------|---------|
| BARE CONDUCTOR CONNECTORS | | | Cu - Cu | | | | Al - Al | | | | | | |
| | | |  | |  | |  | |  | | | | |
| STOCK CODE | | | 06122 | 15075 | 15567 | 15918 | 05890 | 05891 | 05893 | 22547 | 05909 | | |
| PG CLAMP TYPE | | | 2 BOLT | 2 BOLT | 2 BOLT | U BOLT | 2 BOLT | 2 BOLT | 2 BOLT | 3 BOLT | U BOLT | | |
| MAIN | SIZE | mm ² | 25-70 | 16-95 | 16-150 | 95-240 | 16-70 | 16-120 | 25-150 | 35-300 | 95-240 | | |
| | RANGE | mmϕ | 2.75-10.5 | 5.1-12.5 | 5.1-15.7 | 12.5-21.0 | 5.1-10.5 | 5.1-14.0 | 6.3-15.7 | 7.5-22.8 | 12.5-21.0 | | |
| TAP | SIZE | mm ² | 6-70 | 16-95 | 16-150 | 95-240 | 16-70 | 16-120 | 25-150 | 35-300 | 95-240 | | |
| | RANGE | mmϕ | 2.75-10.5 | 3.55-12.5 | 5.1-15.7 | 12.5-21.0 | 5.1-10.5 | 5.1-14.0 | 6.3-15.7 | 7.5-22.8 | 12.5-21.0 | | |
| INSTALL. TORQUE Nm | | | Install to torque stamped on connector | | | | For bimetal connections, install with copper beneath aluminium or galv steel | | | | | | |
| Al - Cu | | | | | | TEE Connector | Galv.Steel - Steel/Al | | Galv.Steel - Cu | | | | |
|  | |  | |  | |  |  | |  | | | | |
| STOCK CODE | | | 14693 | 15568 | 22548 | 15569 | 05898 | 05890 | 23302 | | | | |
| PG CLAMP TYPE | | | 1 BOLT | 2 BOLT | 3 BOLT | U BOLT | | 2 BOLT | 2 BOLT | | | | |
| MAIN | SIZE | mm ² | 35-120 | 25-150 | 50-300 | 95-240 | 30-210 | 16-70 | 16-70 | | | | |
| | RANGE | mmϕ | 7.5-14 | 6.3-15.7 | 9-22.8 | 12.5-21.9 | 7-19 | 5.1-10.5 | 5.1-10.5 | | | | |
| TAP | SIZE | mm ² | 10-50 | 10-95 | 35-240 | 70-185 | - | 16-70 | 6-50 | | | | |
| | RANGE | mmϕ | 3.55-9 | 3.55-12.5 | 7.7-19.5 | 10.5-17.6 | - | 5.1-10.5 | 3-9 | | | | |
| INSTALL.TORQUE(Nm) | | | Install to torque stamped on connector | | | | For bimetal connections, install with copper beneath aluminium or galv steel | | | | | | |
| A | ORIGINAL ISSUE |  ©COPYRIGHT 2014 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX | | | | OVERHEAD CONSTRUCTION MANUAL CONSTRUCTION PRACTICE JOINTING PARALLEL GROOVE CLAMPS AND BOLTED CONNECTORS | | | APP'D | P.Pearl | TECH STDS | | AUTOCAD |
| | DATE 28/08/2014 | | | | | | | | DATE | 10-11-93 | 4920-A4 | | I |
| | APPD F. ZAINI | | | | | | | | REC'D | | SECT | PAGE | |
| | CKD P. RELF | | | | | | | | CKD | D.McKenzie | 8 | 33 | |
| | DRN P. JUDGE | | | | | | | | DWN | M.Welsh | SHEET 1 OF 1 | | FILE: |
| Amended Stockcode for Steel to CU 23302 | | | | | | | | | | | | | |

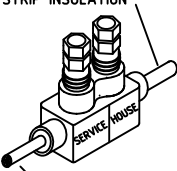
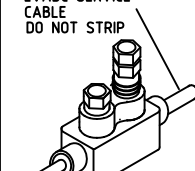
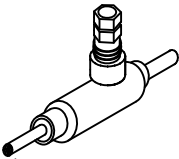
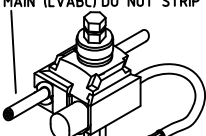
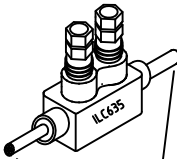
| BARE AND INSULATED CONDUCTOR CONNECTORS | | | SERVICE MAINS CONNECTORS TO BARE MAINS | | ABC-SL MAINS |
|---|-------|-----------------|--|---|---|
| | | |  |  |  |
| Stock Code | | | 16567 | 16568 | 19926 |
| MAIN | SIZE | mm ² | 16.8-210 | 5.5-135 | 16-95 |
| | RANGE | mm ϕ | 5-19 | 3-14 | |
| TAP | SIZE | mm ² | 6-35 | 6-35 | 1.5-6 |
| | RANGE | mm ϕ | 4-10.3 | 4-10.3 | |
| INSTALL. TORQUE | | | Nm | | |
| | | | Install to torque marked on connector | | |

| | | | | | | | | | | | | | | | | | | |
|------------|-------|-----------------|---|----------------------|-------|-------|---|-------|--|-----------------|--|-------|-----------------|---------------------|-------------------|---------|-------|-------|
| | | | LVABC | | | | | | | | | | | | | | | |
| | | | <div><div>NOTE BLACK ONLY TO BE USED ON NEUTRAL</div><div></div></div> | | | | <div><div>TAP (INSULATED HARD-DRAWN Cu or LVABC DO NOT STRIP</div><div></div><div>MAIN (Cu or LVABC) DO NOT STRIP</div></div> | | <div><div>INSULATED LV Cu or LVABC DO NOT STRIP</div><div></div><div>MAIN (BARE Cu or Al)</div></div> | | <div><div>TAP (LVABC) DO NOT STRIP</div><div></div></div> | | | | | | | |
| Stock Code | | | | 17000 | 21310 | 21311 | 21312 | 10603 | 10604 | 20148 | 14090 | 14253 | | | | | | |
| MAIN | SIZE | mm ² | 35-95 | COLOURED PLATES ONLY | | | 23392 | 23393 | 23394 | mm ² | 25-95 | 25-95 | 35 - 95 | 50-150 (BARE Al) | 7-95 (BARE Cu) | | | |
| | RANGE | mmϕ | - | | | | | | | | | | | | | | | |
| TAP | SIZE | mm ² | 4 x 6-35 | | | | | | | | | | mm ² | 6-35 | 25-95 | 35 - 95 | 35-95 | 35-95 |
| | RANGE | mmϕ | 4 x 4-10.3 | | | | | | | | | | | | | | | |
| TORQUE | | Nm | Install to torque marked on connector | | | | | | | | | | | | | | | |

NOTE:- These drawings are pictorial representations of the clamps only.


When installing, keep bare copper beneath bare aluminium.

| | | | | | | | | | | | | | | | |
|---|----------------|----------------|---------------|---------|---------|------------------------------|--|---|---------------------------------|------|----------|-----------|-----------|---|---------|
| A | ORIGINAL ISSUE | | APPD F. ZAINI | P. RELF | P. RELF | Split page 34 over two pages | |  © COPYRIGHT 2018 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX | OVERHEAD CONSTRUCTION MANUAL | | APP'D | Pat Pearl | TECH STDS | | AUTOCAD |
| | Q | DATE | | | | | | | 28/05/2018 | DATE | 10-02-95 | 4920-A4 | | Q | |
| | | REC'D | | | | | | | SECT | | PAGE | | | | |
| | | CKD Ron Walker | | | | | | | 8 | | 34 | | | | |
| | | DWN M. Welsh | | | | | | | SHEET 1 OF 1 | | FILE: | | | | |
| | | | | | | | | | CONSTRUCTION PRACTICE | | | | | | |
| | | | | | | | | | INSULATION PIERCING CONNECTORS | | | | | | |
| | | | | | | | | | Overhead Mains to Service Mains | | | | | | |

| | | | SERVICE MAINS TO CONSUMER'S MAINS | | | | | | | |
|---|-----|------------------|---|--|---|---|---------------|--|--------|--------|
| <div>INSULATED CONDUCTOR CONNECTORS</div> | | | <div>HSC 435</div> <div>CONSUMER'S MAINS STRIP INSULATION</div> <div>LVABC SERVICE CABLE DO NOT STRIP</div>  | <div>LVABC SERVICE CABLE DO NOT STRIP</div> <div>10mm² CU tail</div>  | <div>16mm² CU tail</div> <div>Water Blocked Connector</div>  | <div>MAIN (LVABC) DO NOT STRIP</div> <div>EARTH TAIL</div>  | | <div>ILC 635</div> <div>FOR 6-35mm² ONLY</div> <div>Refer Note 1</div> <div>LVABC SERVICE CABLE DO NOT STRIP</div>  | | |
| | | | Stock Code | 16569 | 17247 | 23731 | 16570 | | 23730 | |
| | | | MAIN | SIZE | mm² | 6-35 (Service) | 6-35 | 1.5-25 | 6-35 | 6-35 |
| | | | | RANGE | mmØ | 4-10.3 (Service) | 4-10.3 | 2.7-10.3 | 4-10.3 | 4-10.3 |
| | | | TAP | SIZE | mm² | 4-35 (House) | 10 mm CU Tail | 16 mm CU Tail | 4-35 | 6-35 |
| RANGE | mmØ | 3.5-10.3 (House) | | Fitted (200mm) | Fitted (150mm) | 3.5-10.3 | 4-10.3 | | | |
| TORQUE | | Nm | Install to torque marked on connector | | | | | | | |

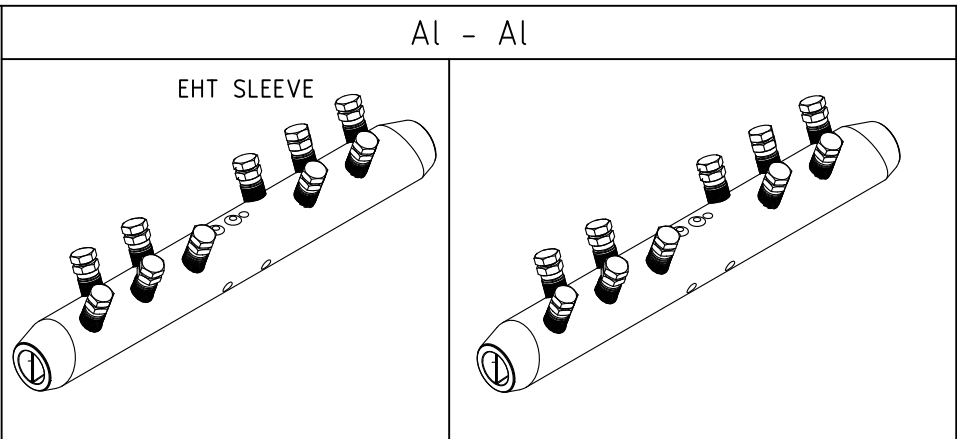
Note 1:- To be used only if consumers mains insulation is very difficult to strip (e.g. Property Pole Connections to hard drawn XLPE Consumers Mains)

Note 2:- These drawings are pictorial representations of the clamps only. When installing, keep bare copper beneath bare aluminium.

| | | | | | | | | | | | | | | | | | |
|---|----------------|------|------|---------|-----|--------|-----|--------|---|--|------------------------------|-------|--------------|--------------|-----------|---|---------|
| A | ORIGINAL ISSUE | | APPD | F.ZAINI | CKD | P.RELF | DRN | P.RELF | Moved original drawing to page 37 Split page 34 over two pages. Added new Note | <div> © COPYRIGHT 2018 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL | | APP'D | P.RAINBIRD | TECH STDS | | AUTOCAD |
| | P | DATE | | | | | | | | | 08/06/2018 | DATE | 7/6/96 | 4920-A4 | | P | |
| | | | | | | | | | | | | REC'D | J.TUNNEY | SECT | PAGE | | |
| | | | | | | | | | | | | CKD | M.WELSH | 8 | 35 | | |
| | | | | | | | | | | | | DWN | W.WILLIAMSON | SHEET 1 OF 1 | | | |
| | | | | | | | | | | | | | | | FILE: | | |


BARE CONDUCTOR CONNECTORS

| | | | | |
|------------|-----------------|-----------|-----------|--|
| STOCK CODE | 2466654 | 2466662 | 23974 | |
| CU | SC2466654 | SC2466662 | SC0023974 | |
| CLAMP TYPE | 5 BOLT | 6 BOLT | 5 BOLT | |
| SIZE | mm ² | | | |
| | 22-78 | 61-125 | 74-210 | |
| RANGE | mmØ | | | |
| | 6.0-11.3 | 10.0-14.5 | 11.0-18.8 | |



- NOTES
1. INSTALL AS PER MANUFACTURERS GUIDELINES
 2. SUITABLE FOR JOINING DISSIMILAR SIZED AAC, AAAC AND ACSR CONDUCTORS
 3. FOR JOINING SAME SIZED CONDUCTORS, USE COMPRESSION SLEEVES AS PER OHCM 8-35
 4. JOINTS TO BE SCRATCH BRUSHED PRIOR TO JOINING


- RESTRICTIONS
1. FOR SPANS TENSIONED TIGHTER THAN T660 - ONLY JOIN CONDUCTORS OF THE SAME TYPE (E.G. AAC TO AAC, AAAC TO AAAC, ACSR TO ACSR), AND CONDUCTORS OF EQUIVALENT SIZE. E.G: METRIC CONDUCTORS WITH THEIR IMPERIAL EQUIVALENT, SUCH AS:
 - 'FLY' (7/.134 AAC) TO 'MARS' (7/3.75 AAC) OR 'WASP' (7/.173 AAC) TO 'MOON' (7/4.75 AAC)
 2. WHEN USED IN SLACK SPAN SITUATIONS (T660 OR SLACKER), IT IS RECOMMENDED THAT THE CONDUCTORS TO BE JOINED SHOULD ALSO BE OF SIMILAR SIZE OR CURRENT CARRYING CAPACITY. WHERE CONDUCTORS OF DIFFERENT TYPES AND/OR LARGE SIZE DIFFERENCES ARE TO BE JOINED, DUE CONSIDERATION SHALL BE GIVEN TO BOTH THE MECHANICAL AND ELECTRICAL PROPERTIES OF BOTH CONDUCTORS BEFORE PROCEEDING WITH THE CONNECTION.
 3. EHT SLEEVES SUITABLE FOR SOME ACSR CONDUCTORS - REFER TO TSD0201 (NOTE 6).
 4. NOT SUITABLE FOR COPPER, STEEL ONLY (EG: 3/12 STEEL), OR COMPACTED ACSR CONDUCTORS.
 5. CONSULT WITH THE LOCAL DESIGN OFFICE OR WITH THE ENGINEERING STANDARDS DEPARTMENT IF THERE IS ANY UNCERTAINTY.
 6. FOR FURTHER DETAIL, REFER TO TECHNICAL INSTRUCTION TSD0201 - OH CONDUCTOR FULL TENSION SHEAR BOLT CONNECTORS.

| | | | | | | | | | | | | | |
|---|----------------|--------------|-----------------|---------------|----------------|--|--|---|------------------------------|-------------------|----------|---------|--|
| A | ORIGINAL ISSUE | | APPD F ZAINI | CKD P RELF | DRN F ZAINI | Removed SC23975 from range. Notes 3 & 4 updated. Note 6 added. | |  © COPYRIGHT 2019 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX | OVERHEAD CONSTRUCTION MANUAL | APP'D Rod Douglas | ENG STDS | AUTOCAD | |
| | D | DATE 13-9-19 | | | | | | | 4920-A4 | | D | | |
| | | | | | | | | | REC'D | SECT | PAGE | | |
| | | | | | | | | | CKD John Tunney | 8 | 36 | | |
| | | | | | | | | | DWN W.Williamson | SHEET 1 OF 1 | | | |
| | | | | | | | | | | | FILE: | | |

CONDUCTOR FITTINGS

SCRATCH BRUSH ALL CONDUCTING JOINT SURFACES AND IMMEDIATELY APPLY GREASE SEE CONDUCTOR PREPARATION DETAILS - PAGE 8-32

| CONDUCTOR TYPE | CONDUCTOR | TERMINAL LUG | BI-METAL LUG | CONNECTOR | COMPRESSION SLEEVE | | DEADEND | HELICAL SPLICE | NOTES |
|-------------------|--------------------------------------|--------------|--------------|-----------|--------------------|------------------------|---------|----------------|---|
| | | | | | NON-TENSION | FULL TENSION NOTE 1 | | | |
| Cu (METRIC) | 7/2.00 (22mm ²) | 14023 | | | | 15815 | 6435 | | <p>1. <u>FULL TENSION SLEEVES</u> FULL TENSION SLEEVES ARE FOR JOINING SAME SIZE CONDUCTORS ONLY. (EXCEPTION NOTE 5)</p> <p>2. CONDUCTOR AND COMPRESSION FITTING COMBINATIONS LISTED ON THIS PAGE ARE TYPICAL BUT MAY VARY DEPENDING UPON THE SUPPLIER. THIS LIST IS TO BE USED AS A GUIDE ONLY.</p> <p>3. <u>COMPRESSION FITTINGS</u> ALWAYS ENSURE THE CONDUCTOR AND FITTING COMBINATION INCLUDING THE DIE TO BE USED IS IN ACCORDANCE WITH THE MARKINGS ON EACH COMPRESSION FITTING.</p> <p>4. <u>HELICAL SPLICES</u> ONLY TO BE USED FOR A) "RAISIN" CONDUCTOR STRUNG AT T42 AND T65 (SC 8374) B) 3/12 STEEL (SC 6405)</p> <p>5. <u>19/.101 FULL TENSION SLEEVES</u> SC 15816 TO JOIN 19/.101 TO 19/.101 SC 17256 TO JOIN 19/.101 TO 19/.104 OR 19/2.75 SC 17257 TO JOIN 19/.104 OR 19/2.75 TO 19/.104 OR 19/2.75</p> |
| | 7/2.75" (42mm ²) | 06259 | | | | 17317 | 6436 | | |
| | 19/2.00 (60mm ²) | 06260 | | | | 15742 | 6437 | | |
| | 19/2.75 (113mm ²) | 06265 | | | | 15816 | 6438 | | |
| Cu (IMPERIAL) | 7/.064" 7/16 (16mm ²) | 15125 | | | | 17497 | 6434 | | |
| | 7/.080" 7/14 (25mm ²) | 10886 | | | | 15815 | 6435 | | |
| | 7/.104" 7/12 (40mm ²) | 06259 | | | | 17317 | 6436 | | |
| | 19/.064" 19/16 (40mm ²) | 06259 | | | | 17317 | 6436 | | |
| | 19/.083" 19/14 (70mm ²) | 06260 | | | | 15742 | 6437 | | |
| | 19/.101" 19/12 (100mm ²) | 06265 | | | | NOTE 5 | 25481 | | |
| AAC (METRIC) | 7/3.00 (LIBRA) | | 09943 | | | 11082 | 6011 | | |
| | 7/3.75 (MARS) | 05926 | 09944 | | | 08797 | 6012 | | |
| | 7/4.50 (MERCURY) | | | | | 23777 | 6016 | | |
| | 7/4.75 (MOON) | 12788 | 09945 | | 05990 | 05984 | 6013 | | |
| | 19/3.75 (PLUTO) | | 17631 | | 08669 | 05985 | 6014 | | |
| | 37/3.00 (SATURN) | | | | 05991 | 05986 | 6015 | | |
| AAC (IMPERIAL) | 7/.134" (FLY) | | | | | 23776 | 23184 | | |
| | 7/.173" (WASP) | | | | | 23777 | 6016 | | |
| ACSR | 6/1/3.00 (APPLE) | | 09943 | | | 11080 | 8372 | | |
| | 6/1/3.75 (BANANA) | 05926 | 09944 | | | 08277 | 6010 | | |
| | 6/4.75+7/1.60 (CHERRY) | 12788 | 09945 | | 05990 | 05987 | 8373 | | |
| | 3/4/2.50 (RAISIN) | 11086 | 14463 | | | | 6019 | 08374 | |
| | 30/7/3.00 (LEMON) | | | | 05991 | 05975 | 6015 | | |
| ABC | LVABC 25mm ² | | 16833 | | | | | | |
| | LVABC 35mm ² | | 14463 | | | | | | |
| | LVABC 95mm ² | 14677 | 15641 | 14090 | | 12782 | | | |
| | HVABC 35mm ² | | 14463 | | | | | | |
| | HVABC 70mm ² | | 17254 | | | | | | |
| | HVABC 120mm ² | | 09945 | | | | | | |
| CCT | CCT 120mm ² 7/4.75 | 12788 | 09945 | | 05990 | 05984 | | | |


| | | | | | | | | | | | |
|---|----------------|---|--|------------------------------|--|-------|------------|--------------|------|---------|--|
| A | ORIGINAL ISSUE | Information copied from page OCM 8-35 Added 19/064 and SC25481 deadend for 19/101 |  © COPYRIGHT 2018 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX | OVERHEAD CONSTRUCTION MANUAL | | APP'D | F. ZAINI | TECH STDS | | AUTOCAD | |
| | | | | CONSTRUCTION PRACTICE | | DATE | 11/06/2018 | 4920-A4 | | A | |
| | | | | | | REC'D | | SECT | PAGE | | |
| | | | | | | CKD | P. RELF | 8 | 37 | | |
| | | | | | | DWN | P. RELF | SHEET 1 OF 1 | | FILE: | |
| | | CONDUCTOR FITTINGS | | | | | | | | | |

CROSSARMS

| COMPOSITE FIBRE CROSSARMS | | |
|---------------------------|---------------------------|-------|
| SIZE | CONSTRUCTION | SC |
| 2600x100x100 | LVP,LVA,LVU,LVT,LVS | 19799 |
| 2700x100x100 | 11P,11ED03 | 19813 |
| 2100x100x100 | LVPM,LVUM,LVSM,LVTM | 19897 |
| 2100x100x100 | 11TM,11SM | 20053 |
| 3600x125x125 | Long Span,LVSL,LVTL | 21250 |
| 3000x100x100 | LVPTU,LVPTS, LVPTT | 21251 |
| 1500x100x100 | Buck Arm PT Stations | 21306 |
| 2700x125x125 | LVT2, LVS2 | 21976 |
| 2600x125x125 | 11SC2,11TC2 | 22277 |
| 2600x100x100 | 11SC, 11TC | 22310 |
| 2400x100x100 | 11ABC11,11ABC2 | 22792 |
| 1900x100x100 | 11ABC3,11ABC4 | 22818 |
| 2700x125x125 | 11SUC | 24090 |
| 2700x125x125 | 11SUAC,11SUABC,33PC,33TPC | 24091 |
| 3600x125x125 | 33POC | 24092 |
| 3600x125x125 | 33SUC | 24093 |
| 3600x125x125 | 33SUAC | 24094 |
| 3600x125x125 | 33SUABC | 24095 |

| WOOD CROSSARMS - Undrilled | | |
|----------------------------|--------------------|-------|
| SIZE | CONSTRUCTION | SC |
| 2700X100X150 | 100mm Face painted | 5869 |
| 3000x150x100 | 150mm Face Painted | 5870 |
| 2700X100X100 | 100mm Face Painted | 10891 |
| 3600X150X100 | 150mm Face Painted | 10894 |
| 3000X100X100 | 100mm Face Painted | 11067 |
| 2700X150X100 | 150mm Face Painted | 15839 |
| 3600X100X125 | End Plates fitted | 11381 |

| WOOD CROSSARMS - Drilled | | |
|--------------------------|--|-------|
| SIZE | CONSTRUCTION | SC |
| 2700x100x100 | 11P/M, 11ED0/M, 11CE, 11P0, 11ED0, DO/M--> 19813 CF Xarm | 2531 |
| 2700x150x100 | 11WB, 33WB, 11W, 11WA, 33W, 33WA (Lower Arm) | 2544 |
| 2700X150X100 | 11WB, 33WB, 11W, 11WA, 33W, 33WA (Upper Arm) | 2547 |
| 1500x100x100 | Type A OHEW Support | 10594 |
| 1500x100x100 | Type B OHEW Support | 10595 |
| 2700x150x100, | 11S/M, 11T/M, 11XS/M, 11T, 11S | 10609 |
| 2700x100x100 | 11RBS | 14276 |
| 2700x150x100 | 11SUA, 11SUAH | 14277 |
| 2700x150x100 | 11SU | 14278 |
| 2700x150x100 | 11A | 14279 |
| 2700x100x100 | LVA, LVP, LVU | 14295 |
| 2700x100x100 | LVCP, LVCA | 14296 |
| 2700x100x100 | LVT, LVS, LVT2, LVS2 | 14297 |
| 2700X150X100 | LVSUA | 14298 |
| 3000x150x100, | LVPTT, LVPTT2, LVPTS2 | 14299 |
| 2700X150X100 | 11W, 33W | 14317 |
| 3600X150X100 | 33SV | 14437 |
| 3600X150X100 | 33SVA | 14438 |
| 3600X150X100 | 33SVAH | 14439 |
| 3600X150X100 | 33PO | 14440 |
| 3000X100X100 | LVPTU | 14649 |
| 2700X150X100 | 33P, 33TP | 14681 |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|-----------------------|--|------|----------|------|---------|-----|--------|-----|--------|-------------------------|---|------------------------------|--|---------|--|--------------|--|-----------|--|---------|--|
| A | ORIGINAL ISSUE | | DATE | 18/09/18 | APPD | F.ZAINI | CKD | P.RELF | DRN | P.RELF | CORRECTED LVSL AND LVTL | <div><p>©COPYRIGHT 2018 ENERGEX</p><p>This drawing must not be reproduced in part or whole without written permission from ENERGEX</p></div> | OVERHEAD CONSTRUCTION MANUAL | | APP'D | | F.ZAINI | | TECH STDS | | AUTOCAD | |
| | DATE | | | | | | | | | | | | | | 7/11/13 | | 4920-A4 | | C | | | |
| | CONSTRUCTION PRACTICE | | | | | | | | | | | | REC'D | | P.RELF | | SECT | | PAGE | | | |
| | | | | | | | | | | | | | CKD | | A.ANAND | | 8 | | 52 | | | |
| | | | | | | | | | | | | | DWN | | P.RELF | | SHEET 1 OF 1 | | FILE: | | | |


STATUTORY REQUIREMENTS

| CATEGORY | | LOCATION DESCRIPTION | PRESCRIBED DISTANCE | L.V. CONDUCTOR | | | H.V. CONDUCTOR |
|--|--|---|---------------------|--|--------|---------|------------------------------|
| | | | | NEUTRAL SCREENED, INSULATED SERVICE LINE | LV ABC | LV BARE | EXCEEDING 1000V BUT NOT 33kV |
| MINIMUM CLEARANCE FROM GROUND | ROADS | At centre line of carriageway | Vertically | 5.5m | 5.5m | | 6.7m |
| | | At other positions | Vertically | - | 5.5m | | 5.5m |
| | | At kerb line (Bottom of kerb) | Vertically | 4.9m | - | | - |
| | | At fence alignment | Vertically | 3.7m | - | | - |
| | OTHER | Private driveways and elevated vehicle access | Vertically | 4.5m | 5.5m | | 5.5m |
| | | Areas not normally accessible to vehicles | Vertically | 2.7m | 4.5m | | 4.5m |
| | | Road cuttings, embankments and the like | Horizontally | 1.5m | 1.5m | | 2.1m |
| MINIMUM CLEARANCE FROM STRUCTURES, BUILDINGS & STAYWIRES | Unroofed terraces, balconies, sundecks, paved areas & similar areas that are subject to pedestrian traffic only, that have a surrounding hand rail or wall and on which a person is likely to stand. | Vertical Above | 2.4m | 2.7m | 3.7m | 4.6m | |
| | | Vertical Below | 1.2m | - | - | - | |
| | | Horizontally | 0.9m | 1.2m | 1.5m | 2.1m | |
| | Roofs or similar structures not used for traffic or resort but on which a person is likely to stand, and for parapets surrounding roofs or similar structures not used for traffic or resort but on which a person is likely to stand. | Vertically | 0.5m | 2.7m | 3.7m | 3.7m | |
| | | Horizontally | 0.2m | 0.9m | 1.5m | 2.1m | |
| | Covered places of traffic or resort, including for example, windows capable of being opened, roofed open verandahs and covered balconies. | In Any Direction | 1.2m | 1.2m | 1.5m | 2.1m | |
| | Blank walls / windows which cannot be opened | Horizontally | 0.2m | 0.6m | 1.5m | 1.5m | |
| | Other structures not normally accessible to persons | Vertically | - | 0.6m | 2.7m | 3.0m | |
| | | Horizontally | 1.2m | 0.3m | 1.5m | 1.5m | |
| | Stays (Stay Insulator must be installed below lowest power circuit) | In Any Direction | 0.1m | 0.1m | 0.3m | 0.5m | |
| RAILWAYS | Railway tracks (non-electrified areas) | Vertically | 7.6m | 7.6m | | 7.6m | |
| | Electrical traction wiring and supports (electrified areas) | - | U.G. | U.G. | | 3.0m | |
| | Telegraph, telephone, stays, signal lines, and electrical lines 1000V and below | Vertically | 0.6m | 0.6m | | 1.2m | |
| | Electrical lines over 1000V to 33kV excluding electrical traction wiring | Vertically | 1.2m | 1.2m | | 1.2m | |
| TELECOM | Mid-span separation to telecom | Refer Overhead Design Manual for Clearances | | | | | |
| | Stays | In Any Direction | 1.0m | 1.0m | | 2.0m | |

ALL INFORMATION from Electricity Regulations (QLD)

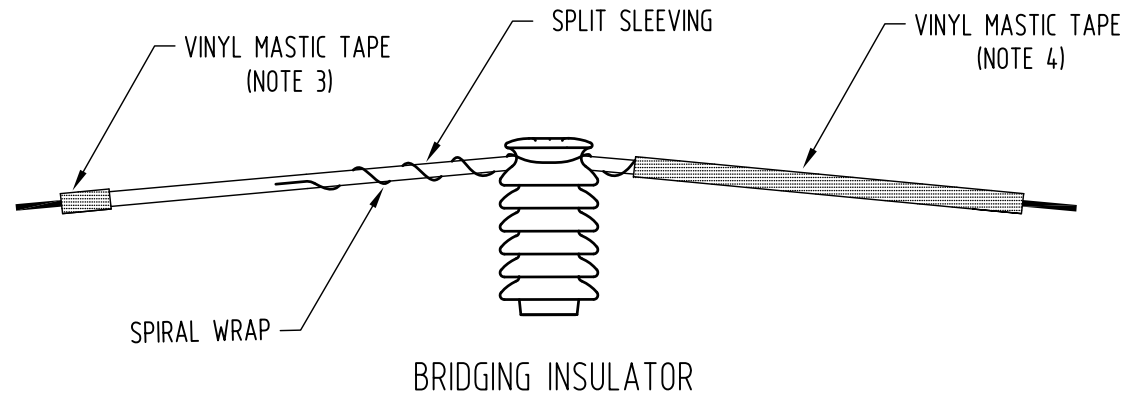
Agreement for Overhead & Underground Electric Lines crossing Railways in Queensland
Code of Practice for Overhead Power & Telecommunication In-span Crossings.

For Vegetation Clearing Profiles, refer to WCS 1.6 Vegetation Management Plan

| | | | | | | | | | | | | | | | | | | | |
|---|----------------|-------|------|----------|------|----------|-----|---------|-----|----------|--|---|------------------------------|------------------------|----------|-----------|--------|---------|--|
| A | ORIGINAL ISSUE | | DATE | 11/08/17 | APPD | F. Zaini | CKD | P. Relf | DRN | F. Zaini | Stay Clearances added. Vegetation Clearing Profile note added. | <div> ©COPYRIGHT 2017 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</div> | OVERHEAD CONSTRUCTION MANUAL | APP'D | P. PEARL | TECH STDS | | AUTOCAD | |
| | F | DATE | | | | | | | | | | | | 10/2/95 | 4920-A4 | | F | | |
| | | REC'D | | | | | | | | | | | | | SECT | | PAGE | | |
| | | CKD | | | | | | | | | | | | R. WALKER | 8 | | 91 | | |
| | | DWN | | | | | | | | | | | | M.W | SHEET | | 1 OF 1 | | |
| | | | | | | | | | | | | | | FILE: | | | | | |
| | | | | | | | | | | | | | | CONSTRUCTION PRACTICE | | | | | |
| | | | | | | | | | | | | | | STATUTORY REQUIREMENTS | | | | | |


MATERIAL LIST

| Stock Code | DESCRIPTION |
|------------|-----------------------------------|
| 17272 | 10mm ID Insulating Split Sleeving |
| 17273 | 19mm ID Insulating Split Sleeving |
| 17474 | Vinyl Mastic Tape |
| 17799 | Spiral Wrap Side Tie |
| 17803 | Spiral Wrap Top Tie |



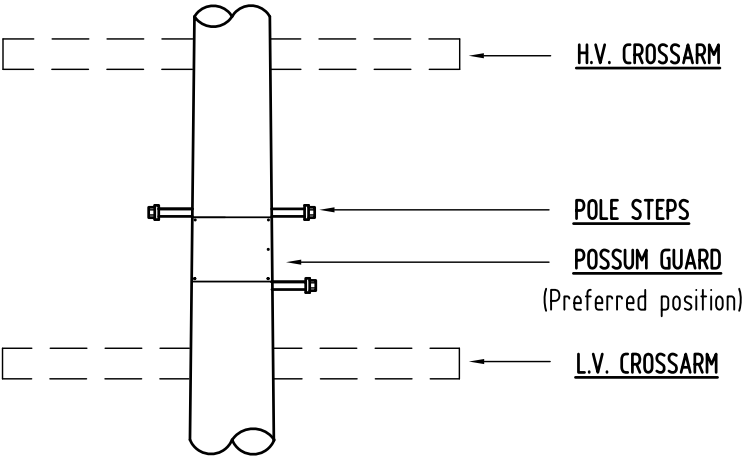
NOTE :

1. Where wildlife proofing is required it is to be applied in accordance with TSD0007B
2. Vinyl mastic tape is to be used at each end of the bridge
3. Vinyl mastic tape can be used along the full length of sleeving if required
4. Bridging clamps are to be applied at the beginning or the end of the bridge
5. Ensure tubing is continuous from the beginning to the end of the tube

| | | | | | | | | | | |
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| | | | <u>CONSTRUCTION PRACTICE</u> WILDLIFE PROOFING WILDLIFE PROOFING HV OPEN WIRE BRIDGING | | DATE | 22/06/11 | 4920-A4 | | A | |
| | | | | | REC'D | | SECT | PAGE | | |
| | | | | | CKD | J.Tunney | 8 | 92 | | |
| | | | | | DWN | P.Relf | SHEET 1 OF 1 | | | |
| | | | | | FILE: | | | | | |

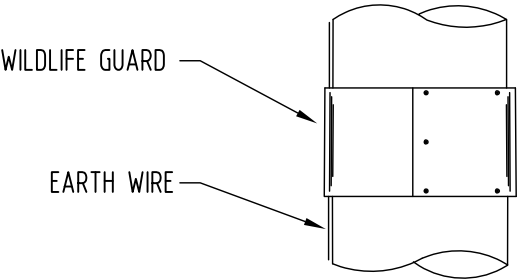
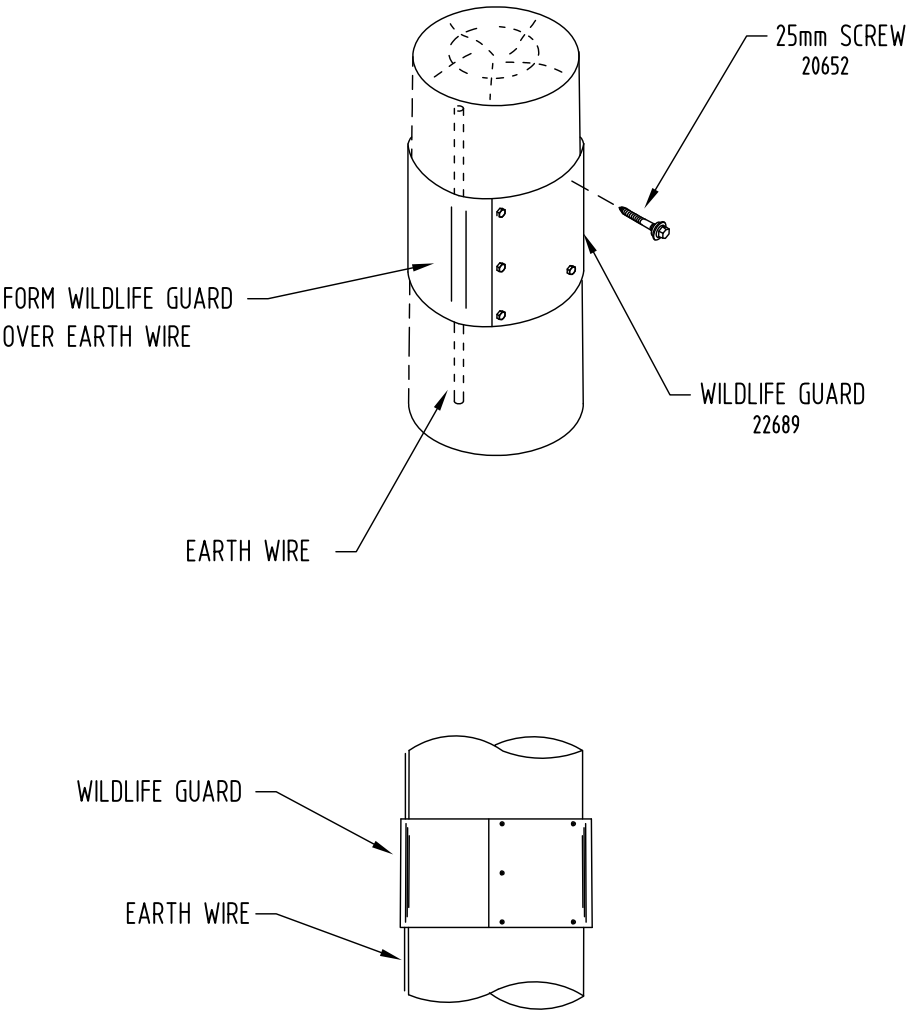
CU LIST -

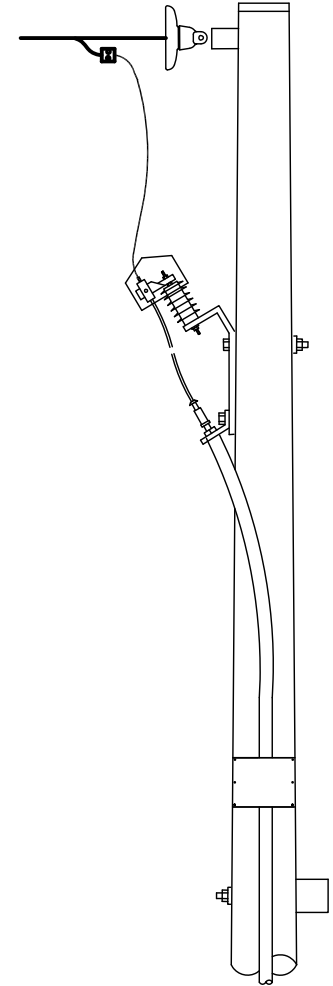
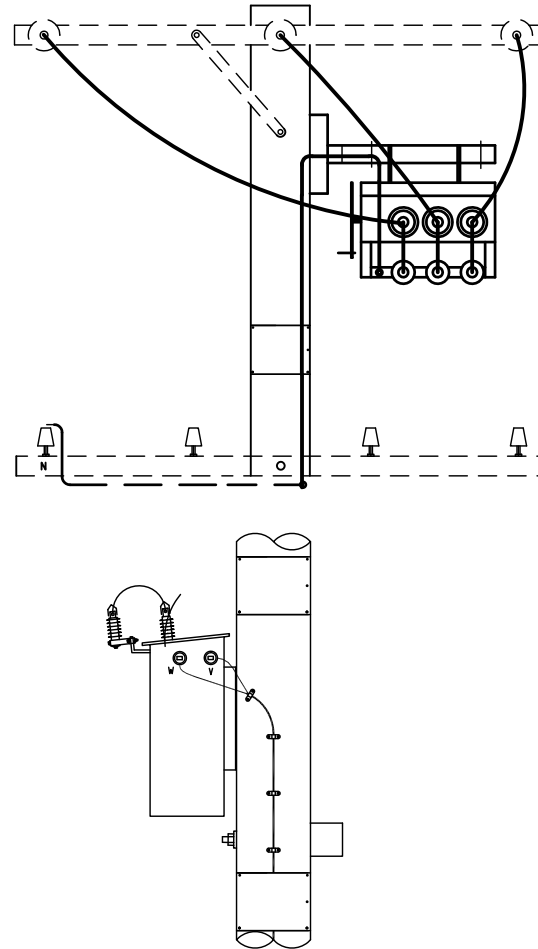
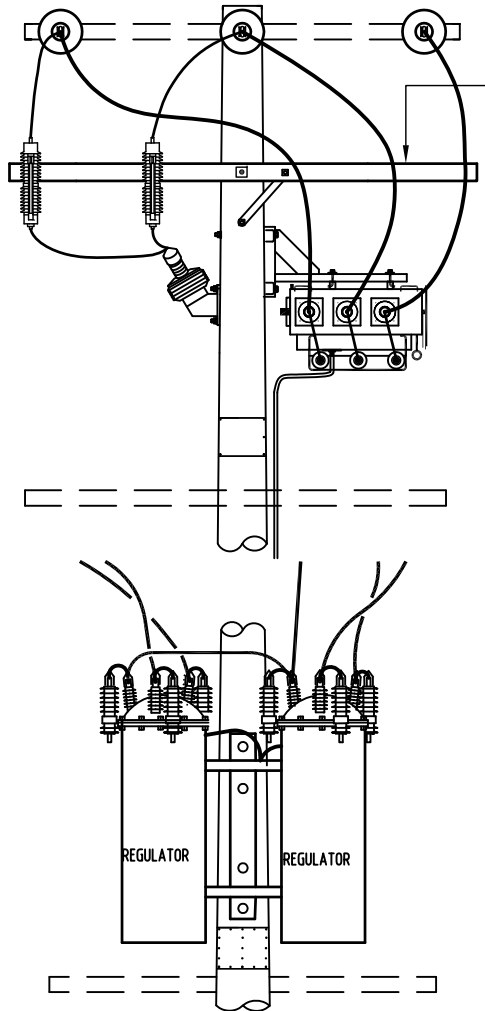
| STOCK CODE | DESCRIPTION | WLPPG |
|------------|----------------|-------|
| 20652 | 25mm SCREW | 7 |
| 22689 | WILDLIFE GUARD | 1 |



NOTE :


- 1. Screws are to be 20mm from edges
- 2. Hex Drive Socket for drill is SC 22279
- 3. Shiny side of the Pole Guard to be installed inward against the pole.

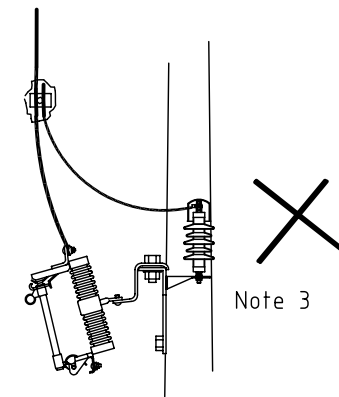
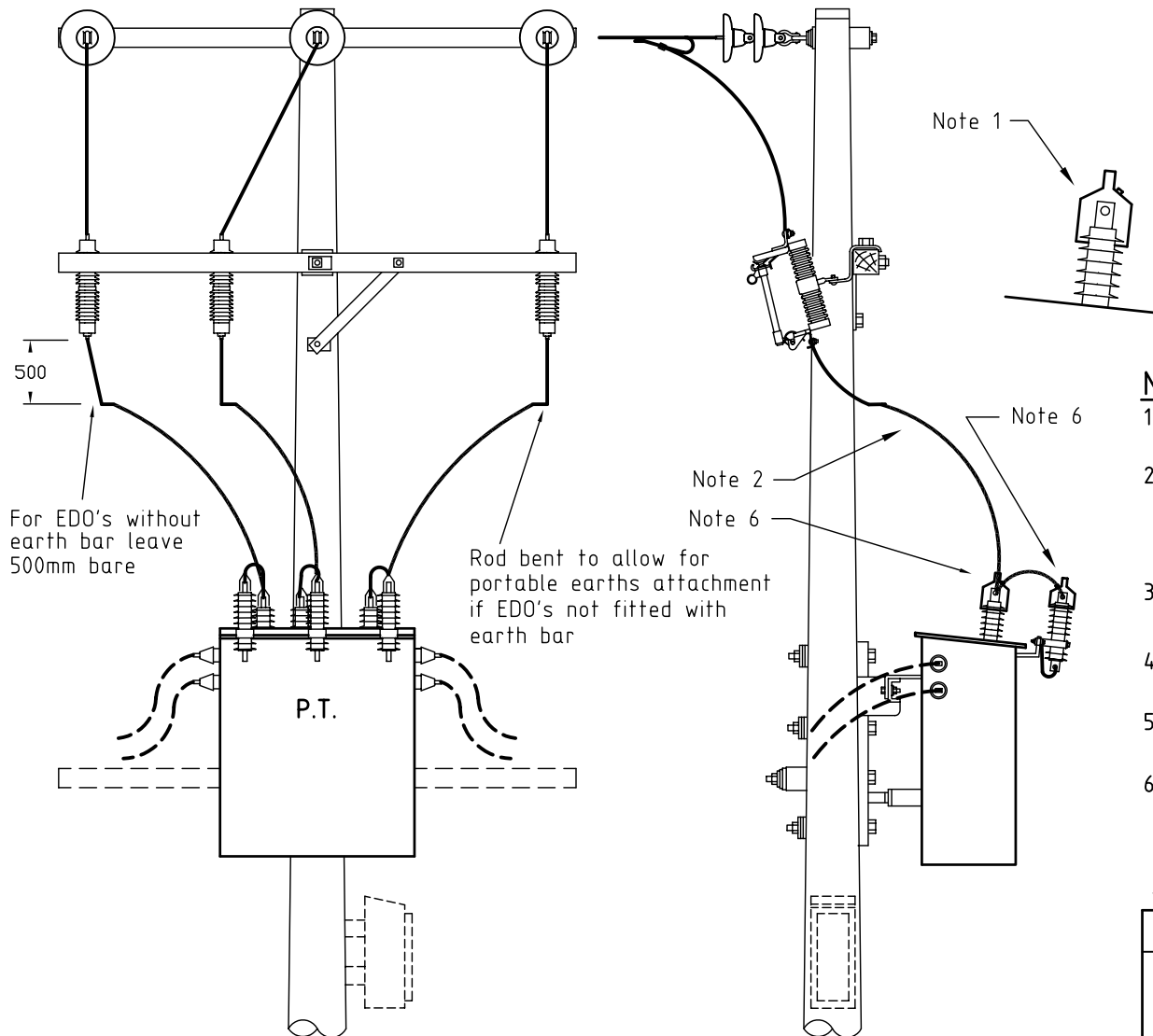




NOTE :

1. If LV is on pole, Wildlife Guard to be positioned above LV
2. 2 Wildlife Guards are to be used on transformer poles. 1 below the LV arm and 1 below the EDO arm

| | | | | | | | | | |
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| | | | | CONSTRUCTION PRACTICE | | DATE 13/03/12 | 4920-A4 | | A |
| | | | | WILDLIFE PROOFING | | REC'D | SECT | PAGE | |
| | | | | INDICATIVE POSITION OF WILDLIFE PROOFING | | CKD J.Tunney | 8 | 94 | |
| | | | | HV POLES | | DWN P.Relf | SHEET 1 OF 1 | | FILE: |




NOTES

- 1 Insulating Hood shall be fitted over the top shroud of the 11kV Transformer Bushing and Surge Arrester.
- 2 Use Insulating Split Sleeving over copper rods between EDO's and Transformer. (Stock Code 17272) Leave bare 500mm from the bottom of EDO's not fitted with earth bars otherwise insulate to EDO.
- 3 Remove surge arresters from xarms and relocate to transformer tank.
- 4 Replace steel xarms with composite or timber xarms.
- 5 11kV Surge Arrestors (20750) are supplied with insulated leads and caps.
- 6 Replace damaged caps on 11KV Transformer Bushings and Surge Arresters with new Insulating Hoods.

MATERIAL LIST

| Stock Code | DESCRIPTION |
|------------|-----------------------------------|
| 17270 | Insulating Hood (Wildlife Shroud) |
| 17272 | 10mm ID Insulating Split Sleeving |
| 17273 | 19mm ID Insulating Split Sleeving |
| 20750 | Surge Arrester with lead & hood |

| | | |
|---|----------------|-----------------|
| A | ORIGINAL ISSUE | |
| | DATE | 30-6-2010 |
| | APPD | RENGISH |
| | CKD | J.TUNNEY |
| | DRN | J.TUNNEY |
| | TITLE AMENDED | Note 4 updated. |


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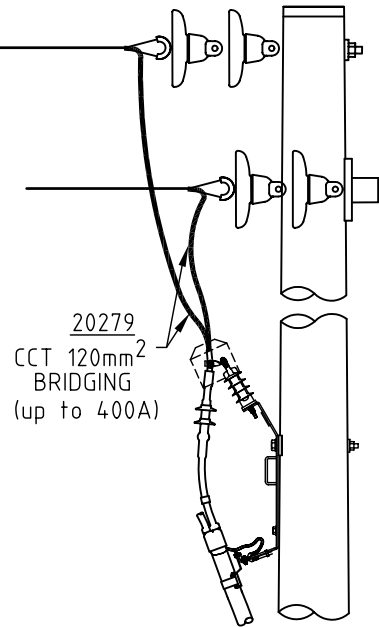
OVERHEAD CONSTRUCTION MANUAL

POLE MOUNTED PLANT

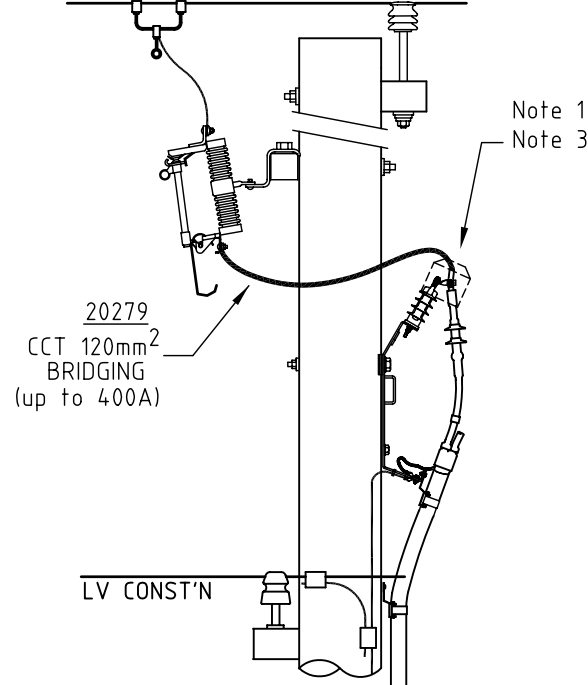
WILDLIFE PROOFING

EXISTING TRANSFORMER STATIONS

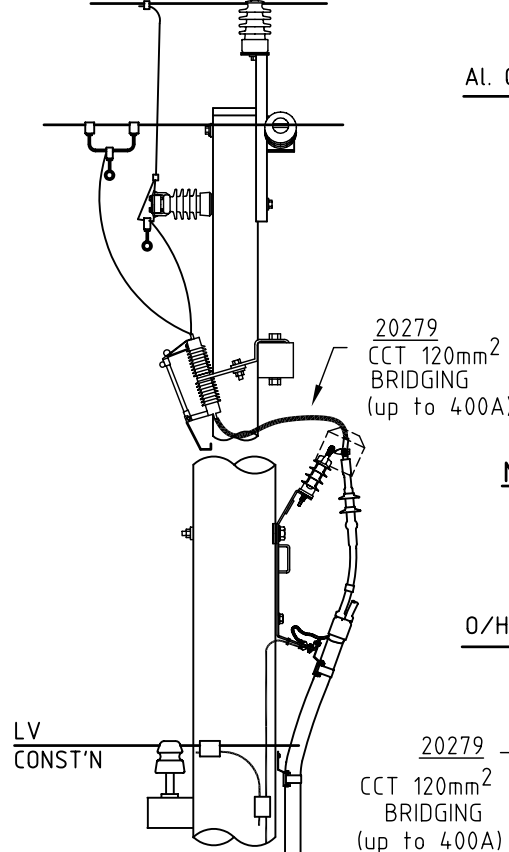
| | | | |
|-------|----------|-----------|---------|
| APP'D | P.PEARL | TECH STDS | AUTOCAD |
| DATE | 10/2/95 | 4920-A4 | D |
| REC'D | | SECT | PAGE |
| CKD | R.WALKER | 8 | 95 |
| DWN | M.W | SHEET | 1 OF 1 |
| | | FILE: | |



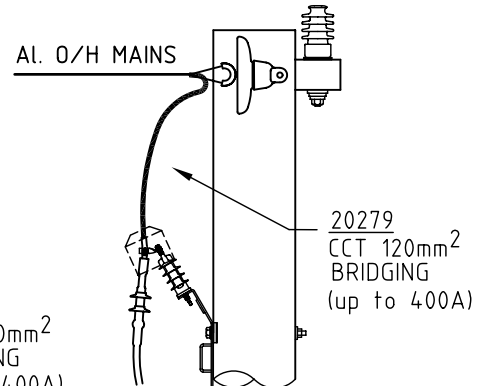
**HV TRIANGULAR
METHOD TO UNDERGROUND CABLE**



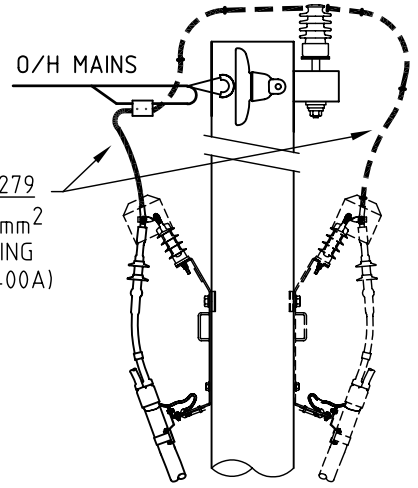
**WOOD POLE
EXPULSION DROP-OUT FUSES**



**WOOD POLE - HV TRIDENT
EXPULSION DROP-OUT FUSES**



**HV TERM/SHACKLE
METHOD TO UNDERGROUND CABLE**




**HV TERM/SHACKLE
ALTERNATIVE ARRANGEMENT**

NOTES

- 1 Insulating Hood shall be fitted over the top shroud of the Surge Arrester or 11kV UG Cable termination.
- 2 11kV Surge Arrestors are supplied with covered leads and caps.
- 3 Replace damaged caps on 11KV Transformer Bushings and Surge Arresters with new Insulating Hoods.

| | | | | | | | | | | | | | | | | |
|---|----------------|--|---|---------------|--|------|----------|--|-----|----------|--|-----|------------|--|------------------|--------------------|
| B | ORIGINAL ISSUE | | C | DATE 21.03.07 | | APPD | KNUTTALL | | CKD | J.TUNNEY | | DRN | G.JAYAWERA | | TEMPLATE CHANGED | CCT BRIDGING ADDED |
| | | | | | | | | | | | | | | | | |



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OVERHEAD CONSTRUCTION MANUAL

CONSTRUCTION PRACTICE

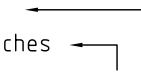
WILDLIFE PROOFING

WILDLIFE PROOFING

UG POLE TERMINATIONS


| | | | | |
|-------|------------|--------------|------|---------|
| APP'D | P.RAINBIRD | TECH STDS | | AUTOCAD |
| DATE | 15/12/97 | 4920-A4 | | C |
| REC'D | J.TUNNEY | SECT | PAGE | |
| CKD | J.TUNNEY | 8 | 96 | |
| | | SHEET 1 OF 1 | | |
| DWN | J.HILL | FILE: | | |

CLEARANCE TO BROADBAND EQUIPMENT

| ENERGEX Asset | Minimum Clearance (m) | ENERGEX Asset | Minimum Clearance (m) | ENERGEX Asset | Minimum Clearance (m) |
|------------------------|-----------------------|--|--|---|--------------------------------------|
| LV SERVICES & FITTINGS | | LOW VOLTAGE Uninsulated Mains Insulated Mains Bridging Insulated Uninsulated Exposed Terminals or Conductors UG Cable Tail & Guards Underslung Links LV Fuses & Switches <div style="text-align: center;">  <p>Keep adequate operational clearance</p> </div> | 0.45 0.30 0.30 0.45 0.45 0.05 1.05 0.50 | 33kV Bare Mains Cable Terminations (Bottom of Support Bracket) UG Cable Tail & Guards | 3.00 2.50 0.15 |
| STREETLIGHTS | | 11kV Bare Mains CCT HVABC Cable Terminations (Bottom of Support Bracket) UG Cable Tail & Guards | 1.50 1.50 0.50 0.90 0.05 | 110/132kV Bare Mains | 4.30 |

Ground Stays

1. Minimum clearance 0.1m
2. Staywire to be covered with a non-metallic UV stabilised protection from 0.6m above to 0.6m below the wire crossing location.

| | | | | | | | | | | | | | | | | | | | | |
|---|----------------|---|------|--------|------|---------|-----|----------|-----|----------|-------------------|--|--|------------------------------|--|-------|-----------|--------------|------|---------|
| A | ORIGINAL ISSUE | D | DATE | 1-7-09 | APPD | RENGISH | CKD | J.TUNNEY | DRN | T.BAKKER | CCT & HVABC added | |  energex ©COPYRIGHT 2009 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX | OVERHEAD CONSTRUCTION MANUAL | | APP'D | R.DOUGLAS | TECH STDS | | AUTOCAD |
| | | | | | | | | | | | | | | CONSTRUCTION PRACTICE | | DATE | 15/12/99 | 4920-A4 | | D |
| | | | | | | | | | | | | | | | | REC'D | J.TUNNEY | SECT | PAGE | |
| | | | | | | | | | | | | | | | | CKD | J.TUNNEY | 8 | 97 | |
| | | | | | | | | | | | | | | | | DWN | W.W | SHEET 1 OF 1 | | FILE: |

CLEARANCE TO BROADBAND (at pole)
STRAND & CABLE NETWORK

REQUIRED CLEARANCES FROM ADSS TO THE FOLLOWING ENERGEX ASSETS

| | ON POLE RADIAL MINIMUM (metres) |
|---|---------------------------------------|
| 132/110 kV INFRASTRUCTURE | 2.4 |
| 33 kV INFRASTRUCTURE see note 2 & 3 | 2.0 |
| 11 kV INFRASTRUCTURE (Bare and CCT) see note 2 & 3 | 1.5 |
| 11 kV SCREENED HVABC MAINS | 0.15 |
| LV INFRASTRUCTURE (including services and streetlights) | 0.15 |
| MECHANICAL INFRASTRUCTURE (stays, brackets, tanks, attachments) | 0.15 |

Notes

1. Installation is not to impair the operation of HV or LV switching apparatus including switches, links and fuses.
2. Infrastructure includes mains, bridges, connections etc. (any energised part)
3. Minimum clearances apply for new constructions. Where ADSS is retrofitted to existing networks;
 - It is not required to upgrade intercircuit clearances and constructions to new standards
 - 33kV and 11kV Infrastructure clearance may be reduced to 1.6m for 33kV and 1.2m for 11kV

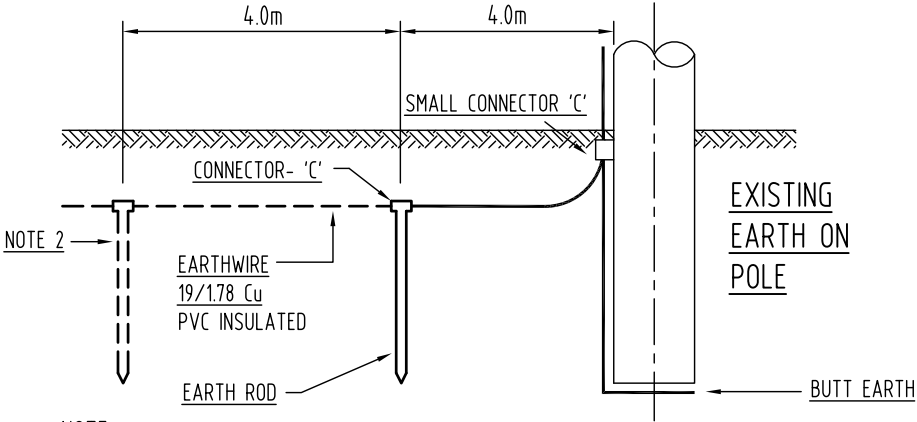
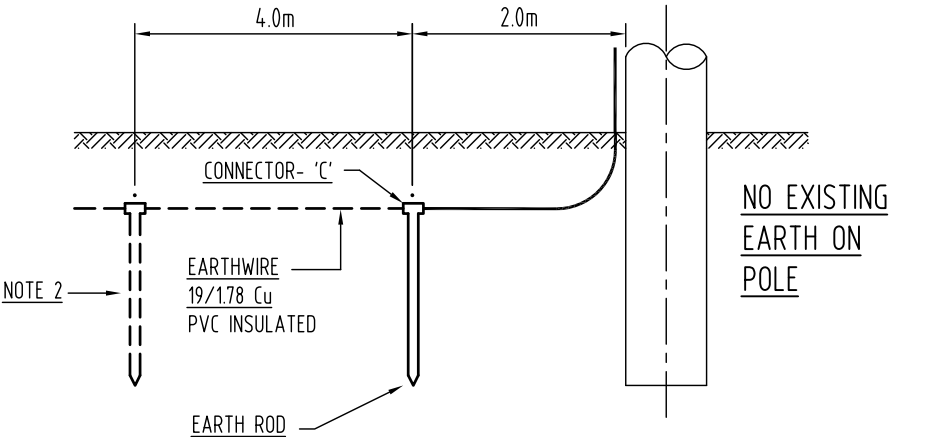
MID SPAN CLEARANCES FROM ADSS TO THE FOLLOWING ENERGEX MAINS

| | MINIMUM (metres) |
|-------------|---------------------|
| 33 kV MAINS | 0.5 |
| 11 kV MAINS | 0.5 |
| LV MAINS | 0.15 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----------------|--|---|----------------|--|---|--------------|--|---|-------------|--|---|--------------|--|---|------------------------|--|---|---------------------|--|---|--|--|---|---------|--|---|-------------------------|--|---|--|--|---|------------------------------|--|---|-----------------------|--|---|---|--|---|-----------------|--|-----------|--|---------|--|
| A | ORIGINAL ISSUE | | B | DATE 15/03/13 | | C | APP'D C. LEE | | D | CKD P. RELF | | E | DRN P. JUDGE | | F | CHANGE ADSS CLEARANCES | | G | DRAWING INFORMATION | | H | DRAWING Duplicated in Overhead Design Manual Section 4 pg 6980 | | I | energex | | J | ©COPYRIGHT 2009 ENERGEX | | K | This drawing must not be reproduced in part or whole without written permission from ENERGEX | | L | OVERHEAD CONSTRUCTION MANUAL | | M | CONSTRUCTION PRACTICE | | N | CLEARANCE TO ADSS FIBRE OPTIC CABLE NETWORK AT POLE | | O | APP'D R.ENGLISH | | TECH STDS | | AUTOCAD | |
| | DATE 17-07-2009 | | | REC'D J.TUNNEY | | | CKD J.TUNNEY | | | DWN T.B. | | | SECT 8 | | | PAGE 98 | | | SHEET 1 OF 1 | | | FILE: | | | 4920-A4 | | | B | | | | | | | | | | | | | | | | | | | | |

MATERIAL LIST - ADE

| STOCK CODE | DESCRIPTION | QTY |
|------------|---|-----|
| 06122 | CONNECTOR (Parallel Groove above guard) | AR |
| 06144 | COUPLING | AR |
| 22946 | EARTHROD | AR |
| 06339 | DRIVING POINT (NORMAL) or | AR |
| 06338 | DRIVING POINT (STAR) | AR |
| 07235 | EARTHWIRE 19/1.78 Cu | AR |
| 15658 | CONCRETE | AR |
| 12952 | CONNECTOR - 'C' | AR |
| 12953 | SMALL CONNECTOR - 'C' | AR |
| 14318 | MARKING TAPE | AR |




- NOTE :
- 1. Earthing to run in direction of mains.
 - 2. If soil resistivity decreases with depth - drive rods in deeper.
If soil resistivity increases with depth - additional earth rods to be installed at 4m intervals. (Refer to current version of SWP 34.)
 - 3. Earthwire insulation to be stripped only at connectors.

EARTHWIRE TRENCH SECTIONS

| UNCULTIVATED AREAS | CULTIVATED AREAS | SOLID ROCK |
|--------------------|------------------|------------|
| | | |

| | | | | | |
|----------------|------------|---------|---------|--------|----------------------|
| ORIGINAL ISSUE | DATE | APP'D | CKD | DRN | EARTH ROD UPDATED TO |
| A | 09/10/2012 | A.PEREZ | J.CHUNG | P.RELF | SC22946 |
| F | | | | | |



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OVERHEAD CONSTRUCTION MANUAL
CONSTRUCTION PRACTICE
ADE
ADDITIONAL EARTHING

| | | |
|--------------------|--------------|----------|
| APP'D C.WILLIAMSON | TECH STDS | AUTOCAD |
| DATE 31/8/89 | 4920-A4 | F |
| REC'D R.CAVILL | SECT 8 | PAGE 101 |
| CKD G.HUBNER | SHEET 1 OF 1 | |
| DWN PT | FILE: | |

NOTE : This drawing is repeated in OHDM Section 10


| REQUIREMENTS FOR BUSHFIRE AND COASTAL ZONES | | | | |
|--|--|------------------------------------|--|--------------------------|
| | <u>BUSHFIRE ZONES</u> Identified in Energise (note: zones updated annually) | Detailed information | <u>COASTAL ZONES</u> Defined as - Up to 3km from coastline | Detailed information |
| Vibration dampers | To be installed on all spans >300m | OHCM 8-26 OHDM 3-6964 | No special requirement | |
| Conductor Spreaders (retro-fit only) (Note: new work to have suitable phase clearances) | 33kV and 11kV flat constructions - 150m increments LV open wire flat constructions - 20m increments | OHCM 8-26 TSD0071b & TSD0012 | No special requirement | |
| Sparkless EDO's | Fault Tamers sparkless fuses on Pole Transformers up to 200kVA | OHCM 4-23 TSD0019e | No special requirement | |
| (Pole Transformers Only Not suitable for MDO Sites) | K Mate HRC fuses on pole transformers greater than 200kVA and above 8KA Fault Level | OHCM 4-32 | No special requirement | |
| LBS or ABS | LBS only to be used | | LBS only to be used | OHDM 10-13 OHCM 8-122 |
| Porcelain/Synthetic strain insulators | No special requirement | | Synthetic only to be used | OHDM 3-11 |
| Fog post insulators | No special requirement | | Exclusive use | OHDM 3-11 |
| Regulators | No special requirement | | Stainless steel tank type only Stock code 22351 | TSD0103b |
| Narrow trident construction | To be replaced with expanded trident in every case | TSD0071b | No special requirement | |
| Steel sleeved concrete filled butted pole | No special requirement | | Not to be used | StdsA32.8 |
| LV Cross Arms | 2.7m minimum arms | TSD0071b | No special requirement | |
| Double clamped neutral connections | No special requirements | | 2 PG clamps or 2 IPCs on ALL LV neutral connections | StdsA58.4 |

| | | | | | | | | | | | |
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| | C | DATE | | 29/12/14 | CONSTRUCTION PRACTICE | | DATE | 20/1/12 | 4920-A4 | | C |
| | APPD | F. ZAINI | | REQUIREMENTS FOR BUSHFIRE & COASTAL ZONES | | REC'D | | SECT | PAGE | | |
| | CKD | P. RELF | | | | 8 | 121 | | | | |
| | DRN | M. SHAW | | | | SHEET 1 OF 1 | | | | | |
| | ADDED DOUBLE CLAMPING REQUIREMENT IN COSTAL REGIONS | | | | | DWN | P. RELF | FILE: | | | |

Guidelines in the Selection of 11kV Air Break Switches Vs Manually Operated Load Break Switches

| Application | Switch |
|---|--------------------------|
| <p>1. On all open wire rural and low to medium customer density urban feeders where loads would not normally exceed 150 Amps.</p> <p><i>Excludes situations covered in 2, 3, & 4 below</i></p> | Air Break Switch |
| <p>2. Within Bushfire High Risk areas (as displayed in EnerGISE) or on all open wire high customer density urban / commercial / industrial feeders where loads may normally exceed 150 Amps.</p> | Load Break Switch |
| <p>3. On open wire feeders at all locations within 2 km of 33/11 kV substation</p> | Load Break Switch |
| <p>4. In all CCT feeders or within sections of CCT feeders including the beginning and end of sections as required</p> | Load Break Switch |
| <p>5. On open wire feeders within 3 km of the marine coast</p> | Load Break Switch |

NOTE: This drawing is repeated in OHDM 11-12

| | | | | | | | | | | |
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| | | | CONSTRUCTION PRACTICE | | DATE | 20/1/12 | 4920-A4 | | A | |
| | | | | | REC'D | | SECT | PAGE | | |
| | | | | | CKD | J, TUNNEY | 8 | 122 | | |
| | | | | | SHEET 1 OF 1 | | | | | |
| | | | | | DWN | P. RELF | FILE: | | | |
| 11kV ABS Vs Manually Operated LBS selection | | | | | | | | | | |