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**PM11xxxASD**

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**PM11xxxFBX**

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22kV PADMOUNTED SUBSTATION

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**UNDERGROUND DISTRIBUTION**

**PADMOUNTED SUBSTATIONS INDEX**

**FILE:  5  55 5097 4**
11kV PADMOUNTED SUBSTATION (INCLUDING LV SWITCHGEAR) CONSTRUCTION CODE

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

PM 11/500

PADMOUNT
PM = Front Entry Type
Padmounted Substation

VOLTAGE
11 = 11kV

CAPACITY (kVA)
100
315
500
750
1000

EXAMPLE:- PM11/500 = Padmounted Substation, 11kV, 500kVA
EXAMPLE: PM 11/500/ASL 2S1F = 11kV padmounted substation, 500 kVA Capacity, Schneider Electric FBX HV RMU with 2 switchable feeder units and 1 fuse protected tee-off unit.
11kV PADMOUNTED SUBSTATION FOUNDATION & SITE FINISH CONSTRUCTION CODE

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

PMF 11 U HL

Required only where foundation is not provided by others.

SERVICE PLATFORM
HL = High + Low Voltage
(Omit where not req’d)

PADMOUNT FOUNDATION
PMF = Front Entry Type
Padmounted Substation Foundation

VOLTAGE
11 = 11kV

FOUNDATION TYPE
U = Uniculvert
US = Uniculvert with Base Slab
BPU = Bored Pier Unreinforced < 2.0m deep
BPR = Bored Pier Reinforced > 2.0m deep
R = Raised Blockwork < 1.2m height

NOTES:-
1. Includes uniculvert or uniculvert & base slab plus allowance for other materials required & installation.
2. Includes an allowance only for materials required & installation.
3. No materials are included in construction.

EXAMPLE:- PMF11U = Padmounted Substation Foundation, 11kV, Uniculvert

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
CONSTRUCTION CODE GUIDE
FOUNDATION AND SITE FINISH
22kV PADMOUNTED SUBSTATION (INCLUDING LV SWITCHGEAR) CONSTRUCTION CODE

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

PMR 22/5/41

PADMOUNT
PMR = Rectangular Type Padmounted Substation

VOLTAGE
22 = 22kV

CAPACITY (kVA)
3 = 315
5 = 500
1k = 1000

ENCLOSURE LENGTH
41 = 4.1m

EXAMPLE:-
PMR 22/5/41 = Rectangular type padmounted substation, 22kV, 500 kVA, 4.1m long.
22kV PADMOUNTED SUBSTATION WITH LV SWITCHGEAR AND F&G HV RMU CONSTRUCTION CODE

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

**PMR 22/5/41 FGA 21**

- **PADMOUNT**
  - PMR = Rectangular Type Padmounted Substation
- **CAPACITY (kVA)**
  - 3 = 315
  - 5 = 500
  - 1k = 1000
- **TYPE**
  - FGA = F&G GA...-C
  - RM6 = Schneider Electric RM6
- **VOLTAGE**
  - 22 = 22kV
- **ENCLOSURE LENGTH**
  - 41 = 4.1m (ONLY)

**SWITCH ARRANGEMENT**

- 21 = 2 switchable feeder units + 1 fuse protected tee
- 31 = 3 switchable feeder units + 1 fuse protected tee
- 22 = 2 switchable feeder units + 2 fuse protected tees

**EXAMPLE:**

PMR 22/5/41 RM6 21 = Rectangular type padmounted substation, 22kV, 500kVA, 4.1m long, Schneider Electric RM6 RMU, with 2 switchable feeder units and 1 fuse protected tee-off unit
22kV PADMOUNTED SUBSTATION FOUNDATION & SITE FINISH CONSTRUCTION CODE

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

PMRF 22/41/8 HL

Required only where foundation is not provided by others.

PADMOUNT FOUNDATION
PMRF = Rectangular Type Padmounted Substation Foundation

VOLTAGE
22 = 22kV

ENCLOSURE LENGTH
41 = 4.1m

HEIGHT ABOVE GROUND
8 = 800mm Max.
14 = 1400mm Max.

SERVICE PLATFORM
H = High Voltage
L = Low Voltage
HL = High & Low Voltage
(Omit where not req’d)

NOTE:–
1. No materials are included in constructions

EXAMPLE:– PMRF22/41/8HL = Rectangular type padmounted substation foundation, 22kV, 4.1m enclosure, 800mm max. above ground, high & low voltage service platforms.
22kV / 11kV PADMOUNTED AUTO TRANSFORMER CONSTRUCTION CODE

PM 22-11/5k

VOLTAGE
22-11 = 22kV to 11kV

CAPACITY (kVA)
5k = 5000

PM = Padmounted Transformer

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

NOTE:–
1. No materials are included in constructions

22kV / 11kV PADMOUNTED AUTO TRANSFORMER FOUNDATION AND SITE FINISH CONSTRUCTION CODE

PMF 22-11/4

VOLTAGE
22-11 = 22kV to 11kV

HEIGHT ABOVE GROUND
4 = 400mm Max.

PMF = Padmounted Transformer Foundation

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

Footnotes:

22-11 = 22kV to 11kV
5k = 5000

Foundation

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Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 5553581

Dwg 5358 Sh 1
PADMOUNTED SUBSTATION INSTALLATION

1 SITE

1.1 General
The padmount substation site shall be to the satisfaction of
Ergon Energy and fulfil the requirements of the subsequent clauses
including:
- Be sensitive to the local environment
- Be secure from third party and environmental damage
- Be relatively flat and structurally sound
- Not be subject to tidal inundation, storm tide
  or flooding (1:100 year risk)
- Provide secure access for operational purposes
- Not be an obstruction or public nuisance

Along coastal areas the site must be located as far as possible
from the shoreline and sheltered from salt spray.

A site should not be located where impact by traffic is likely and,
if at a truncated section of the street alignment or other non-regular
shaped site the following shall apply:
- The front edge of the substation plinth shall be 200mm from
  and as near to parallel as possible to the R.P. Street Alignment.
- The specified rectangular size of the site shall not be reduced.

1.2 Site Size
The minimum area required to accommodate a front entry
Padmounted substation shall be:

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<th>SITE SIZE</th>
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<td>EARTHING ARRANGEMENT</td>
<td>(WIDTH x DEPTH)</td>
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<td>Common earth locations for flat site (≤ 1000 kVA)</td>
<td>3000 x 2800</td>
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<tr>
<td>Common earth locations community title 1500kVA for flat &amp; sloping sites with retaining walls. all locations</td>
<td>4800 x 5000</td>
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<td>Separate earth other than raised padmounted substations for flat &amp; sloping sites with retaining wall</td>
<td>12000 x 7200</td>
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<tr>
<td>Separate earth raised padmounted substations</td>
<td>12000 x 9600</td>
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</tbody>
</table>

Note: Site size requirements are being reviewed with a view
to rationalize the number of options.

1.3 Substation Orientation
Front entry padmounted substations shall be oriented such that
the LV and HV panels are easily accessible from the dedicated
footpath.

1.4 Fire Risk Zone
Protection shall be provided against fire initiated or propagated by any
part or element of the padmount substation. The site selection shall
provide for the protection of -
- Each building adjacent to or near a padmount substation from the
  fire hazard originating at the padmount substation.
- Padmount substations from the fire hazards originating in the
  building adjacent or near the installation.

The below provides the minimum distances required for the separation
of padmount substations and buildings.
- Residential buildings (BCA class 1 or 10) - 3.0m
- All other buildings - 6.0m

Drawing 5335 sh 1 & sh 2 show the fire risk zone around a
padmount substation.

The separations given are the minimum and any additional separation
required by the building owner or local authority shall apply.

Where the separation distance cannot be met between padmount
substations and buildings, a barrier with FRL 120/120/120 shall be
provided. Where a building or building surface within the fire risk zone
has a minimum FRL 120/120/120 no additional barrier is required.
The minimum dimensions for fire barrier is shown on drawing
5335 sh 3.
The separation required between the padmount substation and a
barrier of fire rated building is 1.0m
1 SITE (CONT'D)

1.5 EMF

The table below lists the separation distance between padmounted substations and buildings for which human occupation can be expected for significant periods of time.

<table>
<thead>
<tr>
<th>SUBSTATION SIZE</th>
<th>RESIDENTIAL</th>
<th>COMMERCIAL / INDUSTRIAL</th>
<th>SCHOOLS</th>
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<tr>
<td>1500 kVA</td>
<td>-</td>
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</tbody>
</table>

1.6 URD

The developer shall provide a padmounted substation site(s) as required by Ergon Energy at no cost to Ergon Energy. The site shall be included in the road reserve, or located on freehold property. No padmounted substations are to be located in Trustee Reserves.

Where the developer required the padmount to be included:

a) In the Road Reserve:-
   The Developer shall obtain all necessary approvals from the Department of Transport or the Local Authority.

b) On Freehold property (including residential or parkland):-
   The Developer shall provide Ergon Energy with a registered easement at no cost to Ergon Energy.

1.7 Commercial and Industrial or Landscaped Areas

Whether the padmounted substation is for the sole use of that complex, or is required as part of the distribution network, the owner is required to grant Ergon Energy an easement for the padmounted site, access and cabling.

1.8 Parklands - for other than URD

Obtain the necessary approval for an easement to accommodate the padmounted substation, cabling and access to site.

1.9 Cabling and Access Requirement

**Cabling and Access**

A 3.0m wide easement, or road reserve, from the front of the site is required for cabling and access.

**Cabling Only**

Should the cabling route not be available in conjunction with access, a 1.0m wide cable easement is required to the front of the padmount. Additionally 2.0m x 3.0m (padmount site width) is required immediately in front to allow spreading of cables for entry to the padmount and also include the buried earth cable.

2 SITE PREPARATION

Sites shall be prepared in accordance with the included construction drawings.

3 CONSTRUCTION OF RETAINING WALLS

Retaining walls shall be constructed around the perimeter of a padmounted substation site where:

- A change in ground level of 300mm or more occurs within 2.0m of the boundary of the padmounted substation site.
4 PADMOUNTED SUBSTATION FOUNDATION

4.1 Uniculvert
Uniculvert foundations shall not be constructed where site and ground conditions do not provide an even or equal bearing capacity for the padmounted substation, or where no HV switchgear is fitted and the cable is connected directly to the transformer HV terminals.

Uniculvert foundations for both stable and unstable soil conditions shall be constructed in accordance with Drawing No. 5005.

4.2 Concrete Piers
Concrete piers shall be installed where the site ground conditions do not provide an even or equal bearing capacity for the padmounted substation foundation, or where no HV switchgear is fitted and the cable is connected directly to the transformer HV terminals.

At sites where shallow rock is encountered use the uniculvert foundation type if applicable.
Concrete piers shall be constructed in accordance with Drawing No. 5009.

4.3 Raised Blockwork
Raised blockwork foundations shall not be constructed where site and ground conditions have either of the following conditions:
- Soil bearing pressure <100kPa.
- Water table within 500mm of the base of the foundation.

4.4 Unstable Sites
Where sites are very unstable, and conventional foundation construction techniques as described in this document cannot be applied, a special design shall be required.
In such circumstances, the developer shall obtain a certified design from a Civil Engineer (RPEQ) for Ergon Energy's consideration. No special designs for padmounted substation foundation construction shall be used without the approval of Ergon Energy.

5 BACKFILLING AND FINAL SITE FINISH
All backfill of the site must be compacted before final site finish in accordance with the applicable drawing.

5.1 Common Earthing Sites
Sealing of the cable apertures in the precast concrete plinth and construction of the concrete surround slab over the ground surface shall be in accordance with drawing No. 5004.

5.2 Separate Earthing Sites
In addition to the requirements of Clause 5.1 the remaining ground surface between the concrete surround slab and site extremities shall be finished in accordance with drawing No. 5175.

5.3 Raised Blockwork Foundation - Common Earthing Sites
The substation 3.0m x 5.2m site surface is to be finished with interlocking masonry paving (besser "interlock" or equivalent approved by Ergon Energy) installed in accordance with the manufacturer's installation specifications. A concrete slab shall not be provided.

5.4 Raised Blockwork Foundation - Separate Earthing Sites
In addition to the requirements of clause 5.3 the remaining ground surface between the barrier kerb (around the paving) and site extremities shall be finished in accordance with Dwg no. 5300 Sh 3.
6 ADDITIONAL REQUIREMENTS

6.1 Commercial and Industrial Installation
The preferred location of padmounted substation sites at commercial and industrial developments is at the real property street alignment.
Switchgear cabinet doors shall face the adjoining footpath.

Should the site be located in restricted areas such as carparks and between buildings, an additional minimum 2.0m of clear access shall be provided in front of, and for the full width of the site (ie 4.8m depth). This will provide a safe working platform and access around latched open doors for emergency operations.

Padmounted substations shall be located on the development in areas where clear, all weather access is provided for personnel and heavy equipment at all times.

Easy access for a mobile crane must be available for the purpose of installation or replacement.

Ergon Energy cable conduits for the development may be placed in the substation site and shall pass down the sides of the uniculvert foundation.

No conduits shall pass through or under the uniculvert foundation.
Conduits shall be 750mm minimum depth below the finished surface level.
The substation site surface is to be finished with a concrete slab (refer to drawing No. 5004). The 2.0m apron in front of the substation cabinet shall be finished with a concrete slab sectioned with construction joints for ease of future removal.

6.2 Padmounted Substations in Landscaped Areas
Where the padmounted substation is located in a landscaped area (gardens) the following shall apply:

- An additional 2.0m apron shall be provided in front of, and for the full width of the site (ie 4.8m depth). This will provide a safe working platform and access around latched open doors for emergency operations.
- The substation site surface is to be finished with a concrete slab (refer to drawing No. 5004).
- The 2.0m apron in front of the substation site shall be finished with a concrete slab sectioned with construction joints for ease of future removal.

6.2 Padmounted Substations in Landscaped Areas (CONT'D)
When planting vegetation in landscaped areas and gardens, ensure vegetation does not encroach on the padmounted substation site. Take into consideration the fully matured size of vegetation to allow continuing access to the site.

Ergon Energy cable conduits for the development may be placed in the substation site and shall pass down the sides of the uniculvert foundation. No conduits shall pass through or under the uniculvert foundation. Conduits shall be 750mm minimum depth below the finished surface level.

6.3 Padmounted Substations Installation in Parklands
Where the padmounted substation is located in Council Parklands, the installation shall be in accordance with the requirements of drawing No. 5010 Sheets 1.
A 2.0m apron as specified in Clause 6.2 shall be provided.

7 SPACING BETWEEN PADMOUNTED SUBSTATION AND OTHER METAL OBJECTS - SEPARATE EARTHING SITES
No buildings/residences, fences, including their foundations, LV switchboard earths, or metallic objects are permitted within the clearance zone around the padmount.

Clearance to Telstra assets shall be as noted on EARTHING drawing No. 5014 Sheet 1.
NOTES:

1. The fire risk zone shown applies to the following padmount substation constructions:
   - 315 kVA
   - 500 kVA
   - 750 kVA
   - 1000 kVA

2. The fire risk zone shown applies to Building Code of Australia (BCA) class 1 & 10 buildings.

3. This drawing is indicative only. The fire risk zone extends 3.0m from the outer point of the padmount substation.

4. Easement details shown on this drawing are indicative only, actual easement size will depend on earthing arrangement and padmount substation location.

Legend:

- Fire zone

No other structures in this zone (unless fire protected)
NOTES:

1. The fire risk zone shown applies to the following padmount substation constructions:
   - 315 kVA
   - 500 kVA
   - 750 kVA
   - 1000 kVA

2. This drawing is indicative only. The fire risk zone extends 6.0m from the outer point of the padmount substation.

3. No buildings shall be in the fire risk zone unless they meet the requirements of a fire resistance surface. Refer sheet 3 for details.

4. Easement details shown on this drawing are indicative only, actual easement size will depend on earthing arrangement and padmount substation location.

No other structures in this zone unless protected

Legend:

- Fire zone

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - FIRE RISK ZONE
NOTES:

1. The fire risk zone shown and barrier requirements apply to the following padmount substation constructions:
   - 315 kVA
   - 500 kVA
   - 750 kVA
   - 1000 kVA

2. Fire resistance surface is a barrier or building surface having a minimum FRL 120/120/120.

3. This drawing is indicative only.
   The minimum size required for the fire resistant surface shall extend 6.0m from the outer point of the padmount.

4. Easement details shown on this drawing are indicative only, actual easement size will depend on earthing arrangement and padmount substation location.
NOTES:

1. Clearance radius is taken from the LV enclosure. Refer table in clause 1.5 of drawing 5000 sh 2 for required distance.
NOTES:

1. For SEPARATE HV & LV earthing provide the clearance zone as shown. The clearance zone is to be maintained free from metallic objects, buildings and structures - including their foundations.

2. HV earth electrodes are to be contained within the boundary of the concrete surround slab. Additional HV earth if required is to be within the clearance zone. Provide min. 2.0m from site side and rear boundaries to earth cable/rod/deep drill hole. Refer EARTHING drawing No.5014.

3. The clearance zone shall be turfed or landscaped with mulched beds and shrubs.

4. Separately earthed padmounts should be located in areas remote from residential dwellings.

5. The entire site shall be an easement to prevent encroachment.
NOTES:

1. 5.0m x 3.5m site suits old style front and rear entry type padmounted substations.

2. The 3.0m x 2.8m padmounted substation site shall be finished with a concrete slab. The remainder of the site shall be grassed.

3. In instances where the 3.5m x 5.0m site has fences or retaining walls erected, the whole site shall be finished with a concrete slab in accordance with drawing 5004.
FOR SEPARATE HV & LV EARTHING SITES,
SIZE AND OTHER REQUIREMENTS.
REFER DRAWING No. 5175.

NOTES:

1. Refer drawing 5000 for installation requirements.
2. Ergon Energy's 3000mm x 2800mm (minimum) site shall be levelled and surrounding area graded to ensure NO PONDING of water occurs.
3. No services other than the Ergon Energy's electric cables shall pass through this padmounted substation site.
4. Clear access to the padmounted substation shall be maintained for Ergon Energy's personnel & heavy equipment.
5. After installation is complete the site surface is to be finished with a concrete slab. (Refer drawing 5004).
6. Mature landscaping (including trees, sprinklers etc) shall not encroach onto the padmounted substation site.
7. The finished surface of the adjacent footpath, in front of the padmount cabinet, shall be level to ensure that the cabinet doors will swing into the fully open position.
NOTES:

1. Refer drawing 5000 for installation requirements.
2. Ergon Energy's 6000mm x 2800mm (minimum) site shall be levelled and surrounding area graded to ensure NO PONDING of water occurs.
3. No services other than the Ergon Energy's electric cables shall pass through this padmounted substation site.
4. Clear access to the padmounted substation shall be maintained for Ergon Energy's personnel & heavy equipment.
5. After installation is complete the site surface is to be finished with a concrete slab. (Refer drawing 5004).
6. Mature landscaping (including trees, sprinklers etc) shall not encroach onto the padmounted substation site.
7. The finished surface of the adjacent footpath, in front of the padmount cabinet, shall be level to ensure that the cabinet doors will swing into the fully open position.
8. Refer to Underground distribution drawing 5005 for standard uniculvert foundation details.
R.P. Street Alignment

Concrete Edge Beam

Site Boundary (Level Site)

Reinforced concrete surround slab cast around plinth

100mm x 10mm Expansion joint foam (Abelflex or equivalent)

Unreinforced Concrete

100mm thick crushed metal to surface

PADMOUNTED SUBSTATION

HV

LV

Fall

Polyethylene barriers to front of apertures

Finished Ground Line

Backfill Cable Pit Refer note 1.

Uniculvert or Pier Foundation

Earth grid under concrete edge beam

Concrete edge beam to perimeter 150 wide x 150 deep below finished surface level.

Refer to Sheet 2 for detail and notes.

11kV PADMOUNTED SUBSTATIONS

FRONT ENTRY TYPE

SITE FINISH CONCRETE SURROUND

UNDERGROUND DISTRIBUTION

Ergon Energy Corporation Ltd
ABN 50 087 646 062
NOTES:

1. Backfill excavated area with crusher dust, deco or bedding material and compact in place. Ensuring that only bedding material is used around cables.

2. Reinforced concrete surround slab:
   a) 100 / 125mm thick slab;
   b) F62 mesh reinforcement in centre of slab;
   c) 25 MPa grade concrete;
   d) Finish by wood float or by nylon broom.

3. The top face of the concrete surround slab shall be 25mm above the final surface level (when turf is laid).

4. The concrete slab is to slope away from plinth falling at a slope of 1 in 25.

5. Cable apertures through the precast concrete plinth shall be backfilled to 50mm from the top of the plinth, using bedding material.

6. The surface of the surround slab may be finished with a stencil pattern surface to match the surrounding pavements of the development. (Use textcrete or equivalent product. Construct to supplier's specifications).
NOTES:

1. A padmounted substation in parkland shall be located:
   - Away from residential dwellings and surrounding properties to minimise visual and sound impact;
   - As close as possible to the road kerb to allow 24 hour all weather access for personnel, a conventional crane and heavy equipment.

2. When planting vegetation in parklands, ensure vegetation does not encroach on the padmounted substation site. Take into consideration the fully matured size of vegetation to allow continuing access to the site.

3. A 3.0m wide cable and access easement or road reserve shall be provided between the padmounted substation site and the R.P. Street Alignment.

4. If the property boundary does not adjoin the front boundary of the padmount substation site, an additional 2.0m shall be added to the depth of the site to allow for 2.0m clear operating area at the front of the transformer.

5. The location of padmounted substation sites is based on acceptable separation to adjacent dwellings to achieve fire and EMF separation.

FOR SEPARATE H.V. & L.V. EARTHING SITES, SIZE AND OTHER REQUIREMENTS.
REFER DRAWING No. 5175

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATION
FRONT ENTRY TYPE
LOCATION IN COUNCIL PARKLANDS

ERGON ENERGY CORPORATION LTD
ABN 50 087 646 062

DRAWN T. Borg
APPROVED A. Bletchly
PASSED K. Slater
DATE 3/2/03
ORIGINAL ISSUE 10.2.04
PASSED 20.11.18
DRAWN 05.06.01
FILE: 55 5010 1
Dwg 5010 Sh 1

PADMOUNT SET BACK FROM R.P. STREET ALIGNMENT
NOTES:

1. Foundation design details are as follows:
   - Unstable soils are soft clay to sandy gravel with a soil strength 60-150 kPa. These soil types REQUIRE a base slab as shown.
   - Stable soils are very stiff clay to shale/rock with soil strength of 150kPa or higher. These soil types DO NOT REQUIRE a base slab.

2. Lift the unicalvert and Base Slab separately with 4 x 1.3 tonnes Reid Swiftlift lifting eyes. Refer to ASSEMBLIES Page 509.

3. Position the top face of the Unicalvert at the finished ground level of the site, as detailed on the Project's Civil Construction drawings.

4. Do NOT remove the unicalvert end wall knockouts.

5. The unicalvert shall be constructed level. Under no circumstances shall it be allowed to tilt forward towards the footpath.

6. If a deep excavation is constructed under the padmounted substation cabinet and in front of the foundation then the front edge of the plinth shall be propped for the period the excavation remains open.

7. Refer drawing No. 5004 for site finish concrete surround.

FOUNDATION COMPONENTS

1 x Unicalvert (CSR Humes Product No. BC1200.9500 or Equiv.)
2 x End Walls (CSR Humes Product No. BC1200.9510 or Equiv.)
1 x Base Slab (CSR Humes Product No. BC1200.0186 or Equiv.)

Unicalvert and end walls come assembled with a layer of preformed sealant to the perimeter of the unicalvert end, and between the mating surfaces.
NOTES:

1. The foundation is suitable for transformers from 100kVA to 1000kVA.
2. The minimum depth of each pier shall be at least 450mm into the stratum of the undisturbed natural soil and 600mm below cable entry excavation.
   If the material is unsuitable then the hole shall be drilled deeper until a firm bearing stratum is reached.
3. Bored piers 2m deep or less shall be unreinforced.
   Bored piers greater than 2m deep shall be reinforced in accordance with the detail on sheet 2.
4. Pier vertical reinforcement shall be grade 400Y in accordance with AS 1302.
   Hoop reinforcement shall be grade 250R in accordance with AS 1302.
5. Minimum concrete cover to steel shall be 50mm.
6. Concrete shall be grade N25, f'c = 25MPa.
7. Concrete piers shall be constructed using a continuous single concrete pour.
8. The top of piers shall be horizontal. The maximum variation in level between the four piers shall be 3mm.
9. Refer drawing No. 5004 for site finish concrete surround.
NOTE:
P1 only offset

Piers greater than 2m deep:
8 x Y12 vertical bars
R6 hoops at 750 centres max.

Construction Type
PMF11BP

UNDERGROUND DISTRIBUTION
11KV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE
PIER FOUNDATION DETAILS

Ergon Energy Corporation Ltd
ABN 63 087 546 062

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NOTES:

1. Refer drawing 5000 for installation requirements.
2. Ergon Energy's Padmount Substation site shall be levelled and surrounding area graded to ensure NO PONDING of water occurs.
3. No services other than the Ergon Energy's electric cables shall pass through this padmounted substation site.
4. Clear access to the padmounted substation shall be maintained for Ergon Energy's personnel & heavy equipment.
5. After installation is complete the site surface is to be finished with a concrete slab. (Refer drawing 5338).
6. Mature landscaping (including trees, sprinklers etc) shall not encroach onto the padmounted substation site.
7. The finished surface of the adjacent footpath, in front of the padmount cabinet, shall be level to ensure that the cabinet doors will swing into the fully open position.
SITE FINISH CONCRETE SURROUND

- Un-reinforced 100 / 125mm thick concrete slab
- Polyethylene barriers to front of apertures
- Reinforced concrete surround slab cast around plinth
- Earth grid under concrete edge beam
- Concrete edge beam to perimeter 150 wide x 150 deep below finished surface level.
- 100mm x 10mm Expansion joint foam (Abelflex or equivalent)

Construction Type: PMF11

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - COMMUNITY TITLE
SITE FINISH CONCRETE SURROUND

Refer to Sheet 2 for detail and notes.
NOTES:
1. Backfill excavated area with crusher dust, deco or bedding material and compact in place. Ensuring that only bedding material is used around cables.
2. Reinforced concrete surround slab:
   a) 100 / 125mm thick slab;
   b) F62 mesh reinforcement in centre of slab;
   c) 25 MPa grade concrete;
   d) Finish by wood float or by nylon broom.
3. The top face of the concrete surround slab shall be 25mm above the final surface level (when turf is laid).
4. The concrete slab is to slope away from plinth falling at a slope of 1 in 25.
5. Cable apertures through the precast concrete plinth shall be backfilled to 50mm from the top of the plinth, using bedding material.
6. The surface of the surround slab may be finished with a stencil pattern surface to match the surrounding pavements of the development. (Use textcrete or equivalent product. Construct to supplier’s specifications).

Construction Type
PMF11

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - COMMUNITY TITLE
SITE FINISH CONCRETE SURROUND
NOTES:

1. Foundation design details are as follows:
   - Unstable soils are soft clay to sandy gravel with a soil strength of 50-150 kPa. These soil types REQUIRE a base slab as shown.
   - Stable soils are very stiff clay to shale/rock with soil strength of 150kPa or higher. These soil types DO NOT REQUIRE a base slab.

2. Lift the uniculvert and Base Slab separately with 4 x 1.3 tonnes Reid Swiftlift lifting eyes. Refer to ASSEMBLIES Page 509.

3. Position the top face of the Uniculvert at the finished ground level of the site, as detailed on the Project's Civil Construction drawings.

4. Do NOT remove the uniculvert end wall knockouts.

5. The uniculvert shall be constructed level. Under no circumstances shall it be allowed to tilt forward towards the footpath.

6. If a deep excavation is constructed under the padmounted substation cabinet and in front of the foundation then the front edge of the plinth shall be propped for the period the excavation remains open.

7. Refer drawing No. 5338 for site finish concrete surround.

---

**MATERIAL**

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<tr>
<td>509-2</td>
<td>Base Slab</td>
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</tr>
</tbody>
</table>

---

**ASSY**

509-1

Uniculvert

1

509-2

Base Slab

AR

---

**NOTES:**

1. Foundation design details are as follows:
   - Unstable soils are soft clay to sandy gravel with a soil strength of 50-150 kPa. These soil types REQUIRE a base slab as shown.
   - Stable soils are very stiff clay to shale/rock with soil strength of 150kPa or higher. These soil types DO NOT REQUIRE a base slab.

2. Lift the uniculvert and Base Slab separately with 4 x 1.3 tonnes Reid Swiftlift lifting eyes. Refer to ASSEMBLIES Page 509.

3. Position the top face of the Uniculvert at the finished ground level of the site, as detailed on the Project's Civil Construction drawings.

4. Do NOT remove the uniculvert end wall knockouts.

5. The uniculvert shall be constructed level. Under no circumstances shall it be allowed to tilt forward towards the footpath.

6. If a deep excavation is constructed under the padmounted substation cabinet and in front of the foundation then the front edge of the plinth shall be propped for the period the excavation remains open.

7. Refer drawing No. 5338 for site finish concrete surround.
PMF11U

UNICULVERT FOUNDATION DETAILS

Compact pit sand

Uniculvert & base slab location

2535

1300 Plinth

1870 ref

1710 ref

4500 Site

Plinth

Uniculvert

1465

Uniculvert

Ref 17

Ref 1465

2000 x 1700 x 100
precast concrete
base slab
(unstable soil only)

2500 Site

5000 Site

1130 Stable

1280 Un-stable

1080 Nom.

110

50 Stable

100 Un-stable

Polyethylene Barriers to front of apertures
 HV & LV cables

Cable entry

Assy 509-1

Assy 509-2

Base slab NOT REQ’D in stable soil

Finished Ground Line (Site)

Precast concrete plinth supplied with padmounted substation

Backfill with approved suitable material and compact in place

Construction Type

11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - COMMUNITY TITLE
UNICULVERT FOUNDATION DETAILS

ERGON. ENERGY

Ergon Energy Corporation Ltd
ABN 50 087 646 062

DATE 25/08/15
PASSED A. Bletchly
DRAWN T. Borg

FILE: 5 5553392
Dwg 5339 Sh 2

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1 SETTING OUT

The service provider shall be responsible for the correct setting out of works. The service provider shall establish the actual position of all services on site before commencing work on the site.

2 COMPLIANCE

The service provider shall comply with acts of parliament, statutory, municipal and other regulations or bylaws, that in any way affect the works, with particular regard to:

- Workplace Health & Safety
- Protection of Public Utilities
- Traffic Hazards and Public Safety.

3 DAMAGE RESPONSIBILITY

The service provider shall be responsible for any damage to public utility service installations such as water, gas and sewer pipes, electrical, traffic signal or telephone conduits and shall bear the costs of reinstating any service damaged during construction of the works.

4 SPECIAL CONDITIONS

The retaining wall construction drawings provided by Ergon Energy are to be applied in normal situations. Where special conditions exist, (in the opinion of a Civil Engineer RPEQ) such as:

- Extra heavy surcharge
- Unstable ground conditions
- Property boundary limitations
- Excavation or backfilling restrictions

The developer shall provide a certified design from a Civil Engineer (RPEQ) for Ergon Energy's consideration. No special designs for retaining wall construction shall be used without the approval of Ergon Energy.

5 ADDITIONAL REQUESTS

Additional requests will be required if the developer, or the developer's representative, choose to:

- Construct the padmounted substation on a slope where the retaining wall would be higher than 2.0m, or
- Use a different method of construction for the retaining wall.

Requests shall be accompanied by a certified design from a Civil Engineer (RPEQ) for Ergon Energy's consideration. No special designs for retaining wall construction shall be used without the approval of Ergon Energy.

6 MASONRY

Concrete masonry materials and workmanship shall comply with AS3700.

Masonry blocks shall be 200 series and shall comply with AS/NZS 4455.

Mortar shall consist of 1 part cement, 1/10 part slaked lime and 3 parts sand measured by volume.

The bottom course blocks shall contain an opening to permit clean out of the cell space.
7 FOUNDATIONS
Where the bearing surface under the foundation is silt or clay soil, a 100mm layer of compacted sand or gravel bedding material shall be placed under the concrete foundation.

8 CONCRETE
Concrete work shall comply with AS3600

Concrete:-
- Foundation - $F'c = 25\text{MPa}; \text{75mm Slump}; 20\text{mm Max Agg.}$
- Core Filling - $F'c = 17.5\text{MPa}; 150\text{mm Slump}; 10\text{mm Max Agg.}$

Concrete foundation slab with continuous reinforcement overlapped at joints shall be poured MONOLITHICALLY (in one operation).

9 REINFORCEMENT
Reinforcement:-
- Hot rolled deformed bar - "TEMPCORE" complying with AS/NZS 4671.

10 DRAINAGE SYSTEM
It is essential that steps be taken to prevent the soil behind the wall from becoming saturated. These steps shall include:
- Sealing the soil surface - this is achieved by the site finish.
- A drainage system within the soil - this shall be achieved by placing gravel to a minimum width of 300mm immediately behind the wall with a continuous 100mm diameter slotted PVC agricultural pipe with geo fabric sock located at the base of the wall. The outlets of the pipe must extend beyond the ends of the wall unless the pipe is connected to a proper storm water drainage system. Weep-holes must be provided in the retaining wall as per the notes below.

11 WEEP-HOLES
For walls less than 1.4m in height weep-holes shall be provided in a minimum of one horizontal row, spaced not more than 1.5m apart horizontally.
For walls exceeding 1.4m weep-holes shall be provided in a minimum of two horizontal rows, spaced not more than 1.5m apart vertically and 1.5m apart horizontally. The lowest row should be just above the finished ground level below the wall. When necessary a collecting system e.g. spoon drain shall be provided to remove water from the area of the toe of the wall footing.

12 BACKFILLING
Clay soils and organic silts shall not be used as backfill as they have poor drainage characteristics.

Backfill should not be placed or compacted until the wall has cured (14 days minimum for 17.5 MPa concrete) so as to have sufficient strength to withstand backfilling loads.

Backfill shall be compacted to 95% of the maximum dry density as defined in the Modified Compaction Test - Test AS 1289.5.2.1.

After installation of the padmounted substation and cables has been completed, the ground within the enclosure shall be backfilled, compacted, levelled and finished in accordance with Drawing No. 5004.
Plinth over shown dashed. For details of reinforced concrete surround slab refer to drawing 5004.

For earth rod location refer EARTHING: Drawing No. 5013 or 5014.

Concrete infill to be rounded to form watershed capping

NOTE:
Where a retaining wall greater than 1.2 metres high is required a Pier Foundation must be used.

CONCRETE STRENGTHS

<table>
<thead>
<tr>
<th></th>
<th>F'c</th>
<th>Slump</th>
<th>Aggregate Size (Max)</th>
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<tbody>
<tr>
<td>Foundation</td>
<td>25MPa</td>
<td>75</td>
<td>20mm</td>
<td>-</td>
</tr>
<tr>
<td>Blockwork / Core Filling</td>
<td>17.5MPa</td>
<td>150</td>
<td>10mm</td>
<td>300kg/cu. m</td>
</tr>
</tbody>
</table>

11kV PADMOUNTED SUBSTATIONS

CUT SLOPING SITE - UNICULVERT FOUNDATION
RETAINING WALL - MAXIMUM HEIGHT 1.2m

UNDERGROUND DISTRIBUTION

Ergon Energy Corporation Ltd
ABN 50 087 646 062
Plinth over shown dashed. For details of reinforced concrete surround slab Refer Padmounted Subs drawing 5004.

Truncate foundation to allow cable access into padmount. Use formwork.

R.P. Street Alignment

Fence refer drawing 5011.

Footpath Ground Line

Ground Line

Filter material

Weepholes

SL62 mesh with 60 cover top

100mm dia conduit through footing for earth rod. Trim top of conduit as req'd.

Site Boundary

Natural Ground Line

Concrete infill to be rounded to form watershed capping

200 series blockwork

N16 at 400 crs lap 500 at corners & where necessary

Weep-holes

N16 at 400 crs

20 cover to inside face

Retaining wall foundation (1300 wide shown)

For earth rod location refer EARTHING: Drawing No. 5013 or 5014.

Concrete strengths

<table>
<thead>
<tr>
<th></th>
<th>F'c</th>
<th>Slump</th>
<th>Aggregate Size (Max)</th>
<th>Cement Content (Min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td>25MPa</td>
<td>75</td>
<td>20mm</td>
<td>-</td>
</tr>
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<td>10mm</td>
<td>300kg/cu. m</td>
</tr>
</tbody>
</table>

Underground Distribution

11kV PADMOUNTED SUBSTATIONS

CUT SLOPING SITE - PIER FOUNDATION

RETIALL WALL - MAXIMUM HEIGHT 2.0m
Plinth over shown dashed. For details of reinforced concrete surround slab refer to drawing 5004.

For earth rod location refer EARTHING: Drawing No. 5013 or 5014.

Concrete infill to be rounded to form watershed capping

Concrete strengths

<table>
<thead>
<tr>
<th></th>
<th>F’c</th>
<th>Slump</th>
<th>Aggregate Size (Max)</th>
<th>Cement Content (Min)</th>
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<td>17.5MPa</td>
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<td>10mm</td>
<td>300kg/cu. m</td>
</tr>
</tbody>
</table>

NOTE:
Where a retaining wall greater than 1.2 metres high is required a Pier Foundation must be used.

R.P. Street Alignment

Footpath

Ground Line

Fence refer drawing 5011.

Truncate foundation to allow cable access into padmount. Use formwork.

Site Boundary

Filter material

Weepholes

Weep-holes

Natural Ground Line

Backfill

100mm dia conduit through footing for earth spike. Trim top of conduit as req’d.

SL62 mesh with 60 cover top

N12 at 300 crs lap 400

N16 at 400 crs lap 500 at corners & where necessary

200 series blockwork

100mm slotted drainage pipe

NOTE:

Drainage

250-1200Max.
CONCRETE STRENGTHS

<table>
<thead>
<tr>
<th></th>
<th>F'c</th>
<th>Slump</th>
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<td>10mm</td>
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</tbody>
</table>

For details of reinforced concrete surround slab refer Padmounted Subs drawing 5004.

For earth rod location refer EARTHING: Drawing No. 5013 or 5014.

Concrete infill to be rounded to form watershed capping

Blockwork

Masonry block wall

Fence refer drawing 5011.

Footpath

Ground Line

Retaining wall foundation (1300 wide shown)

Natural Ground Line

Weepholes

Filter material

SL62 mesh with 60 cover top

N12 at 300 crs lap 400

N16 at 400 crs 20 cover to inside face

N16 at 400 crs lap 500 at corners & where necessary

200 series blockwork

Backfill Material

Drainage material

Weep-holes drainage pipe

100mm slotted

N16 at 400 crs 75 cover to bottom

250

500

5008

2

300

200

100

10mm

75

17.5MPa

300kg/cu. m

2800

2450

700 for B1

2600

3000

3600

1200 for B2

100

3000

4000

100mm dia conduit through footing for earth spike. Trim top of conduit as req'd.

100mm dia conduit

Site Boundary

SL62 mesh

10mm

N16 at 400 crs

500

B1=850

B2=1300

10mm

750

150

10mm

20mm

For details of reinforced concrete

Use formwork.

Truncate foundation to allow cable access into padmount.

Plinth over shown dashed.

For details of reinforced concrete surround slab Refer Padmounted Subs drawing 5004.
1. A safety fence shall be constructed on retaining wall sloping sites where the difference between ground level and padmount site is 300mm or greater.

2. Chain wire infill and the support cables shall be PVC or baked polyester coated and coloured black or green.

3. All construction of safety fences to be:
   (a) In accordance with AS 1657 / AS 1926 including latest amendments.
   (b) Of a type where infill is between top and toe board / bottom rails.

Notes for cut sloping sites:

10mm thick aluminium base plate fully welded to aluminium post in accordance with AS 1657 and AS 1665.

2 x M12 S/Steel trubolts embedded 110mm minimum. (Ramset T16175SS or approved equivalent)

2 x M12 S/Steel trubolts embedded 110mm minimum. (Ramset T16100SS or approved equivalent)

50mm thick aluminium base plate fully welded to aluminium post in accordance with AS 1657 and AS 1665.

2 x M12 S/Steel trubolts embedded 110mm minimum. (Ramset T16100SS or approved equivalent)

NOTES:

Galvanised steel posts

Concrete surface must fall away from edge of steel posts

2 x M12 S/Steel trubolts embedded 110mm minimum. (Ramset T16175SS or approved equivalent)

Natural Ground Line

200 MIN. 120 + 0

600 MIN. INTO CONCRETE

Earth Face

NOTES:

1. A safety fence shall be constructed on retaining wall sloping sites where the difference between ground level and padmount site is 300mm or greater.

2. Chain wire infill and the support cables shall be PVC or baked polyester coated and coloured black or green.

3. All construction of safety fences to be:
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   (b) Of a type where infill is between top and toe board / bottom rails.

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50mm thick aluminium base plate fully welded to aluminium post in accordance with AS 1657 and AS 1665.

2 x M12 S/Steel trubolts embedded 110mm minimum. (Ramset T16100SS or approved equivalent)
NOTES:
1. For general site requirements refer to dwg 5000
2. For site size requirements refer:
dwg 5300 sh 2 - CMEN
dwg 5300 sh 3 - Separate

Item 2 - Service Platform
Refer dwg 5300 sh 7 to sh 15

Item 1 - Blockwork Foundation
Refer dwg 5300 sh 4 to sh 6
NOTES:

1. The padmount substation site shall be paved. Refer dwg 5000, clause 5.3.
2. Refer drawing 5000 for site requirements.
3. No services other than the Ergon Energy's electric cables shall pass through this padmount substation site.
4. Clear access to the padmount substation shall be maintained for Ergon Energy's personnel and heavy equipment.
5. Mature landscaping (including trees, sprinklers etc.) shall not encroach onto the padmount substation site.
6. Where the distance above paving to the base of the substation HV and LV cabinet access doors exceed 400mm, provide service platform and ladder. Refer dwg 5300 sh 7 to sh 15.
NOTES:

1. For separate HV & LV earthing provide the clearance zone as shown. The clearance zone is to be maintained free from metallic objects, buildings & structures - including their foundations.

2. HV earth electrodes are to be located as shown on the applicable earthing detail. Additional HV earth if required is to be confined within the clearance zone. Provide minimum 2.0m from site side & rear boundaries to earth cable / rod / deep drill hole. Refer earthing dwg.

3. The clearance zone shall be turfed or landscaped with mulched bed & shrubs.

4. Separately earthed padmounts shall be in areas remote from residential dwellings.

5. The entire site shall be an easement to prevent encroachment.
1 CONSTRUCTION CO-ORDINATION
Co-ordination is required during foundation construction and site finish of the padmount substation to ensure installation of conduit, earthing and (where required) service platforms.

2 SERVICE PLATFORM
Where the distance above site finish to top of blockwork at HV and LV cabinet access doors exceeds 400mm provide a service platform and access ladder.
Refer Padmount Substations dwg 5300 Sh 7 to 15 for detail.

3 CONCRETE
(a) All concrete work shall be in accordance with AS3600 and AS2870.
(b) Concrete for footings and slabs shall be grade N20 to AS3600.
(c) Minimum cover to reinforcement - 50mm.

4 CABLE CONDUITS

5 EARTHING CABLE PROTECTION CONDUITS
Provide 25dia UPUC conduit at earth penetrations through 50mm thick unreinforced concrete slab.

6 DRAINAGE SLOTS
Provide approximately 5mm wide slots down to finished ground level to drain, at every second block.

7 MASONARY BLOCKWORK
(a) Concrete blocks shall be grade N in accordance with AS3700.
(b) Mortar shall be class M3 in accordance with AS3700.
(c) Concrete fill shall be 20MPA at 28 days - 10mm maximum aggregate size.
(d) Concrete masonry material and workmanship shall comply with AS3700.
(e) Masonary blocks shall be 200 series and comply with AS/NZS4455.
(f) All cores shall be concrete filled. Provide an opening in bottom course to permit clean out of cell space.
(g) Vertical reinforcement to block walls shall be 1/N12 at corners, beside opening and at 400mm max centres.
(h) Horizontal reinforcement to block walls shall be 1/N12 at 400mm max centres. With 2/N12 at top course only.

8 ALUMINIUM COVER PLATES & SUPPORT ANGLES
Provide 3mm marine grade aluminium cover plates fitted to aluminium 75x75 angle at two (2) openings in blockwork. Obtain final dimensions on site.
**UNDERGROUND DISTRIBUTION**

11kV PADMOUNTED SUBSTATIONS

FRONT ENTRY TYPE - BLOCKWORK FOUNDATION

ITEM 1 - LAYOUT & CONSTRUCTION DETAILS

---

### Detail A

- **Top Elevation**
  - 200 Series Masonry Blocks
  - S20 grade concrete fill to all masonry cores
  - N12 vertical reinforcing at 400mm CTS (central)
  - 200 series block 2 x N12 bars horizontally. Top course only.
  - 200 series block N12 horizontal bars at 400 vert cts
  - R6 Ligs @ 400CTS
  - 2 x N12 Top & Bottom

---

**Elevation**

---

**Layout & Construction Details**

---

**Notes**

---

**Design Details**

---

**Approval Details**

---
M10 Galv. Masonary Anchors @ 400 max crs.

Cable Conduits Refer Note 4

25dia Earthing Protection Conduit. Refer Note 5.

SECTION A

10 thick x 50mm dia Backing Plate
Stitch weld
Drill & tap M12 (2 places) for lifting holes

6 Thick x 25mm dia Backing Plate
Stitch weld
Drill & tap M10 SS 'D' Head Bolts

Cover Plate

14 dia Hole for Earth Connection

VIEW B
1 MATERIAL
Structural bars and sections shall be in accordance with AS/NZS 3679-300.
Circular hollow section shall be in accordance with AS 1163-C250.

2 TOLERANCES
Unless otherwise shown ± 2.0mm.
Hole positioning ± 1.0mm.
Hole size ± 0.5mm - 0.0mm.

3 FABRICATION
(a) Welds shall be category SP in accordance with AS/NZS 1554.1.
   All joints shall be full seal welds unless noted otherwise. Fillet weld shall be 6mm.
(b) Remove sharp edges, burrs & weld spatter prior to galvanising.
(c) Remove slag after galvanising.

4 PROTECTIVE COATING
Hot dip galvanise after fabrication in accordance with AS/NZS 4680.

5 CONCRETE
(a) All concrete work shall be in accordance with AS 3600.
(b) Concrete shall be grade N20 in accordance with AS 3600.
(c) Minimum cover to reinforcement - 65mm.

NOTES
(a) Fix gridmesh to support frame using galvanised clamps in accordance with manufacturers requirements.
(b) Chain to be hooked on padmount substation side of platform.
   Chain & hook to be clear of ladder access when in unhooked position.
(c) Establish height of service platform and ladder on site.
Refer Detail 'C'
2 corners typical

Refer Detail 'D'
2 typical

TOP VIEW

Refer Detail 'A'
2 corners typical

Refer Detail 'B'

Web Force Gridmesh
WM50110
Across entire top platform
omitted in part for clarity

UNDERGROUND DISTRIBUTION
11kV PAD MOUNTED SUBSTATIONS
FRONT ENTRY TYPE
SERVICE PLATFORM

A. Betchly

T. Berg

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 55 5300 9
Dwg 5300 Sh 9
Grind weld flush on top & bottom side

Grind weld flush on top side

Grind weld flush on top side

32 x 5 Fl. x 60 long for earth connection

2 holes Ø 14

125 x 125 6L x 150 long

2 holes Ø 14

125 PFC

125 PFC

125 PFC

TOP VIEW

TOP VIEW

TOP VIEW

FRONT VIEW

FRONT VIEW

FRONT VIEW

DETAIL 'A'

DETAIL 'B'

DETAIL 'C'

DETAIL 'D'

110 ± 1

27 ± 1

6
125 PFC

6
6

110 ± 1

27 ± 1

6
6

110 ± 1

27 ± 1

6
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6
Refer to Dwg 5300 Sh 12

Ladder stiles refer Dwg 5300 Sh 13

4 x N12 vertical bars

W8 ties @ 600 centres

R8 spiral ties @ 300 pitch max.

BP1

N12 vertical bars

4 x N12 Vertical bars

R8 spiral ties @ 300 pitch max.

W8 ties @ 600 centres

BP2

Construction joint if required
Provide internal holes in hand rails & posts as required by galvanizer to vent and drain zinc during galvanizing.

48.3 x 3.2 CHS Posts

Refer to Dwg 5300 Sh 14 Item 2

TOP VIEW

33.7 x 2 CHS Top-rail

900 + 5 / - 0

450

450

26.9 x 2 CHS Mid-rail

Refer to Dwg 5300 Sh 14 Item 1

For foundation details refer Dwg 5300 Sh 11

FRONT VIEW

Detail 'A'

Detail 'B'

Detail 'C'

Detail 'D'

Detail 'E'
Refer Dwg No. 5300 Sh 9 & 10 for platform details

8mm galv. chain at ladder access. Refer note.

20mm dia. MS Rungs Full seal fillet weld to Stiles.

Top of top rung level with top of gridmesh.

Rungs to be equally spaced 200min - 300max

Fabricate 150 x 125 x 6 L x 600 Long
20 x 6 Fl. 600 Long Stitch Weld

WebForce Gridmesh Floor WM50110

33.7 x 2 CHS top rail

188 x 6 Fl. 80 Long M12 bolt

195 x 4 Fl. 65 x 10 Fl.

48.3 x 2 CHS PFC 125 PFC

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE
LADDER DETAILS

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ERGON ENERGY

Ergon Energy Corporation Ltd
ABN 50 087 646 062

DATE 11/04/14
PASSED A. Bletchly
DRAWN T. Berg

FILE: 5 55 5300 15
Dwg 5300 Sh 15
**MATERIAL - PADMOUNTED SUBSTATION INCLUDING LV SWITCHGEAR**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
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<tbody>
<tr>
<td>565-3</td>
<td>Padmounted Substation 315kVA with LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>565-4</td>
<td>Padmounted Substation 500kVA with LV Switchgear</td>
<td></td>
</tr>
<tr>
<td>565-5</td>
<td>Padmounted Substation 750kVA with LV Switchgear</td>
<td></td>
</tr>
<tr>
<td>565-6</td>
<td>Padmounted Substation 1000kVA with LV Switchgear</td>
<td></td>
</tr>
</tbody>
</table>

**MATERIAL - LV FUSE - EACH CIRCUIT**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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</thead>
<tbody>
<tr>
<td>529-11</td>
<td>Fuse link 125A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-13</td>
<td>Fuse link 200A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-14</td>
<td>Fuse link 250A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-15</td>
<td>Fuse link 315A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-16</td>
<td>Fuse link 355A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-17</td>
<td>Fuse link 400A din size 2</td>
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</table>

**MATERIAL - LV SWITCH - PARALLEL**

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>611-1</td>
<td>Parallel cable adapter to suit Jean Muller</td>
<td>AR</td>
</tr>
</tbody>
</table>

**NOTES:**
1. All Padmounted Substations are supplied with LV Switchgear fitted.
2. Designer to nominate LV fuse link current rating.

**CONTRACT No. 2004/037/T**
For mains distribution cable connection, Refer LV CONSTRUCTION drawing No. 5209.
### 11kV PADMOUNTED SUBSTATIONS

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<td>Padmounted Substation 315kVA with LV Switchgear &amp; Ring Main Unit ABB, SafeLink, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>566-4</td>
<td>Padmounted Substation 500kVA with LV Switchgear &amp; Ring Main Unit ABB, SafeLink, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>566-5</td>
<td>Padmounted Substation 750kVA with LV Switchgear &amp; Ring Main Unit ABB, SafeLink, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>566-6</td>
<td>Padmounted Substation 1000kVA with LV Switchgear &amp; Ring Main Unit ABB, SafeLink, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>555-5</td>
<td>Cartridge fuse link 25A (to suit 315kVA padmounted substation)</td>
<td>1</td>
</tr>
<tr>
<td>555-7</td>
<td>Cartridge fuse link 40A (to suit 500kVA padmounted substation)</td>
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<tr>
<td>555-9</td>
<td>Cartridge fuse link 63A (to suit 750kVA padmounted substation)</td>
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</tr>
<tr>
<td>555-10</td>
<td>Cartridge fuse link 80A (to suit 1000kVA padmounted substation)</td>
<td>3</td>
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</tbody>
</table>

### MATERIAL - LV FUSE - EACH CIRCUIT

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</tr>
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<td>529-14</td>
<td>Fuse link 250A din size 2</td>
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</tr>
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<td>Fuse link 315A din size 2</td>
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</tr>
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<td>Fuse link 400A din size 2</td>
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### MATERIAL - LV SWITCH - PARALLEL

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<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>603-1</td>
<td>Parallel cable adapter to suit Weber</td>
<td>AR</td>
</tr>
</tbody>
</table>

**NOTES:**

1. All Padmounted Substations are supplied with LV Switchgear and Ring Main Unit fitted - ABB SafeLink, 2 switch 1 fuse.
2. Designer to nominate LV fuse link current rating. HV fuse links are provided in construction.

**CONTRACT No. 2004/037/T**

**ERGON ENERGY CORPORATION LTD**
ABN 50 087 646 062

**FILE: 5 555191 1**

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**A** ORIGINAL ISSUE
**B** 01.12.16

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**DRAWN** T.Borg
**PASSED** A.Bletchly
**APPROVED** C.Noel
For feeder cable connection, Refer HV CONSTRUCTION drawing No. 5206 or 5207 (ABB SafeLink RMU)

For mains distribution cable connection, Refer LV CONSTRUCTION drawing No. 5209.

CONTRACT No. 2004/037/T

SUPERSDED

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Ergon Energy Corporation Ltd
ABN 50 087 646 062
11kV PADMOUNTED SUBSTATION
with LV FUSE SWITCH ONLY

RATING
100kVA

NOTE:
Alternator connection point provided on LV Bus Bars.

11kV PADMOUNTED SUBSTATION
with LV FUSE SWITCHES ONLY

RATING
315kVA
500kVA

NOTE:
Alternator connection point provided on LV Bus Bars.
NOTE:
- 3 x Right angle adaptor brackets with bolts etc. to connect to LV busbars are supplied in plastic bag. Brackets will accept 3 x 300mm² cables per phase.
- Alternator connection point provided on LV Bus Bars.

11kV PADMOUNTED SUBSTATION with LV FUSE SWITCHES ONLY

RATING
750kVA

11kV PADMOUNTED SUBSTATION with LV DISCONNECTOR

RATING
1000kVA

CONTRACT No. 2004/037/T

UNIQUE IDENTIFIER

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - SCHEMATIC
LV SWITCHGEAR ONLY

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NOTE:
Alternator connection point provided on LV Bus Bars.

11kV PADMOUNTED SUBSTATION
with ABB SafeLink RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCHES

RATING
315kVA
500kVA

750kVA

NOTE:
- 3 x Right angle adaptor brackets with bolts etc.
  to connect to LV busbars are supplied in plastic bag.
  Brackets will accept 3 x 300mm² cables per phase.
- Alternator connection point provided on LV Bus Bars.
NOTE:
- 3 x Right angle adaptor brackets with bolts etc. to connect to LV busbars are supplied in plastic bag.
- Brackets will accept 3 x 300mm² cables per phase.
- Alternator connection point provided on LV Bus Bars.

RATING
1000kVA

11kV PADMOUNTED SUBSTATION
with ABB SafeLink RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV DISCONNECTOR

CONTRACT No. 2004 / 037 / T

ORIGINAL ISSUE
8.3.11

DRAWN
C.Lindsay

Dwg 5192 Sh 2
**NOTES:**

1. All Padmounted Substations are supplied with LV Switchgear fitted.

2. HV Switchgear is supplied separately as required.

3. Ensure correct phasing, HV switchgear to transformer cabling, prior to installation of switchgear.

4. Designer to nominate LV fuse link current rating. HV fuse links are provided with switchgear construction.

5. Assy 537-6 fitted with LV board transformer disconnector only

**CONTRACT No. 2004 / 037 / T**

---

### Padmounted Substation Including LV Switchgear

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>537-1</td>
<td>Padmounted Substation 100kVA with LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>537-2</td>
<td>Padmounted Substation 200kVA with LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>537-3</td>
<td>Padmounted Substation 315kVA with LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>537-4</td>
<td>Padmounted Substation 500kVA with LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>537-5</td>
<td>Padmounted Substation 750kVA with LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>537-6</td>
<td>Padmounted Substation 1000kVA with LV Switchgear</td>
<td>1</td>
</tr>
</tbody>
</table>

### LV Fuse

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>529-11</td>
<td>Fuse link 125A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-13</td>
<td>Fuse link 200A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-14</td>
<td>Fuse link 250A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-16</td>
<td>Fuse link 355A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-17</td>
<td>Fuse link 400A din size 2</td>
<td>3</td>
</tr>
</tbody>
</table>

### ABB SD Series HV Switchgear

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>538-2</td>
<td>Ring Main Unit ABB, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>554-3</td>
<td>Cartridge fuse link 16A</td>
<td>3</td>
</tr>
<tr>
<td>554-5</td>
<td>Cartridge fuse link 25A</td>
<td>3</td>
</tr>
<tr>
<td>554-8</td>
<td>Cartridge fuse link 31.5A</td>
<td>3</td>
</tr>
<tr>
<td>554-8</td>
<td>Cartridge fuse link 50A</td>
<td>3</td>
</tr>
<tr>
<td>554-8</td>
<td>Cartridge fuse link 63A</td>
<td>3</td>
</tr>
<tr>
<td>554-11</td>
<td>Cartridge fuse link 80A</td>
<td>3</td>
</tr>
</tbody>
</table>

### Magnefix MD Series HV Switchgear

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>538-1</td>
<td>Ring Main Unit Magnefix, 3 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>538-3</td>
<td>Ring Main Unit Magnefix, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>538-4</td>
<td>Switch Fuse Unit Magnefix, 1 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>555-2</td>
<td>Cartridge fuse link 10A</td>
<td>3</td>
</tr>
<tr>
<td>555-4</td>
<td>Cartridge fuse link 20A</td>
<td>3</td>
</tr>
<tr>
<td>555-5</td>
<td>Cartridge fuse link 25A</td>
<td>3</td>
</tr>
<tr>
<td>555-7</td>
<td>Cartridge fuse link 40A</td>
<td>3</td>
</tr>
<tr>
<td>555-8</td>
<td>Cartridge fuse link 50A</td>
<td>3</td>
</tr>
</tbody>
</table>
For feeder cable connection, Refer HV CONSTRUCTION drawing. No. 5051 (ABB RMU) or drawing. No. 5054 (Magnefix RMU & SFU or Transformer)

For mains distribution cable connection, Refer LV CONSTRUCTION drawing. No. 5209.

ASSY SELECTION

537-1 to 6

538-2 and 554-3 to 11 or 538-1, 3 or 4 and 555-2 to 8

CONTRACT No. 2004 / 037 / T

PM11

UNDERGROUND DISTRIBUTION

11kV PADMOUNTED SUBSTATIONS

FRONT ENTRY TYPE CONSTRUCTION
## MATERIAL - PADMOUNTED SUBSTATION

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>563-3</td>
<td>Padmounted Substation 315kVA with LV Switchgear &amp; Ring Main Unit ABB, SDAF3, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>563-4</td>
<td>Padmounted Substation 500kVA with LV Switchgear &amp; Ring Main Unit ABB, SDAF3, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>563-5</td>
<td>Padmounted Substation 750kVA with LV Switchgear &amp; Ring Main Unit ABB, SDAF3, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>563-6</td>
<td>Padmounted Substation 1000kVA with LV Switchgear &amp; Ring Main Unit ABB, SDAF3, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>554-6</td>
<td>Cartridge fuse link 31.5A (to suit 315kVA padmounted substation)</td>
<td>3</td>
</tr>
<tr>
<td>554-8</td>
<td>Cartridge fuse link 50A (to suit 500kVA padmounted substation)</td>
<td>3</td>
</tr>
<tr>
<td>554-9</td>
<td>Cartridge fuse link 63A (to suit 750kVA padmounted substation)</td>
<td>3</td>
</tr>
<tr>
<td>554-11</td>
<td>Cartridge fuse link 80A (to suit 1000kVA padmounted substation)</td>
<td>3</td>
</tr>
</tbody>
</table>

## MATERIAL - LV FUSE

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>529-11</td>
<td>Fuse link 125A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-13</td>
<td>Fuse link 200A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-14</td>
<td>Fuse link 250A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-16</td>
<td>Fuse link 355A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-17</td>
<td>Fuse link 400A din size 2</td>
<td>3</td>
</tr>
</tbody>
</table>

NOTES:
1. All Padmounted Substations are supplied with LV Switchgear and Ring Main Unit ABB SDAF3, 2 switch 1 fuse fitted.
2. Designer to nominate LV fuse link current rating. HV fuse links are provided with switchgear construction.
Concrete Plinth

For replacement with Safelink RMU Assy 602-1

Assy Selection 554-6 to 11

For mains distribution cable connection, Refer LV CONSTRUCTION drawing No. 5209.

For feeder cable connection, Refer HV CONSTRUCTION drawing No. 5051 (ABB RMU)

ASSY SELECTION 554-6 TO 11

For mains distribution cable connection, Refer LV CONSTRUCTION drawing No. 5209.

For feeder cable connection, Refer HV CONSTRUCTION drawing No. 5051 (ABB RMU)

SIDE VIEW

Concrete Plinth

Assy Selection 563-3 to 6
11kV PADMOUNTED SUBSTATION
with ABB SDAF3 RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
100kVA
11kV PADMOUNTED SUBSTATION
with MAGNEFIX MD451 RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
100kVA

11kV PADMOUNTED SUBSTATION
with MAGNEFIX MD414 SWITCH FUSE UNIT
(1 SWITCHABLE FEEDER UNIT & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
100kVA

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - SCHEMATIC
MAGNEFIX HV SWITCHGEAR & LV SWITCHGEAR
### MATERIAL - PADMOUNTED SUBSTATION

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>587-3</td>
<td>Padmounted Substation 315kVA with LV Switchgear &amp; Schneider Electric FBX, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>587-4</td>
<td>Padmounted Substation 500kVA with LV Switchgear &amp; Schneider Electric FBX, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>587-5</td>
<td>Padmounted Substation 750kVA with LV Switchgear &amp; Schneider Electric FBX, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>587-6</td>
<td>Padmounted Substation 1000kVA with LV Switchgear &amp; Schneider Electric FBX, 2 Switch 1 Fuse</td>
<td>1</td>
</tr>
<tr>
<td>587-7</td>
<td>Padmounted Substation 1500kVA with LV Switchgear &amp; FBX HV Switchgear, 2 Switch 1 Circuit Breaker</td>
<td>1</td>
</tr>
<tr>
<td>555-5</td>
<td>Cartridge fuse link 25A (to suit 315kVA padmounted substation)</td>
<td>3</td>
</tr>
<tr>
<td>555-7</td>
<td>Cartridge fuse link 40A (to suit 500kVA padmounted substation)</td>
<td>3</td>
</tr>
<tr>
<td>555-9</td>
<td>Cartridge fuse link 63A (to suit 750kVA padmounted substation)</td>
<td>3</td>
</tr>
<tr>
<td>555-10</td>
<td>Cartridge fuse link 80A (to suit 1000kVA padmounted substation)</td>
<td>3</td>
</tr>
</tbody>
</table>

### MATERIAL - LV FUSE - EACH CIRCUIT

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>529-11</td>
<td>Fuse link 125A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-13</td>
<td>Fuse link 200A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-14</td>
<td>Fuse link 250A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-15</td>
<td>Fuse link 315A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-16</td>
<td>Fuse link 355A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-17</td>
<td>Fuse link 400A din size 2</td>
<td>3</td>
</tr>
</tbody>
</table>

### MATERIAL - DISTRIBUTION PADLOCK

<table>
<thead>
<tr>
<th>REGION</th>
<th>ASSY</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>595-2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>595-3</td>
<td>6</td>
</tr>
<tr>
<td>Mackay</td>
<td>595-4</td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td>595-5</td>
<td></td>
</tr>
<tr>
<td>Wide Bay</td>
<td>595-6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>595-7</td>
<td></td>
</tr>
<tr>
<td>South West</td>
<td>595-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>595-9</td>
<td></td>
</tr>
</tbody>
</table>

### MATERIAL - LV SWITCH - PARALLEL

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>594-1</td>
<td>LV Parallel Kit to suit Jean Muller</td>
<td>AR</td>
</tr>
<tr>
<td>611-1</td>
<td>Parallel cable adapter to suit Jean Muller</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES:

1. All Padmounted Substations are supplied with LV Switchgear and Ring Main Unit fitted.
2. Designer to nominate LV fuse link current rating. HV fuse links are provided as part of the construction code, they need to be ordered separately when using stock codes.
3. All LV fuse - switch- disconnector bases are 630A rated.
4. Designer to nominate the position of the outgoing cable circuit (refer dwg 5265 for schematic) as follows:
   - Radial feeders - switch disconnector provided with CFI unit
   - Ring feeders - determine the circuit arrangement in consultation with system operations staff
5. Designer to nominate distribution padlock.

**CONTRACT No. 08088EECL**
For feeder cable connection, Refer HV CONSTRUCTION drawing No. 5270 (FBX RMU)

For mains distribution cable connection, Refer LV CONSTRUCTION drawing No. 5209.

Assy Selection 555-5 to 10

Assy Selection 595-2 to 9

Assy Selection 529-11 to 17
& 594-1 (if required)
& 611-1 (if required)

Concrete Plinth

Concrete Plinth

Transformer Lifting Point

Sub-Station & Transformer Lifting Point

Transformer Lifting Point

Sub-Station Lifting Point

Transport Tie Down Point places

Contract No. 08088EECL PM11xxxFBX

11kV PADMOUNTED SUBSTATIONS FRONT ENTRY TYPE WITH LV SWITCHGEAR AND FBX - CONSTRUCTION

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 55 5264 2

Dwg 5264 Sh 2

SUPERSEDED
NOTE:
Alternator connection point provided on LV Bus Bars.

11kV PADMOUNTED SUBSTATION
with SCHNEIDER ELECTRIC FBX RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCHES

NOTE:
- 3 x Right angle adaptor brackets with bolts etc. to connect to LV busbars are supplied in plastic bag. Brackets will accept 3 x 300mm² cables per phase.
- Alternator connection point provided on LV Bus Bars.

RATING
315kVA
500kVA

RATING
750kVA
11kV PADMOUNTED SUBSTATION
with SCHNEIDER ELECTRIC FBX RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV DISCONNECTOR

NOTE:
1. LV circuit breaker is suitable for the termination of 8 x 300mm² cables per phase.
2. Alternator connection point provided on LV bus bars.
3. Refer to dwg 5367 for details of LV wiring & HV protection.

11kV PADMOUNTED SUBSTATION
with SCHNEIDER ELECTRIC FBX RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 CIRCUIT BREAKER TEE)
and LV DISCONNECTOR

NOTE:
- 3 x Right angle adaptor brackets with bolts etc. to connect to LV busbars are supplied in plastic bag. Brackets will accept 3 x 300mm² cables per phase.
- Alternator connection point provided on LV Bus Bars.

1500kVA

RATING
1000kVA

FEEDER CABLE
FEEDER CABLE

16.11.11
T.Borg

CONTRACT No. 08088EECL

630A
630A
630A

3200A 2800A 330A

630A

RATING
1500kVA

DYN
Transformer
11/0.433kV
1500kVA

Short Circuit & Earth Fault Indicator

CABLE FEEDER

Alternator Connection

K. Slater

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - SCHEMATIC
FBX HV SWITCHGEAR & LV SWITCHGEAR

ERGON ENERGY CORPORATION LTD
ABN 50 087 646 062

SUPERSEDED

FILE: 5 5552652
Dwg 5265 Sh 2
HV SCHEMATIC DIAGRAM
SCHNEIDER FBX-CCT2 CONFIGURATION

1500 kVA 11000/415 V
A PHASE
B PHASE
C PHASE

CIRCUIT BREAKER (T2)

LOAD BREAK SWITCH (C)

LINE FEEDER

FAC TOLL INDICATOR

ELBOW CONNECTIONS

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - 1500 kVA
HV SCHEMATIC
### MATERIAL - PADMOUNTED SUBSTATION

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>614-3</td>
<td>Padmounted Substation 315kVA with Siemens 8DJH RMU 2S1F &amp; LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>614-4</td>
<td>Padmounted Substation 500kVA with Siemens 8DJH RMU 2S1F &amp; LV Switchgear</td>
<td></td>
</tr>
<tr>
<td>614-5</td>
<td>Padmounted Substation 750kVA with Siemens 8DJH RMU 2S1F &amp; LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>614-6</td>
<td>Padmounted Substation 1000kVA with Siemens 8DJH RMU 2S1F &amp; LV Switchgear</td>
<td></td>
</tr>
<tr>
<td>614-7</td>
<td>Padmounted Substation 1500kVA with Siemens 8DJH RMU 2S1CB &amp; LV Switchgear</td>
<td>1</td>
</tr>
<tr>
<td>555-5</td>
<td>Cartridge fuse link 25A (to suit 315kVA padmounted substation)</td>
<td>3</td>
</tr>
<tr>
<td>555-7</td>
<td>Cartridge fuse link 40A (to suit 500kVA padmounted substation)</td>
<td></td>
</tr>
<tr>
<td>555-9</td>
<td>Cartridge fuse link 63A (to suit 750kVA padmounted substation)</td>
<td></td>
</tr>
<tr>
<td>555-10</td>
<td>Cartridge fuse link 80A (to suit 1000kVA padmounted substation)</td>
<td></td>
</tr>
</tbody>
</table>

### MATERIAL - LV SWITCH - PARALLEL KIT

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>594-1</td>
<td>LV Parallel Kit to suit Jean Muller</td>
<td>AR</td>
</tr>
<tr>
<td>611-1</td>
<td>Parallel cable adapter to suit Jean Muller</td>
<td>AR</td>
</tr>
</tbody>
</table>

### MATERIAL - DISTRIBUTION PADLOCK

<table>
<thead>
<tr>
<th>REGION</th>
<th>ASSY</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>595-2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>595-3</td>
<td>6</td>
</tr>
<tr>
<td>Mackay</td>
<td>595-4</td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td>595-5</td>
<td></td>
</tr>
<tr>
<td>Wide Bay</td>
<td>595-6</td>
<td>7</td>
</tr>
<tr>
<td>South West</td>
<td>595-7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>595-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>595-9</td>
<td></td>
</tr>
</tbody>
</table>

### MATERIAL - LV FUSE - EACH CIRCUIT

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>529-11</td>
<td>Fuse link 125A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-13</td>
<td>Fuse link 200A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-14</td>
<td>Fuse link 250A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-15</td>
<td>Fuse link 315A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-16</td>
<td>Fuse link 355A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-17</td>
<td>Fuse link 400A din size 2</td>
<td></td>
</tr>
<tr>
<td>586-4</td>
<td>Circuit breaker 1250A (to suit 750kVA padmount substation)</td>
<td>AR</td>
</tr>
<tr>
<td>586-5</td>
<td>Circuit breaker 1600A (to suit 1000kVA padmount substation)</td>
<td>AR</td>
</tr>
</tbody>
</table>

### NOTES:

1. Designer to nominate LV fuse link current rating. HV fuse links are provided as part of the construction code, they need to be ordered separately when using stock codes.
2. Designer to nominate Distribution padlock.
3. Designer to nominate the position of the outgoing cable circuit (refer dwg 5368 for schematic) As follows:
   - Radial Feeders - Switch disconnector provided with CFI Unit.
   - Ring Feeders - Determine the circuit arrangement in consultation with system operations staff.
4. 1500 kVA padmound substations are fitted with a protection relay. Protection group shall be engaged for settings.

### UNDERGROUND DISTRIBUTION

11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE WITH LV SWITCHGEAR & 8DJH SWITCHGEAR - MATERIALS
For mains distribution cable connection, Refer LV CONSTRUCTION drawing No. 5209.

For feeder cable connection, Refer HV CONSTRUCTION drawing No. 5373 (SIEMENS 8DJH RMU)

Concrete Plinth

Sub-Station & Transformer Lifting Point

Transformer Lifting Point

Assy Selection 614-3 to 7

Transport Tie Down Point places

Concrete Plinth

Assy Selection 555-5 to 10

Assy Selection 595-2 to 9

Assy Selection 529-11 to 17 & 594-1, 611-1 (if required) & 586-4, 586-5 (if required)

SUB-DISTRIBUTION

11kV PADMOUNTED SUBSTATIONS

FRONT ENTRY TYPE WITH LV SWITCHGEAR AND 8DJH SWITCHGEAR - CONSTRUCTION

Ergon Energy Corporation Ltd
ABN 50 087 646 062
11kV PADMOUNTED SUBSTATION
with SIEMENS 8DJH RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCHES

RATING
315kVA

Short Circuit
& Earth Fault
Indicator

DYN11 Transformer
11/0.433kV
315kVA

Alternator Connection

11kV PADMOUNTED SUBSTATION
with SIEMENS 8DJH RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCHES

RATING
500kVA

Short Circuit
& Earth Fault
Indicator

DYN11 Transformer
11/0.433kV
500kVA

Alternator Connection
11kV PADMOUNTED SUBSTATION
with SIEMENS 8DJH RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCHES

11kV PADMOUNTED SUBSTATION
with SIEMENS 8DJH RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCHES

DYN11 Transformer
11/0.433kV
750kVA

DYN11 Transformer
11/0.433kV
1000kVA

RATING
750kVA

RATING
1000kVA

Short Circuit & Earth Fault Indicator

Short Circuit & Earth Fault Indicator

630A 630A 630A 200A

630A 630A 630A 630A

HARD COPY
UNCONTROLLED

ERGON ENERGY

Ergon Energy Corporation Ltd
ABN 50 087 646 062

DATE 04.04.17
PASSED A.Bletchly
DRAWN T.Borg

FILE: 5 55 53684
Dwg 5368 Sh4

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE WITH LV SWITCHGEAR & 8DJH SWITCHGEAR - SCHEMATIC
11kV PADMOUNTED SUBSTATION
with SIEMENS 8DJH RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 CIRCUIT BREAKER TEE)
and LV CIRCUIT BREAKER, SWITCH FUSE

NOTES:
1. LV circuit breaker is suitable for the termination of 8 x 300mm² cables per phase.
   Holes are Ø14 spaced 50mm apart.
2. Alternator connection point provided on LV bus bar.
3. Refer sheets 6 & 7 for details of LV wiring and protection circuit.
UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
FRONT ENTRY TYPE - 1500kVA
LV CIRCUIT DIAGRAM

Printed numbers on Multicore wire

Test box terminals 1-10 as viewed from front ID only not labelled

Multifunctional Smart Meter

Connections

LV Circuit Diagram

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 55 5368 7
Dwg 5368 Sh 7

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APPROVED A. Bletchly
DATE 07.03.19
PASSED K. Slater
DRAWN T. Borg

Notes:

- Connections
- Voltage
- Print multcore wire numbers
- Meter numbering differs from multcore wire numbers
- Test box terminals 1-10 as viewed from front ID only not labelled

Diagram:

- LV End
- Transformer
- LV Board
- Transformer Isolator
- 3200A Isolator
- Multifunctional Smart Meter
- Connections
- Voltage
- Printed numbers on Multicore wire
- Meter numbering differs from Multicore Wire Numbers
MATERIAL - RETRO FIT

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>567-12</td>
<td>11kV ABB Safelink 2 switch 1 fuse</td>
<td>1</td>
</tr>
<tr>
<td>612-1</td>
<td>Connection cable transformer to RMU</td>
<td>1</td>
</tr>
</tbody>
</table>

Adapter plates required to fit ABB Safelink RMU to SDAF mounting points. Refer to manufacturing drawing:
1. Rectangular Padmounted Substation 1052548-01
2. Square Padmounted Substation 1052548-02

ASSY DESCRIPTION

567-12 11kV ABB Safelink 2 switch 1 fuse
612-1 Connection cable transformer to RMU

LV SWITCHGEAR COMPARTMENT
TRANSFORMER

Adapter plate design may not work on all rectangular padmounts.

Assy Selection 567-12
Assy Selection 612-1

SIDE VIEW

PLAN VIEW

UNDERGROUND DISTRIBUTION
11kV PADMOUNTED SUBSTATIONS
SDAF RETRO FIT
CONSTRUCTION

Ergon Energy Corporation Ltd
ABN 50 087 646 062
1 SITE

1.1 General
The padmount substation site shall be to the satisfaction of Ergon Energy and fulfil the requirements of the subsequent clauses including:

- Be sensitive to the local environment
- Be secure from third party and environmental damage
- Be relatively flat and structurally sound
- Not be subject to tidal inundation, storm tide or flooding (1:100 year risk)
- Provide secure access for operational purposes
- Not be an obstruction or public nuisance

Along coastal areas the site must be located as far as possible from the shoreline and sheltered from salt spray.

A site should not be located where impact by traffic is likely and, if at a truncated section of the street alignment or other non regular shaped site, the specified rectangular size shall not be reduced.

1.2 Site Size
The minimum area required to accommodate a rectangular type padmounted substation shall be:

<table>
<thead>
<tr>
<th>PADMOUNTED SUBSTATION EARTHING ARRANGEMENT</th>
<th>SITE SIZE (Width x Depth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common earth locations other than community title</td>
<td>4000 x 6000 for flat site</td>
</tr>
<tr>
<td>Common earth community title and sloping sites in other locations</td>
<td>4600 x 6700 for flat site &amp; sloping site with retaining wall</td>
</tr>
<tr>
<td>Separate earth</td>
<td>12000 x 10000 for flat site &amp; sloping site with retaining wall</td>
</tr>
</tbody>
</table>

1.3 Substation Orientation
Except where not practicable, padmounted substations shall be oriented such that the LV cabinet end is facing the dedicated footpath.

1.4 Fire Risk Zone
Protection shall be provided against fire initiated or propagated by any part or element of the padmount substation. The site selection shall provide for the protection of:

- Each building adjacent to or near a padmount substation from the fire hazard originating at the padmount substation.
- Padmount substations from the fire hazards originating in the building adjacent or near the installation.

The below provides the minimum distances required for the separation of padmount substations and buildings.

- Residential buildings (BCA class 1 or 10) - 3.0m
- All other buildings - 6.0m

Drawing 5345 sh 1 & sh 2 show the fire risk zone around a padmount substation.

The separations given are the minimum and any additional separation required by the building owner or local authority shall apply.

Where the separation distance cannot be met between padmount substations and buildings, a barrier with FRL 120/120/120 shall be provided. Where a building or building surface within the fire risk zone has a minimum FRL 120/120/120 no additional barrier is required.

The minimum dimensions for fire barrier is shown on drawing 5345 sh 3.

The separation required between the padmount substation and a barrier of fire rated building is 1.0m.
1 SITE (CONT'D)

1.5 EMF
The table below lists the separation distance between padmounted substations and buildings for which human occupation can be expected for significant periods of time.

<table>
<thead>
<tr>
<th>SUBSTATION SIZE</th>
<th>RESIDENTIAL</th>
<th>COMMERCIAL / INDUSTRIAL</th>
<th>SCHOOLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>315 kVA</td>
<td>3m</td>
<td>4m</td>
<td>4.5m</td>
</tr>
<tr>
<td>500 kVA</td>
<td>4.5m</td>
<td>5m</td>
<td>5.5m</td>
</tr>
<tr>
<td>1000 kVA</td>
<td></td>
<td>7m</td>
<td>8m</td>
</tr>
</tbody>
</table>

1.6 URD
The developer shall provide a padmounted substation site(s) as required by Ergon Energy at no cost to Ergon Energy. The site shall be included in the road reserve, or located on freehold property.

No padmounted substations are to be located in Trustee Reserves.

a) In the Road Reserve:-
The Developer shall obtain all necessary approvals from the Department of Transport or the Local Authority.

b) On Freehold property (including residential or parkland):-
The Developer shall provide Ergon Energy with a registered easement at no cost to Ergon Energy.

1.7 Commercial and Industrial or Landscaped Areas
Whether the padmounted substation is for the sole use of that complex, or is required as part of the distribution network, the owner is required to grant Ergon Energy an easement for the padmounted site, access and cabling.

1.8 Parklands - for other than URD
Obtain the necessary approval for an easement to accommodate the padmounted substation, cabling and access to site.

1.9 Cabling and Access Requirement

**Cabling Only**
Should the cabling route not be available in conjunction with access, a 1.0m wide cable easement is required to the front of the padmount (to align with the front left side where applicable). Additionally 2.0m x 4.0m (padmount site width) is required immediately in front to allow spreading of cables for entry to the padmount and also include the buried earth cable.

**Cabling and Access**
A 4.0m wide easement, or road reserve, from the front of the site is required for cabling and access.

2 SITE PREPARATION

2.1 Generally
Sites shall be prepared in accordance with the included construction drawings.

2.2 Filled Sites
Sites requiring fill shall be provided with compacted fill in accordance with the following:

- For less than 300mm fill, Rolled or Compacted; or
- For greater than 300mm fill, Controlled.

as defined in AS 2870.
3 SLOPING SITES

3.1 Retaining walls / Fences
Retaining walls shall be installed where change in ground level exceeds:
- 200mm in site width
- 400mm in site length or diagonally
within the padmounted substation site. (Note the common earth substation site applies to all situations for this clause).

A safety fence shall be installed for:
- Sloping sites (either front to back or left to right)

Retaining walls and fences shall be constructed to Ergon Energy's standards to satisfy minimum site sizes. For retaining walls refer to drawing 5283 and 5281. For fences refer to drawing 5011.

Alternative designs to those provided in this manual will require a civil engineer's certification (RPEQ). No alternative designs shall be constructed without endorsement by Ergon Energy.

3.2 Rural Sites Only
For padmounted substation sites in rural developments or similar where large allotments are provided and a change in ground level of 300mm or more occurs within 2m of the boundary of the site a 1:4 batter slope in lieu of the retaining wall may be allowed at the sole discretion of Ergon Energy.

On cut battered sites a concrete barrier kerb and channel shall be provided outside the 4000mm x 6000mm to ensure this area remains free of water, silt or similar that could require periodic removal or maintenances. The site size shall be extended as necessary to include the kerb and channel.

4 PMOUNTED SUBSTATION FOUNDATION

4.1 Generally
At stable padmounted substation sites a foundation shall be constructed in accordance with the following:
- 4.1m long substation, base 800mm maximum above ground - refer Drawing No. 5280.
- 4.1m long substation, base 1400mm maximum above ground - refer Drawing No. 5276.

At coastal locations in FN Region, unless agreed otherwise by Ergon Energy, foundations shall be constructed to ensure the base of a padmounted substation is above storm surge level for that location. e.g. In Cairns city, minimum level to the base of a substation shall be AHD 3.6m (R.L. 103.600 Cairns City Council Datum 1976).

LV and/or HV Service Platforms shall be provided where the distance above site surface to top of blockwork at access doors exceeds 400mm.

4.2 Unstable Sites
Where sites are very unstable, and conventional foundation construction techniques as described in this document cannot be applied, a special design shall be required.

In such circumstances, the developer shall obtain a certified design from a Civil Engineer (RPEQ) for Ergon Energy's consideration. No special designs for padmounted substation foundation construction shall be used without the approval of Ergon Energy.
5 BACKFILLING AND FINAL SITE FINISH
Earthling, conduits and cables shall be installed prior to final site finish.
All backfill of the site must be compacted before final site finish in accordance with the applicable drawing.

5.1 Common Earthing Sites
The substation 6.0m x 4.0m site surface is to be finished with interlocking masonry paving (Besser "Interlock" or equivalent approved by Ergon Energy) installed in accordance with the manufacturer’s installation specification. A concrete slab shall not be provided.

5.2 Separate Earthing Sites
In addition to the requirements of Clause 5.1 the remaining ground surface between the barrier kerb (around the paving) and site extremities shall be finished in accordance with drawing No. 5177.

6 ADDITIONAL REQUIREMENTS
6.1 Commercial and Industrial Installation
The preferred location of padmounted substation sites at commercial and industrial developments is at the real property street alignment with the LV cabinet end of the padmounted substation facing the adjoining footpath.

Should the padmounted substation site be located elsewhere on the development, clear all weather access to the site shall be provided for personnel and heavy equipment at all times.

Easy access for a mobile crane must be available for the purpose of installation or replacement.

Ergon Energy cable conduits for the development may be placed in the substation site and shall pass down the sides of the foundation. No conduits shall pass through or under the foundation.

Refer Clause 5 for Backfilling and Final Site Finish.

6.2 Padmounted Substations in Landscaped Areas
When planting vegetation in landscaped areas and gardens, ensure vegetation does not encroach on the padmounted substation site. Take into consideration the fully matured size of vegetation to allow continuing access to the site.

Ergon Energy cable conduits for the development may be placed in the substation site and shall pass down the sides of the foundation. No conduits shall pass through or under the foundation.

Refer Clause 5 for Backfilling and Final Site Finish.

6.3 Padmounted Substations Installation in Parklands
Where the padmounted substation is located in Council Parklands, the installation shall be in accordance with the requirements of drawing No. 5116 Sheets 1 or 2.

7 SPACING BETWEEN PADMOUNTED SUBSTATION AND OTHER METAL OBJECTS - SEPARATE EARTHING SITES
No buildings/residences, fences, including their foundations, LV switchboard earths, or metallic objects are permitted within the clearance zone around the padmount.
Clearance to Telstra assets shall be as noted on EARTHING drawing No. 5125 Sheet 1.
NOTES:

1. The fire risk zone shown applies to the following padmount substation constructions:
   - 315 kVA
   - 500 kVA
   - 750 kVA
   - 1000 kVA

2. The fire risk zone shown applies to Building Code of Australia (BCA) class 1 & 10 buildings.

3. This drawing is indicative only. The fire risk zone extends 3.0m from the outer point of the padmount substation.

4. Easement details shown on this drawing are indicative only. Actual easement size will depend on earthing arrangement and padmount substation location.

The fire risk zone extends 3.0m from the outer point of the padmount substation. No other structures in this zone (unless fire protected).

Legend:
- Fire zone

Residential Boundary
Substation Boundary

R.P. Street Alignment
3.0m

E.G.L

R.P. street alignment

3.0m

Alignment
R.P. Street

F.G.L

alignment
3.0m

padmount substation location.
ed earthing arrangement and easement size will depend on
to the following padmount substation constructions:

- 315 kVA
- 500 kVA
- 750 kVA
- 1000 kVA

This drawing is indicative only. The fire risk zone extends 3.0m from the outer point of the padmount substation.

Easement details shown on this drawing are indicative only. Actual easement size will depend on earthing arrangement and padmount substation location.

The fire risk zone extends 3.0m from the outer point of the padmount substation. No other structures in this zone (unless fire protected).
NOTES:

1. The fire risk zone shown applies to the following padmount substation constructions:
   - 315 kVA
   - 500 kVA
   - 750 kVA
   - 1000 kVA

2. This drawing is indicative only. The fire risk zone extends 6.0m from the outer point of the padmount substation.

3. No buildings shall be in the fire risk zone unless they meet the requirements of a fire resistance surface. Refer sheet 3 for details.

4. Easement details shown on this drawing are indicative only, actual easement size will depend on earthing arrangement and padmount substation location.
NOTES:

1. The fire risk zone shown and barrier requirements apply to the following padmount substation constructions:
   - 315 kVA
   - 500 kVA
   - 750 kVA
   - 1000 kVA

2. Fire resistance surface is a barrier or building surface having a minimum FRL 120/120/120.

3. This drawing is indicative only.
   The minimum size required for the fire resistant surface shall extend 6.0m from the outer point of the padmount.

4. Easement details shown on this drawing are indicative only, actual easement size will depend on earthing arrangement and padmount substation location.
NOTES:

1. Clearance radius is taken from the LV enclosure. Refer table in clause 1.5 of drawing 5114 sh 2 for required distance.
NOTES:

1. For SEPARATE HV & LV earthing provide the clearance zone as shown. The clearance zone is to be maintained free from metallic objects, buildings and structures - including their foundations.

2. HV earth electrodes are to be located as shown on the applicable foundation, earthing and site details. Additional HV earth if required is to be confined within the clearance zone. Provide minimum 2.0m from site side and rear boundaries to earth cable/rod/deep drill hole. Refer EARTHING drawing No.5125.

3. The clearance zone shall be turfed or landscaped with mulched beds and shrubs.

4. Separately earthed padmounts should be located in areas remote from residential dwellings.

5. The entire site shall be an easement to prevent encroachment.
NOTES:
1. Refer drawing No. 5114 Clause 1 for general site requirements.
2. Refer drawing No. 5114 clauses for sloping site requirements.
3. No services other than the Ergon Energy's electric cables shall pass through this padmounted substation site.
4. Clear access to the padmounted substation shall be maintained for Ergon Energy's personnel and heavy equipment.
5. Mature landscaping (including trees, sprinklers etc) shall not encroach onto the padmounted substation site.

FOR SEPARATE HV & LV EARTHING SITES, SIZE AND OTHER REQUIREMENTS. REFER DRAWING No. 5177.
NOTES:

1. For foundation, earthing, site finish and cover plate details:
   • 4.1m long substation, base 800mm maximum above ground. Refer drawing No. 5274.
   • 4.1m long substation, base 1400mm maximum above ground. Refer drawing No. 5276.

2. At coastal locations in FN region, unless agreed otherwise by Ergon Energy, the base of substation is to be above storm surge level for that location. e.g. in Cairns City ONLY = AHD 3.6m (R.L. 103.600 Cairns City Council Datum 1976)

3. The padmounted substation site shall be paved. Refer drawing No. 5114.

4. Where the distance above paving to the base of substation at HV and/or LV cabinet access doors exceeds 400mm, provide service platform/s and access ladder/s. Refer drawing No. 5280.
NOTES:
1. Refer drawing No. 5114 for installation requirements.
2. Ergon Energy's 4600 x 6700 site shall be levelled and surrounding area graded to ensure no ponding of water occurs.
3. No services other than the Ergon Energy's electric cables shall pass through this padmounted substation site.
4. Clear access to the padmounted substation shall be maintained for Ergon Energy's personnel and heavy equipment.
5. Mature landscaping (including trees, sprinklers etc) shall not encroach onto the padmounted substation site.
NOTES:
1. For foundation, earthing, site finish and cover plate details:
   - 4.1m long substation, base 800mm maximum above ground. Refer drawing No. 5348.
2. At coastal locations in FN region, unless agreed otherwise by Ergon Energy, the base of substation is to be above storm surge level for that location. e.g. in Cairns City ONLY = AHD 3.6m (R.L. 103.600 Cairns City Council Datum 1976)
3. The padmounted substation site shall be paved. Refer drawing No. 5114.
4. Where the distance above paving to the base of substation at HV and/or LV cabinet access doors exceeds 400mm, provide service platform/s and access ladder/s. Refer drawing No. 5280.

Underground Distribution
22kV Padmounted Substations
Rectangular Type - Site Finish
Community Title
### MATERIAL - LV FUSE

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>529-13</td>
<td>Fuse link 200A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-14</td>
<td>Fuse link 250A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-15</td>
<td>Fuse link 315A din size 2</td>
<td>3</td>
</tr>
<tr>
<td>529-16</td>
<td>Fuse link 355A din size 2</td>
<td></td>
</tr>
<tr>
<td>529-17</td>
<td>Fuse link 400A din size 2</td>
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### MATERIAL - LV SWITCHGEAR

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>542-3</td>
<td>Padmounted Substation 4.1m Long 500kVA with LV Switchgear</td>
</tr>
<tr>
<td>542-4</td>
<td>Padmounted Substation 4.1m Long 1000kVA with LV Switchgear</td>
</tr>
<tr>
<td>542-5</td>
<td>Padmounted Substation 4.1m Long 315kVA with LV Switchgear</td>
</tr>
<tr>
<td>513-1</td>
<td>Connection earth bar to cover plate</td>
</tr>
</tbody>
</table>

### MATERIAL - PADMOUNTED SUBSTATION INCLUDING LV AND HV SWITCHGEAR

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>576-1</td>
<td>Padmounted Substation 200kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 1 Switch 1 Fuse</td>
</tr>
<tr>
<td>576-2</td>
<td>Padmounted Substation 315kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 2 Switch 1 Fuse</td>
</tr>
<tr>
<td>576-3</td>
<td>Padmounted Substation 315kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 3 Switch 1 Fuse</td>
</tr>
<tr>
<td>576-4</td>
<td>Padmounted Substation 315kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 2 Switch 2 Fuse</td>
</tr>
<tr>
<td>576-5</td>
<td>Padmounted Substation 500kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 2 Switch 1 Fuse</td>
</tr>
<tr>
<td>576-6</td>
<td>Padmounted Substation 500kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 3 Switch 1 Fuse</td>
</tr>
<tr>
<td>576-7</td>
<td>Padmounted Substation 500kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 2 Switch 2 Fuse</td>
</tr>
<tr>
<td>576-8</td>
<td>Padmounted Substation 1000kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 2 Switch 1 Fuse</td>
</tr>
<tr>
<td>576-9</td>
<td>Padmounted Substation 1000kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 3 Switch 1 Fuse</td>
</tr>
<tr>
<td>576-10</td>
<td>Padmounted Substation 1000kVA 4.1m Long with LV Switchgear &amp; RMU F &amp; G 2 Switch 2 Fuse</td>
</tr>
<tr>
<td>556-3</td>
<td>Cartridge fuse link 16A - 200kVA &amp; 315kVA transformers</td>
</tr>
<tr>
<td>556-4</td>
<td>Cartridge fuse link 20A - 500kVA transformers</td>
</tr>
<tr>
<td>556-7</td>
<td>Cartridge fuse link - 40A 1000kVA transformers</td>
</tr>
<tr>
<td>513-1</td>
<td>Connection earth bar to cover plate</td>
</tr>
</tbody>
</table>

1. All padmount substations are supplied fitted with either LV switchgear or LV and HV switchgear as required.
2. Padmount substations for new installations shall be 4.1m long.
3. Designers to nominate LV fuse link current rating.
4. HV fuse links provided with the padmounted substation construction.

Those fitted with 2 switch 2 fuse RMU are supplied with 3 fuse links to suit that transformer only. Designer to nominate required fuse links for the remaining fuse unit.

**CONTRACT No. 2006/0061/T**
For mains distribution cable connection, Refer LV CONSTRUCTION drawing No. 5087.

For feeder cable connection, Refer HV CONSTRUCTION drawing No. 5044 (F & G RMU) or drawing No. 5120 (Transformer).
22kV PADMOUNTED SUBSTATION
with LV FUSE SWITCH ONLY

RATING
315kVA
500kVA

22kV PADMOUNTED SUBSTATION
with LV FUSE SWITCH ONLY

RATING
1000kVA

UNDERGROUND DISTRIBUTION
22kV PADMOUNTED SUBSTATIONS
RECTANGULAR TYPE - SCHEMATIC
LV SWITCHGEAR ONLY

Dwg 5104 Sh
22kV PADMOUNTED SUBSTATION
with F&G GA 1K1T-C RING MAIN UNIT
(1 SWITCHABLE FEEDER UNIT & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
200kVA

22kV PADMOUNTED SUBSTATION
with F&G GA 2K1TS-C RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
315kVA
500kVA

CONTRACT No. 2006/0061/T

UNDERGROUND DISTRIBUTION
22kV PADMOUNTED SUBSTATIONS
RECTANGULAR TYPE - SCHEMATIC
F&G HV SWITCHGEAR AND LV SWITCHGEAR
RECTANGULAR TYPE - SCHEMATIC

5082

22kV PADMOUNTED SUBSTATIONS

F&G HV SWITCHGEAR AND LV SWITCHGEAR

F&G GA 2K2TS-C RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 2 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
315kVA
500kVA

22kV PADMOUNTED SUBSTATION
with F&G GA 3K1TS-C RING MAIN UNIT
(3 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
315kVA
500kVA

CONTRACT No. 2006/0061/T

UNDERGROUND DISTRIBUTION
22kV PADMOUNTED SUBSTATIONS
RECTANGULAR TYPE - SCHEMATIC
F&G HV SWITCHGEAR AND LV SWITCHGEAR

Dwg 5082 sh.2

Ergon Energy Corporation Ltd
ABN 50 087 845 082

APPROVED
C. Nozi

DATE
22/1/03

PASSED
A. Bletchly

DRAWN
G. Lindsay

FILE: 5 55 5082 2

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25.6.11

C. Lindsay
HV SWITCHGEAR SIDE

LV SWITCHGEAR SIDE

RATING

1000kVA

22kV PADMOUNTED SUBSTATION

with F&G GA 2K1TS-C RING MAIN UNIT

(2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)

and LV FUSE SWITCH

RATING

1000kVA

22kV PADMOUNTED SUBSTATION

with F&G GA 3K1TS-C RING MAIN UNIT

(3 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)

and LV FUSE SWITCH

CONTRACT No. 2006/0061/T

UNDERGROUND DISTRIBUTION

22kV PADMOUNTED SUBSTATIONS
RECTANGULAR TYPE - SCHEMATIC
F&G HV SWITCHGEAR AND LV SWITCHGEAR
22kV PADMOUNTED SUBSTATION
with F&G GA 2K2TS-C RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 2 FUSE PROTECTED TEE
and LV FUSE SWITCH

RATING
1000kVA

CONTRACT No. 2006/0061/T
RETAINING WALL CONSTRUCTION

1 SETTING OUT
The Contractor shall be responsible for the correct setting out of works. The Contractor shall establish the actual position of all services on site before commencing work on the site.

2 COMPLIANCE
The Contractor shall comply with acts of parliament, statutory, municipal and other regulations or bylaws, that in any way affect the works, with particular regard to:

- Workplace Health & Safety
- Protection of Public Utilities
- Traffic Hazards and Public Safety.

3 DAMAGE RESPONSIBILITY
The Contractor shall be responsible for any damage to public utility service installations such as water, gas and sewer pipes, electrical, traffic signal or telephone conduits and shall bear the costs of reinstating any service damaged during construction of the works.

4 SPECIAL CONDITIONS
The retaining wall construction drawings provided by Ergon Energy are to be applied in normal situations. Where special conditions exist, (in the opinion of a Civil Engineer RPEQ) such as:

- Extra heavy surcharge
- Unstable ground conditions
- Property boundary limitations
- Excavation or backfilling restrictions

The developer shall provide a certified design from a Civil Engineer (RPEQ) for Ergon Energy's consideration. No special designs for retaining wall construction shall be used without the approval of Ergon Energy.

5 ADDITIONAL REQUESTS
Additional requests will be required if the developer, or the developer's representative, choose to:

- Construct the padmounted substation on a slope where the retaining wall would be higher than 2.0m, or
- Use a different method of construction for the retaining wall

Requests shall be accompanied by a certified design from a Civil Engineer (RPEQ) for Ergon Energy's consideration. No special designs for retaining wall construction shall be used without the approval of Ergon Energy.

6 MASONRY
Concrete masonry materials and workmanship shall comply with AS3700.

Masonry blocks shall be 200 series and shall comply with AS/NZS 4455.

Mortar shall consist of 1 part cement, 1/10 part slaked lime and 3 parts sand measured by volume complying with the requirements of AS 3700 - masonry structures.

The bottom course blocks shall contain an opening to permit clean out of the cell space.
Step top of wall to site slope as required.

END
7 FOUNDATIONS
Where the bearing surface under the foundation is silt or clay soil, a 100mm layer of compacted sand or gravel bedding material shall be placed under the concrete foundation. Foundation must be undisturbed material which is firm and dry. Wall not to be founded on uncompacted fill material. Where the bearing surface is sand, the sand must be compacted via water saturation prior to concrete placement.

8 CONCRETE
Concrete work shall comply with AS3600

Concrete:-
- Foundation - F'c = 25MPa; 75mm Slump; 20mm Max Agg.
- Core Filling - F’c = 17.5MPa; 150mm Slump; 10mm Max Agg.

Concrete foundation slab with continuous reinforcement overlapped at joints shall be poured MONOLITHICALLY (in one operation).

9 REINFORCEMENT
Reinforcement:-
- Hot rolled deformed bar - "TEMPCORE" complying with AS 1302

10 DRAINAGE
50mm weepholes at 1200 centres shall be provided through walls.

A porous backfill such as gravel or coarse sand shall be provided directly behind the wall to allow water to reach the weepholes. It is essential to have suitable filter material between the wall and the natural ground.

11 BACKFILLING
Clay soils and organic silts shall not be used as backfill as they have poor drainage characteristics.

Backfill should not be placed or compacted until the wall has cured (14 days minimum for 17.5 MPa concrete) so as to have sufficient strength to withstand backfilling loads.

Backfill shall be compacted to 95% of the maximum dry density as defined in the Modified Compaction Test - Test AS 1289 - E2.1.

After installation of the padmounted substation and cables has been completed, the ground within the enclosure shall be backfilled, compacted, levelled and finished in accordance with Drawing No. 5118.
CONCRETE STRENGTHS

<table>
<thead>
<tr>
<th></th>
<th>F'c</th>
<th>Slump</th>
<th>Aggregate Size (Max)</th>
<th>Cement Content (Min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td>25MPa</td>
<td>75</td>
<td>20mm</td>
<td>-</td>
</tr>
<tr>
<td>Blockwork / Core Filling</td>
<td>17.5MPa</td>
<td>150</td>
<td>10mm</td>
<td>300kg/cu. m</td>
</tr>
</tbody>
</table>

Concrete infill to be rounded to form watershed capping

N16 at 400 crs
20 cover to inside face

Compacted Backfill material

Site Boundary

Filter material

SL72 mesh
30 cover

Cleanout blocks

N16 at 400 crs
500 lap corners & where necessary

200 series blockwork

N12 at 400
500

N16 at 400 crs
800 with 55 cover

100mm dia conduit through footing for earth spike. Trim top of conduit as req'd.

REMOVING WALL DETAIL

UNDERGROUND DISTRIBUTION
22kV PADMOUNTED SUBSTATIONS
FILLED SLOPING SITE

REMOVING WALL - MAXIMUM HEIGHT 1.2m

APPROVED: C.Noel
DATE: 10.07.12
PASSED: A.Blechley
DRAWN: T.Borghi

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 55281 2

5281 Sh 2
### MATERIAL - LV FUSE

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
<th>QTY</th>
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<tbody>
<tr>
<td>529-13</td>
<td>Fuse link 200A din size 2</td>
<td>1</td>
</tr>
<tr>
<td>529-14</td>
<td>Fuse link 250A din size 2</td>
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<tr>
<td>529-15</td>
<td>Fuse link 315A din size 2</td>
<td>3</td>
</tr>
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<td>529-16</td>
<td>Fuse link 355A din size 2</td>
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</tr>
<tr>
<td>529-17</td>
<td>Fuse link 400A din size 2</td>
<td></td>
</tr>
<tr>
<td>586-3</td>
<td>Circuit Breaker 1600A AR</td>
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### MATERIAL - PADMOUNTED SUBSTATION INCLUDING LV SWITCHGEAR

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>542-3</td>
<td>Padmounted Substation 4.1m Long 500kVA with LV Switchgear</td>
</tr>
<tr>
<td>542-4</td>
<td>Padmounted Substation 4.1m Long 1000kVA with LV Switchgear</td>
</tr>
<tr>
<td>542-5</td>
<td>Padmounted Substation 4.1m Long 315kVA with LV Switchgear</td>
</tr>
<tr>
<td>513-1</td>
<td>Connection earth bar to cover plate</td>
</tr>
</tbody>
</table>

### MATERIAL - DISTRIBUTION PADLOCK

<table>
<thead>
<tr>
<th>SWITCH ARRANGEMENT</th>
<th>REGION</th>
<th>ASSY</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Far North</td>
<td>595-1</td>
<td>6</td>
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<tr>
<td></td>
<td>Central</td>
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<td>12</td>
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<td>31</td>
<td>Far North</td>
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<td>Central</td>
<td>595-5</td>
<td>12</td>
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<td>22</td>
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<td>Central</td>
<td>595-5</td>
<td>12</td>
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<tr>
<td>N/A</td>
<td>Far North Note 9</td>
<td>595-10</td>
<td>4</td>
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</table>

### MATERIAL - PADMOUNTED SUBSTATION INCLUDING LV AND HV SWITCHGEAR

<table>
<thead>
<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>590-1</td>
<td>Padmounted Substation 200kVA 4.1m Long with LV Switchgear &amp; RM6 1 Switch 1 Fuse</td>
</tr>
<tr>
<td>590-2</td>
<td>Padmounted Substation 315kVA 4.1m Long with LV Switchgear &amp; RM6 2 Switch 1 Fuse</td>
</tr>
<tr>
<td>590-3</td>
<td>Padmounted Substation 315kVA 4.1m Long with LV Switchgear &amp; RM6 3 Switch 1 Fuse</td>
</tr>
<tr>
<td>590-4</td>
<td>Padmounted Substation 315kVA 4.1m Long with LV Switchgear &amp; RM6 2 Switch 2 Fuse</td>
</tr>
<tr>
<td>590-5</td>
<td>Padmounted Substation 500kVA 4.1m Long with LV Switchgear &amp; RM6 2 Switch 1 Fuse</td>
</tr>
<tr>
<td>590-6</td>
<td>Padmounted Substation 500kVA 4.1m Long with LV Switchgear &amp; RM6 3 Switch 1 Fuse</td>
</tr>
<tr>
<td>590-7</td>
<td>Padmounted Substation 500kVA 4.1m Long with LV Switchgear &amp; RM6 2 Switch 2 Fuse</td>
</tr>
<tr>
<td>590-8</td>
<td>Padmounted Substation 1000kVA 4.1m Long with LV Switchgear &amp; RM6 2 Switch 1 Fuse</td>
</tr>
<tr>
<td>590-9</td>
<td>Padmounted Substation 1000kVA 4.1m Long with LV Switchgear &amp; RM6 3 Switch 1 Fuse</td>
</tr>
<tr>
<td>590-10</td>
<td>Padmounted Substation 1000kVA 4.1m Long with LV Switchgear &amp; RM6 2 Switch 2 Fuse</td>
</tr>
<tr>
<td>556-3</td>
<td>Cartridge fuse link 16A - 200kVA &amp; 315kVA transformers</td>
</tr>
<tr>
<td>556-4</td>
<td>Cartridge fuse link 20A - 500kVA transformers</td>
</tr>
<tr>
<td>556-7</td>
<td>Cartridge fuse link - 40A 1000kVA transformers</td>
</tr>
<tr>
<td>513-1</td>
<td>Connection earth bar to cover plate</td>
</tr>
<tr>
<td>550-7</td>
<td>Fuse Switch, 630A to suit Merlin Gerin Opus Switchboard</td>
</tr>
<tr>
<td>613-1</td>
<td>Parallel cable adapter to suit Schneider fuse switch</td>
</tr>
</tbody>
</table>

### UNDERGROUND DISTRIBUTION

**22kV PADMOUNTED SUBSTATIONS**

**RECTANGULAR TYPE**

**MATERIAL**
NOTES:

1. All padmount substations are supplied fitted with either LV switchgear or LV and HV switchgear as required.
2. Padmount substations for new installations shall be 4.1m long.
3. Designers to nominate LV fuse link current rating
4. HV fuse links are provided with the padmounted substation as part of the construction code. They need to be ordered separately when using stock codes. Those fitted with 2 switch 2 fuse RMU are supplied with 3 fuse links to suit that transformer only. Designer to nominate required fuse links for the remaining fuse unit
5. All LV fuse - switch - disconnectors bases are 630A rated.
6. Designer to nominate the position of the outgoing cable circuit (refer dwg 5267 for schematic) As follows:
   - Radial feeders - switch disconnector provided with CFI unit.
   - Ring feeders - determine the circuit arrangement in consultation with system operations staff.
7. Designer to nominate distribution padlock.
8. Order for replacement switch only.
For mains distribution cable connection, Refer LV CONSTRUCTION drawing No. 5087.

For feeder cable connection, Refer HV CONSTRUCTION drawing No. 5279 (RM6 RMU) or drawing No. 5120 (Transformer).

For mains distribution cable connection, Refer HV CONSTRUCTION drawing No. 5087.

For feeder cable connection, Refer HV CONSTRUCTION drawing No. 5279 (RM6 RMU) or drawing No. 5120 (Transformer).
22kV PADMOUNTED SUBSTATION with SCHNEIDER ELECTRIC RM6 NE-QI RING MAIN UNIT (1 SWITCHABLE FEEDER UNIT & 1 FUSE PROTECTED TEE) and LV FUSE SWITCH

RATING
200kVA

22kV PADMOUNTED SUBSTATION with SCHNEIDER ELECTRIC RM6 NE-IQI RING MAIN UNIT (2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE) and LV FUSE SWITCH

RATING
315kVA
500kVA

CONTRACT No. 08088EECL

HARD COPY UNCONTROLLED
22kV PADMOUNTED SUBSTATION
with SCHNEIDER ELECTRIC RM6 NE-IIIQ1 RING MAIN UNIT
(3 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
315kVA
500kVA

22kV PADMOUNTED SUBSTATION
with SCHNEIDER ELECTRIC RM6 NE-IIIQ1 RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 2 FUSE PROTECTED TEE)
and LV FUSE SWITCH

RATING
315kVA
500kVA

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 555267 2
Dwg 5267 Sh 2

HARD COPY UNCONTROLLED
22kV PADMOUNTED SUBSTATION with SCHNEIDER ELECTRIC RM6 NE-IQI RING MAIN UNIT (2 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE) and LV FUSE SWITCH

RATING
1000kVA

22kV PADMOUNTED SUBSTATION with SCHNEIDER ELECTRIC RM6 NE-IQI RING MAIN UNIT (3 SWITCHABLE FEEDER UNITS & 1 FUSE PROTECTED TEE) and LV FUSE SWITCH

RATING
1000kVA

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5  55 5267 3
Dwg 5267  Sh 3
22kV PADMOUNTED SUBSTATION
with SCHNEIDER ELECTRIC RM6 NE-QIQI RING MAIN UNIT
(2 SWITCHABLE FEEDER UNITS & 2 FUSE PROTECTED TEE
and LV FUSE SWITCH)

RATING
1000kVA

CONTRACT No. 08088EECL

UNDERGROUND DISTRIBUTION
22kV PADMOUNTED SUBSTATIONS
RECTANGULAR TYPE - SCHEMATIC
SCHNEIDER ELECTRIC HV SWITCHGEAR AND LV SWITCHGEAR

Ergon Energy Corporation Ltd
ABN 50 087 646 062

FILE: 5 55 5267 4
Dwg 5267 Sh 4
22kV PADMOUNTED SUBSTATION
Schneider Electric with LV FUSE SWITCH ONLY

RATING
315kVA
500kVA

22kV PADMOUNTED SUBSTATION
Schneider Electric with LV FUSE SWITCH ONLY

RATING
1000kVA

CONTRACT No. 08088EECL

UNDERGROUND DISTRIBUTION
22kV PADMOUNTED SUBSTATIONS
RECTANGULAR TYPE - SCHEMATIC
SCHNEIDER ELECTRIC LV SWITCHGEAR ONLY

Ergon Energy Corporation Ltd
ABN 50 087 646 062
1 CONSTRUCTION CO-ORDINATION

Co-ordination is required during foundation construction and finish of the Padmounted Substation site to ensure installation of conduit, earthing and (where required) service platforms. The Civil Service Provider is responsible for co-ordination of works, notifying Ergon Energy or other Service Provider(s), as required.

2 SERVICE PLATFORMS

Where the distance above paving to the top of blockwork at HV and/or LV cabinet access doors exceeds 400mm, provide service platform(s) and access ladder(s).

Refer PADMOUNTED SUBSTATIONS dwg No. 5280 for details.

3 CONCRETE

(a) All concrete work shall be in accordance with AS 3600 & AS 2870.
(b) Concrete for footings and slabs shall be grade N20 to AS 3600.
(c) Minimum cover to reinforcement - 40mm.

4 CABLE CONDUITS

Refer Underground Construction Manual TRENCHING:
Drawing 5142 for HV and LV conduit locations.

5 EARTHING CABLE PROTECTION CONDUITS

Provide 25 dia UPVC conduit at earth penetrations through 50mm thick unreinforced concrete slab.

6 DRAINAGE SLOTS

Provide approx. 5mm wide slots down to finished ground level to drain sand bedding under paving. Terminate top reinforcement bar each side of slot. On flat sites provide slots at 2m max. spacing on all sides and on sloping sites at 2m max. spacing on 'down hill' sides.

7 MASONRY BLOCKWORK

(a) Concrete blocks shall be grade 15 in accordance with AS2733 and AS3700.
(b) Mortar shall be class M3 in accordance with AS 3700.
(c) Grout shall be 20MPa at 28 days - 10mm maximum aggregate size.
(d) Concrete masonry material and workmanship shall comply with AS 3700.
(e) Masonry blocks shall be 200 series and comply with AS/NZS 4455.
(f) All cores containing reinforcement shall be grout filled. Provide an opening in bottom course to permit clean out of cell space.
(g) Vertical reinforcement to block walls shall be 1/Y12 at corners, beside openings and at 1200mm max. centres.
(h) Reinforce single course bond beam at top of wall with 2/Y12 bars horizontally.

8 ALUMINIUM COVER PLATES & SUPPORT ANGLES

Provide 3mm marine grade Aluminium cover plates fitted to Aluminium support L at (2) openings in blockwork. Obtain final dimensions on site.
150mm thick concrete slab (Grade N20) placed centrally.

200 series bond Beam 2/N12 bars horizontally

N12 bars Vertically

150mm thick concrete slab (Grade N20) reinforced with one layer SL72 mesh placed centrally.

SECTION A
Cable conduit omitted from view

SECTION B
Cable conduit omitted from view

SECTION C
Cable conduit omitted from view

VIEW
Cable conduit omitted from view

2/N12 Bars
Min 600 Lap, 40 Cover
Barrier Kerb

6 Thick x 25mm dia Backing Plate
Stitch weld
Drill & tap for M10 SS ‘D’ Head Bolts

14 dia hole for Earth Connection

Cover Plate

10 thick x 50mm dia Backing Plate
Stitch weld
Drill & tap M12 (2 places) for lifting holes

25dia Earthing Protection Conduit: Refer Note 5

25dia Earthing Protection Conduit: Refer Note 5

7.5 dia x 4.6 L
Nail Weld

M10 Galv. Masonary Anchors
@ 400 max crs.

Drill & tap M10 SS ‘D’ Head Bolts
Stitch weld
6 Thick x 25mm dia Backing Plate

UNDERGROUND DISTRIBUTION
22kV PADMOUNTED SUBSTATIONS
RECTANGULAR 3.7m LONG, 800mm MAXIMUM ABOVE
GROUND FOUNDATION, EARTHING & SITE FINISH DETAILS
1 CONSTRUCTION CO-ORDINATION

Co-ordination is required during foundation construction and finish of the Padmounted Substation site to ensure installation of conduit, earthing and (where required) service platforms. The Civil Service Provider is responsible for co-ordination of works, notifying Ergon Energy or other Service Provider(s), as required.

2 SERVICE PLATFORMS

Where the distance above paving to the top of blockwork at HV and/or LV cabinet access doors exceeds 400mm, provide service platform(s) and access ladder(s).

Refer PADMOUNTED SUBSTATIONS dwg No. 5280 for details.

3 CONCRETE

(a) All concrete work shall be in accordance with AS 3600 & AS 2870.
(b) Concrete for footings and slabs shall be grade N20 to AS 3600.
(c) Minimum cover to reinforcement - 40mm.

4 CABLE CONDUITS


5 EARTHING CABLE PROTECTION CONDUITS

Provide 25 dia UPVC conduit at earth penetrations through 50mm thick unreinforced concrete slab.

6 DRAINAGE SLOTS

Provide approx. 5mm wide slots down to finished ground level to drain sand bedding under paving. Terminate top reinforcement bar each side of slot. On flat sites provide slots at 2m max. spacing on all sides and on sloping sites at 2m max. spacing on 'down hill' sides.

7 MASONRY BLOCKWORK

(a) Concrete blocks shall be grade 15 in accordance with AS2733 and AS3700.
(b) Mortar shall be class M3 in accordance with AS 3700.
(c) Grout shall be 20MPa at 28 days - 10mm maximum aggregate size.
(d) Concrete masonry material and workmanship shall comply with AS 3700.
(e) Masonry blocks shall be 200 series and comply with AS/NZS 4455.
(f) All cores containing reinforcement shall be grout filled. Provide an opening in bottom course to permit clean out of cell space.
(g) Vertical reinforcement to block walls shall be 1/Y12 at corners, beside openings and at 1200mm max. centres.
(h) Reinforce single course bond beam at top of wall with 2/Y12 bars horizontally.

8 ALUMINIUM COVER PLATES & SUPPORT ANGLES

Provide 3mm marine grade Aluminium cover plates fitted to Aluminium support L at (2) openings in blockwork. Obtain final dimensions on site.
**GROUND FOUNDATION, EARTHING & SITE FINISH DETAILS**

**RECTANGULAR 4.1m LONG, 800mm MAXIMUM ABOVE 22kV PADMOUNTED SUBSTATIONS**

- 150mm thick concrete slab (Grade N20) reinforced with one layer SL72 mesh placed centrally.
- 200 Series Bond Beam 2/N12 bars horizontally.
- N12 bars vertically.
- Section A
- Cable conduit omitted from view.

**SECTION B**
- 150mm thick concrete slab (Grade N20) reinforced with one layer SL72 mesh placed centrally.
- 203 Min. height above 400mm compacted, well graded, course bedding sand.
- 2/N12 Bars Min 600 Lap, 40 Cover Barrier Kerb.

**SECTION C**
- Cable conduit omitted from view.
- 6 Thick x 25mm dia Backing Plate Stitch weld Drill & tap for M10 SS 'D' Head Bolts.
- 10 thick x 50mm dia Backing Plate Stitch weld Drill & tap M12 (2 places) for lifting holes.
- 30 series bond beam reinforced with one layer SL72 mesh.
- 75 dia Earthing Protection Conduit. Refer Note 5.
- 25 dia Earthing Protection Conduit. Refer Note 5.

**VIEW**
- 14 dia Hole for Earth Connection
- Cover Plate
- Drill & tap M12 (2 places) for lifting holes
- M10 Galv. Masonary Anchors @ 400 max crs.

**50mm thick unreinforced concrete Vapour Barrier 50mm thick unreinforced concrete**

**5274 UNDERGROUND DISTRIBUTION**

**22kV PADMOUNTED SUBSTATIONS**

**RECTANGULAR 4.1m LONG, 800mm MAXIMUM ABOVE**

**GROUND FOUNDATION, EARTHING & SITE FINISH DETAILS**

**ERGON ENERGY CORPORATION LTD**

**DRAWN: T. Borg**

**FILE: 5 5552743**
1 CONSTRUCTION CO-ORDINATION

Co-ordination is required during foundation construction and finish of the Padmounted Substation site to ensure installation of conduit, earthing and (where required) service platforms. The Civil Service Provider is responsible for co-ordination of works, notifying Ergon Energy or other Service Provider(s), as required.

2 SERVICE PLATFORMS

Where the distance above paving to the top of blockwork at HV and/or LV cabinet access doors exceeds 400mm, provide service platform(s) and access ladder(s). Refer PADMOUNTED SUBSTATIONS dwg No. 5280 for details.

3 CONCRETE

(a) All concrete work shall be in accordance with AS 3600 & AS 2870.
(b) Concrete for footings and slabs shall be grade N20 to AS 3600.
(c) Minimum cover to reinforcement - 40mm.

4 CABLE CONDUITS


5 EARTHING CABLE PROTECTION CONDUITS

Provide 25 dia UPVC conduit at earth penetrations through 50mm thick unreinforced concrete slab.

6 DRAINAGE SLOTS

Provide approx. 5mm wide slots down to finished ground level to drain sand bedding under paving. Terminate top reinforcement bar each side of slot. On flat sites provide slots at 2m max. spacing on all sides and on sloping sites at 2m max. spacing on 'down hill' sides.

7 MASONRY BLOCKWORK

(a) Concrete blocks shall be grade 15 in accordance with AS2733 and AS3700.
(b) Mortar shall be class M3 in accordance with AS 3700.
(c) Grout shall be 20MPa at 28 days - 10mm maximum aggregate size.
(d) Concrete masonry material and workmanship shall comply with AS 3700.
(e) Masonry blocks shall be 200 series and comply with AS/NZS 4455.
(f) All cores containing reinforcement shall be grout filled. Provide an opening in bottom course to permit clean out of cell space.
(g) Vertical reinforcement to block walls shall be 1/Y12 at corners, beside openings and at 1200mm max. centres.
(h) Reinforce single course bond beam at top of wall with 2/Y12 bars horizontally.

8 ALUMINIUM COVER PLATES & SUPPORT ANGLES

Provide 3mm marine grade Aluminium cover plates fitted to Aluminium support L at (2) openings in blockwork. Obtain final dimensions on site.
1 CONSTRUCTION CO-ORDINATION

Co-ordination is required during foundation construction and finish of the Padmounted Substation site to ensure installation of conduit, earthing and (where required) service platforms. The Civil Service Provider is responsible for co-ordination of works, notifying Ergon Energy or other Service Provider(s), as required.

2 SERVICE PLATFORMS

Where the distance above paving to the top of blockwork at HV and/or LV cabinet access doors exceeds 400mm, provide service platform(s) and access ladder(s). Refer PADMOUNTED SUBSTATIONS dwg No. 5280 for details.

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4 CABLE CONDUITS


5 EARTHING CABLE PROTECTION CONDUITS

Provide 25 dia UPVC conduit at earth penetrations through 50mm thick unreinforced concrete slab.

6 DRAINAGE SLOTS

Provide approx. 5mm wide slots down to finished ground level to drain sand bedding under paving. Terminate top reinforcement bar each side of slot. On flat sites provide slots at 2m max. spacing on all sides and on sloping sites at 2m max. spacing on 'down hill' sides.

7 MASONRY BLOCKWORK

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(h) Reinforce single course bond beam at top of wall with 2/Y12 bars horizontally.

8 ALUMINIUM COVER PLATES & SUPPORT ANGLES

Provide 3mm marine grade Aluminium cover plates fitted to Aluminium support L at (2) openings in blockwork. Obtain final dimensions on site.
UNDERGROUND DISTRIBUTION
22kV PADMOUNTED SUBSTATIONS
RECTANGULAR 4.1m LONG, 1400mm MAXIMUM ABOVE GROUND FOUNDATION, EARTHING & SITE FINISH DETAILS
150mm thick concrete slab (Grade N20) reinforced with one layer 5/2 mesh placed centrally.

**SECTION**

Cable conduit omitted from view

**SECTION**

Cable conduit omitted from view

**VIEW**

Cable Conduit

M10 Galv. Masonary Anchors

@ 400 max cms.

Drill & tap for M10 SS 'D' Head Bolts

Stitch weld

10 thick x 50mm dia Backing Plate

Drill & tap M12 (2 places) for lifting holes

29.05.15

Ergon Energy Corporation Ltd

ABN 50 087 646 062

FILE: 5 5552763
1 CONSTRUCTION CO-ORDINATION

Co-ordination is required during foundation construction and finish of the Padmounted Substation site to ensure installation of conduit, earthing and (where required) service platforms. The Civil Service Provider is responsible for co-ordination of works, notifying Ergon Energy or other Service Provider(s), as required.

2 SERVICE PLATFORMS

Where the distance above paving to the top of blockwork at HV and/or LV cabinet access doors exceeds 400mm, provide service platform(s) and access ladder(s). Refer PADMOUNTED SUBSTATIONS dwg No. 5280 for details.

3 CONCRETE

(a) All concrete work shall be in accordance with AS 3600 & AS 2870.
(b) Concrete for footings and slabs shall be grade N20 to AS 3600.
(c) Minimum cover to reinforcement - 40mm.

4 CABLE CONDUITS


5 EARTHING CABLE PROTECTION CONDUITS

Provide 25 dia UPVC conduit at earth penetrations through 50mm thick unreinforced concrete slab.

6 DRAINAGE SLOTS

Provide approx. 5mm wide slots down to finished ground level to drain sand bedding under paving. Terminate top reinforcement bar each side of slot. On flat sites provide slots at 2m max. spacing on all sides and on sloping sites at 2m max. spacing on 'down hill' sides.

7 MASONRY BLOCKWORK

(a) Concrete blocks shall be grade 15 in accordance with AS2733 and AS3700.
(b) Mortar shall be class M3 in accordance with AS 3700.
(c) Grout shall be 20MPa at 28 days - 10mm maximum aggregate size.
(d) Concrete masonry material and workmanship shall comply with AS 3700.
(e) Masonry blocks shall be 200 series and comply with AS/NZS 4455.
(f) All cores containing reinforcement shall be grout filled. Provide an opening in bottom course to permit clean out of cell space.
(g) Vertical reinforcement to block walls shall be 1/Y12 at corners, beside openings and at 1200mm max. centres.
(h) Reinforce single course bond beam at top of wall with 2/Y12 bars horizontally.

8 ALUMINIUM COVER PLATES & SUPPORT ANGLES

Provide 3mm marine grade Aluminium cover plates fitted to Aluminium support L at (2) openings in blockwork. Obtain final dimensions on site.
Rectangular 4.1m long, 800mm maximum above 22kV padmount substations

150mm thick concrete slab (Grade N20) reinforced with one layer SL72 mesh placed centrally

200 Series Bond Beam 2/N12 bars horizontally
N12 bars vertically

SECTION

Cable conduit omitted from view

M10 Galv. Masonary Anchors @ 400 max crs.

Cover Plate

14 dia hole for earth connection

6 Thick x 25mm dia Backing Plate
Stitch weld
Drill & tap for M10 SS 'D' Head Bolts

D 5

50

40

35

25

19

12

10

7

8

5

2

1

200 Series Bond Beam

200 Min

300 Max

500 Max

Cable Conduits

Refer Note 4

35 dia Earthing Protection Conduit: Refer Note 5

Drill & tap M12 (2 places) for lifting holes

Stitch weld 6 Thick x 50mm dia Backing Plate

Refer Note 5.

25dia Earthing Protection Conduit: Refer Note 5

SECTION

C SCALE 1:10

VIEW

SCALE 1:10

N12 bars Vertically

50mm thick unreinforced concrete

Vapour Barrier

Compacted, well graded, course bedding sand.

50mm thick unreinforced concrete

Vapour Barrier

40mm Min. compactive layer of compacted, well graded course bedding sand.

2/N12 Bars Min 600 Lap, 40 Cover

Barrier Kerb

Min Fall: 1 in 50

Natural Surface

SECTION

Cable conduit omitted from view
MATERIAL: Structural steel bars and sections shall be in accordance with AS/NZS 3679 - 250. Circular hollow sections shall be in accordance with AS 1163 - C250.

TOLERANCES: ± 2mm except where otherwise specified on drawing.

FABRICATION: (a) Welds shall be category SP in accordance with AS/NZS 1554.1. All joints shall be full seal welds unless noted otherwise. Fillet welds shall be 5mm.
(b) Remove sharp edges, burrs and weld spatter prior to galvanizing.
(c) Remove slag after galvanizing.

PROTECTIVE COAT: Hot dip galvanize after fabrication in accordance with AS/NZS 4680.

CONCRETE: (a) All concrete work shall be in accordance with AS 3600.
(b) Concrete shall be grade N20 in accordance with AS 3600.
(c) Minimum cover to reinforcement - 65mm.

NOTES: (a) Fix Gridmesh to support frame using galv. clamps in accordance with manufacturers requirements.
(b) Chain to be hooked on Padmount side of Platform. Chain and hook to be clear of ladder access when in unhooked position.
(c) Establish height of service platforms and ladders on site.
1.1 Fire Risk Zone

Protection shall be provided against fire initiated or propagated by any part or element of the padmounted auto transformer. The site selection shall provide for the protection of:

- Each building adjacent to or near a padmount auto transformer from the fire hazard originating at the padmounted auto transformer.
- Padmount auto transformer from the fire hazards originating in the building adjacent or near the installation.

The below provides the minimum distances required for the separation of padmounted auto transformers and buildings.

- All other buildings - 10.0m

Drawing 5345 sh 1 & sh 2 show the fire risk zone around a padmount auto-transformer.

The separations given are the minimum and any additional separation required by the building owner or local authority shall apply.

Where the separation distance cannot be met between padmounted auto transformer and buildings, a barrier with FRL 120/120/120 shall be provided. Where a building or building surface within the fire risk zone has a minimum FRL 120/120/120 no additional barrier is required.

The separation required between the padmount substation and a barrier of fire rated building is 5.0m
NOTES:
1. For foundation, earthing, site finish and cover plate details refer drawing 5352, and 5353.
2. The padmounted substation site shall be paved. Refer drawing No. 5352.
NOTES:

1. The clearance zone is to be maintained free from metallic objects, buildings and structures - including their foundations.

2. HV earth electrodes are to be located as shown on the applicable foundation, earthing and site details.
   Additional HV earth if required is to be confined within the clearance zone. Provide minimum 2.0m from site side and rear boundaries to earth cable/rod/deep drill hole.
   Refer EARTHING drawing No.5353.

3. The clearance zone shall be turfed or landscaped with mulched beds and shrubs.

4. Padmounted Auto Transformers should be located in areas remote from residential dwellings.

5. The entire site shall be an easement to prevent encroachment.
1 CONSTRUCTION CO-ORDINATION

Co-ordination is required during foundation construction and finish of the Padmounted Transformer site to ensure installation of conduit, earthing. The Civil Service Provider is responsible for co-ordination of works, notifying Ergon Energy or other Service Provider(s), as required.

2 SLOPING SITES

The foundation drawings provided by Ergon Energy are for a maximum of 4 courses of blockwork (includes blocks above & below finished surface level). Where sloping sites dictate additional courses are required, refer to Ergon Energy.

3 CONCRETE

(a) All concrete work shall be in accordance with AS 3600 & AS 2870.
(b) Concrete for footings and slabs shall be grade N20 to AS 3600.
(c) Minimum cover to reinforcement - 40 mm.

4 CABLE CONDUITS


5 EARTHING CABLE PROTECTION CONDUITS

Provide 25 dia UPVC conduit at earth penetrations through 50 mm thick unreinforced concrete slab.

6 DRAINAGE SLOTS

Provide approx. 5 mm wide slots down to finished ground level to drain sand bedding under paving. Terminate top reinforcement bar each side of slot. On flat sites provide slots at 2 m max. spacing on all sides and on sloping sites at 2 m max. spacing on 'down hill' sides.

7 MASONRY BLOCKWORK

(a) Concrete blocks shall have an unconfined compressive strength of 15 MPa in accordance with AS/NZS 4455.1 and AS3700.
(b) Mortar shall be class M3 in accordance with AS 3700.
(c) Grout shall be 20 MPa at 28 days - 10 mm maximum aggregate size.
(d) Concrete masonry material and workmanship shall comply with AS 3700.
(e) Masonry blocks shall be 200 series and comply with AS/NZS 4455.
(f) All cores containing reinforcement shall be grout filled. Provide an opening in bottom course to permit clean out of cell space.
(g) Vertical reinforcement to block walls shall be 1/Y12 at corners, beside openings and at 1200 mm max. centres.
(h) Reinforce single course bond beam at top of wall with 2/Y12 bars horizontally.

8 ALUMINIUM COVER PLATES & SUPPORT ANGLES

Provide 3 mm marine grade Aluminium cover plates fitted to Aluminium support L at (2) openings in blockwork. Obtain final dimensions on site.

9 BACKFILLING AND FINAL SITE FINISH

Earthing conduits and cables shall be installed prior to final site finish. All backfill of the site must be compacted before final site finish in accordance with the applicable drawing. The transformer 7.0 m x 6.0 m site surface is to be finished with interlocking masonary paving (Besser "interlock" or equivalent approved by Ergon Energy) installed in accordance with the manufacturer's installation specification.
### NOTES

1. 'Supershearflex' pads shall be fitted between the foundation and padmount.

### MATERIAL - PADMOUNTED SUB STATION

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<tr>
<th>ASSY</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>610-1</td>
<td>Padmounted Auto Transformer 5000kVA</td>
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**Assy 610-1**
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<th>LV VOLTS</th>
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Underground Distribution
Padmounted Substations
22/11kV Padmounted Auto Transformer
OTI, PRV Wiring

Oil Temperature Indicator (OTI)
- Alarm 95°C
- Trip 100°C
- Connections: 13-14, 23-24, ER1

Pressure Relief/Valve (PRV)
- Trip 700kPa
- Connections: 13-14, 21-22, ER

OTI Alarm
OTI Trip
Pressure Relief/Valve Trip

Alarm and Trip Circuits
- ER1, ER2 Connections

Ergon Energy Corporation Ltd
ABN 50 087 646 062

A. Bletchly
C. Noel
T. Borg

File: 5 55 5356 3

Dwg 5356 Sh 3