TYPICAL
LV. BOARD FEEDING OUTSIDE AREA
+ LV.CUST. ISOL.

Typical LV. Isolator

TO CONSUMERS
SWITCH BOARD

TO EARTH RING
(2x70mm)

TO CONSUMERS
SWITCH BOARD

TO EARTH RING
(2x70mm)
NOTE:
For access to MEN LINK remove End Panel of Cabinet.

CTS & L/A PREWIRED

TO NEUTRAL 1 x 120mm

TRANSF. MEN

COPPER EARTH STRAP INSIDE CABINET

EARTH CONNECTION TO SUBST. EARTH RING.

DETAIL A

LV CABLE BOX

LV CABLE BOX STRAP

SEE DETAIL A

SIGN

TRANSF MEN BEHIND HERE

END ELEVATION

SIDE ELEVATION

120mm MEN LINK TO NEUTRAL

MEN LINK

EARTH STRAP

EARTH CONNECTION TO SUBST. EARTH RING.

NOTES:
4 x EARTH CONNECTION POINTS PROVIDED AT OPPOSITE CORNERS OF THE TRANSFORMER CABINET FOR CONNECTION TO SUBSTATION EARTH GRID.
NOTE:
FOR ACCESS TO MEN LINK REMOVE END PANEL OF CABINET.
NOTE:
SUBSTATION ROOM DIMENSIONS TO BE INCREASED AS REQUIRED.
MANDATORY CLEARANCES OF (900 BETWEEN SWITCHGEAR AND 1500 FOR OPERATION OF SWITCHGEAR) MUST BE MAINTAINED WHERE H-FRAME IS INSTALLED.
MATERIAL: PARALLEL FLANGE CHANNEL - 150 H x 75 W x 9.5 T(FLANGE) x 6 T(WEB)
PRODUCT CODE 150 PFC GR 300
TO BE HOT DIP GALVANISED.

NOTES:
1. USE IN RETROFIT APPLICATIONS ONLY.
2. NON STANDARD SUPPORT CHANNEL USED IN LIEU. OF SUSPENDED SLAB OF TRENCH.
3. FOR MAXIMUM TRENCH WIDTH 900mm.
4. FOR GROUND TRANSFORMERS UP TO 5,500kg.
15. EARTHING DRAWINGS

7917-A4a   Earth Connections for Transformers with LV Equipment (MEN Area)
7918-A4a   Earth Connections for Transformers with LV Equipment
            (Separate Earthing Area)
7919-A4b   Details of Earth Pockets, Floor Chases & Earthwire Connections
7920-A4a   Earth Connections for Transformers using LV Cubicles for
            Separate Earthing Modifications on LV Cubicles
7921-A4c   Details of Earthing Cable Riser - Earth Grid under Substation Footprint
7922-A4a   Drilling Detail for Copper Earth Busbar
7923-A4a   Earth Grid Construction Details- for One Transformer
            (Materials & Estimating)
7924-A4a   Earth Grid Construction Details- for one Transformer & one RMU
            (Materials & Estimating)
7925-A4a   Earth Grid Construction Layout - 2 RMUs' & 2 Transformers
            (Materials & Estimating)
7926-A4a   Earth Grid Layout - Single or Multiple RMU's
7927-A4a   Separate Earthing Arrangement for Ground Transformer & RMU
7928-A4a   Common Earthing Arrangement for Ground Transformer & RMU
7929-A4a   Earth Grid Layout Under Concrete Slab on Consumer Premises
8433-A4b   Earth Grid Arrangement - Remote from Substation
### Single Transformer Arrangement

- **Main Earth Neutral (2 Cables)**
- **Consumer's Earth connected**
- **Tank Earth**

### Multiple Transformer Arrangement

- **Main Earth Neutral (2 Cables)**
- **Consumer's Earth connected**

---

#### Table: Estimation Model ID.'s

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**Duration**: 1Mhrs
NOTES
1. Earthrods in the floors of cable trenches only require the 60min/100max NB PVC/FRC pipe without the earthpocket.
2. After the earthing connections have been completed by ENERGEX, then the earthpockets, PVC/FRC pipes and floor chases shall be filled with waterproof grout ("Kelgrout" or similar) flush with the floor by the builder/owner of the premises.
3. No PVE conduit shall be used between earthpockets.
4. All earth wire in chases is to be BARE and clear of the reinforcing.
5. Metal Fences shall be clear of reinforcing steel and shall not be connected to earth wire.
6. Earth wire shall NOT contact or be bonded to steel reinforcing.

EARTHING INFORMATION
Details of Earth Pockets, Floor Chases & Earthwire Connections
7919-A4
LV SWITCHBOARD MODIFICATIONS FOR SEPARATE EARTHING

1. Remove LV earth bar from LV switchboard frame.
2. Material for converting to separate earthing system use Model "DSTFRSEN"
3. Install (NILSEN14NBS) Busbar insulator (SC13186)
4. Attach existing earth bar to busbar insulator
5. Attach HV earth busbar on rear side of frame support 120mm above bottom frame
6. Connect HV station earth grid cable to frame earth bar
7. Connect 2 x 70mm2 insulated earth grid cable to LV earth bar
   NOTE: LV cable sheath to be connected to LV earth bar
8. Remove GPO & associated wiring & install WARNING SIGN on GPO surround block
9. Attach “Scotchcal” sign (SC15983) to inside face of doors
10. Do not earth Fence or gates to Station earth

EARTHING INFORMATION

Earth connections for Transformers using LV Cubicles for Separate Earthing
Modifications on LV Cubicles

7920-A4
TYPICAL EARTHING GRID UNDER SUBSTATION FOOTPRINT

EARTH RISER DETAIL A

NOTES
1. Earth Riser Cables to be installed in two separate groups from the Earth Grid.
2. After the Earthing connections have been completed by ENERGEX, then the earth pockets, PVC/FRC pipes & floor chases shall be filled with waterproof grout (Kelgrout) or similar. Flush with the floor by the builder/owner of the premise.
3. When the 40mm conduits run outside of the wall, 2m high protection cover must be installed as shown in Detail A.

EARTHING INFORMATION
Details of Earthing Cable Riser
Earth Grid under Substation Footprint
7921-A4
BUSBAR Cu EARTH
190x100x6 or (190x101.6x6.3)
IN 15365

NOTES
1. MATERIAL FOR EARTH BUSBAR SHALL BE 100x6 or 101.6x6.3 HCU HARD DRAWN COPPER TO AS1567-110.
2. SURFACE FLATNESS ACROSS COPPER SHALL BE ±0.2mm.
3. ALL HOLES SHALL BE DRILLED, BURRS & SHARP EDGES TO BE REMOVED.
4. ALL STAINLESS BOLTS SHALL HAVE ANTI-SEIZE GREASE (IN 16390) "AMPOL JET-LUBE KOPR-KOTE" APPLIED TO THREADS.
5. ALL CONNECTIONS SHOULD BE CLEANED AND FILED WITH NO HIGH SPOTS.
### PLAN

**NOTE** Transformer Tank, LV Guard & MEN earth tails not included. See Transformer Earthing layout for details.

### CONNECTION DETAILS

**EARTH ROD DETAIL**

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<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
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<th>EARTH ROD MODEL</th>
<th>ROCK/EARTH ROD MODEL</th>
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<td>PVC COVER STRIP</td>
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**ESTIMATION MODEL ID.'s**

- EARTH ROD DETAIL
  - DSTFRMEN: TRANSFORMER MEN & TANK
  - DSTFRSEN: SEPARATE HV & LV EARTHING KIT
  - DSRMEGT: RING MAIN UNIT EARTHING CABLE & LUG KIT
  - DSBUREGK: TO CONVERT EXISTING EARTH CHASE MODELS TO DIRECT BURIED ARRANGEMENT-AGO THIS MODEL
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**ESTIMATION MODEL ID.'s**
- DSGT6EGS
- DSG6EGR
- DSGT2EGSA
- DSEGSR

**ESTIMATION MODEL ID.'s**
- DSRMEGT

**ESTIMATION MODEL ID.'s**
- DSBREGK

---

**EARTHING INFORMATION**
Earth Grid Construction Details for One Transformer & one RMU Materials & Estimating

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APP'D: G.Barrrett
C/RD: A.Tikken
DRN: D.Langley

7924-A4
## Connection Details

### Earth Rod Detail

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### Estimation Model ID’s

- Transformer Mf & Tank Earthing Cable & Lug Kit: DSGT8EGS
- Ring Main Unit Earthing Cable & Lug Kit: DSG8EGR
- Estimation Model ID’s 10: DSGT2EGSA
- Estimation Model ID’s 9: DSEGSR

### Estimation Model ID’s 9a

- Separate HV & LV Earthing Kit: DSTFRSEN
- To Convert Existing Earth Chase Models to Direct Buried Arrangement—Add This Model: DSRMEGT
- Estimation Model ID’s: DSBUREGK

---

**Eartning Information**

Earth Grid Construction Layout Details for 2 RMU’s & 2 Transformers Materials & Estimating

7925-A4

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APP'D: C.R.Hatt
CRD: A.Tikkan
DRN: D.Langley

---

File: c:dim/s12/7925-A4.dwg

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### SINGLE RMU ARRANGEMENT

- **Connection Details**
- **Section B**

### DOUBLE RMU ARRANGEMENT

- **Connection Details**
- **Section B**

### Table: Earth Rod Details

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**Estimation Model ID's**

- **DSGT4EGS**
- **DSGT4EGR**
- **DSGT2EGSA**
- **DSEGSR**  

**Estimation Model ID's**

- **DSBUREGK**  
- **DSRMGST**

**Eartching Information**

Earth Grid Layout Details
Single or Multiple RMU Arrangements

7926-A4
NOTES
1. Earth pockets/floor anchors not required if Earth grid is below slab.
2. DO NOT EARTH FENCE OR GATES for Outdoor type substations
3. Where outdoor LV boards are installed modify the LV Earth Bar Remove GPO & attach “CAUTION LABEL”
4. 11kV Cable sheath/screen can be connected to RMU earth bar.
5. Separate LV earth may be run in UG cable trench alignment.

EARTHING INFORMATION
Ground Transformer & RMU
Separate Earthing Arrangement

7927-A4
NOTES
1. Earth pockets and floor chases not required where earth grid is installed below the slab.
2. DO NOT EARTH FENCE OR GATES for Outdoor type substations.
3. If 1.0 ohm cannot be achieved when the earth grid is connected to the MEN system then separate Earthing is required.
4. 11kV cable sheath/screen can be connected to the RMU earth bar.
TYPICAL ARRANGEMENT FOR EARTH GRID
BURIED UNDER CONCRETE SLABS

NOTE
To order Materials and Labour for a Buried Earth arrangement, select the appropriate 4 or 6 electrode Models (DSGT4EGS, DSGT4EGL, DSGT6EGS & DSGT6EGL) and add Model DSBUREGK. This will adjust the bare cable quantity.

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<td>LABOUR</td>
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ESTIMATION MODEL ID.'s: DSBUREGK

EARTHING INFORMATION
Earth Grid Layout Under Concrete Slab
On Consumers Premises
7929-A4
**Typical Earthing Grid Arrangements**

**Detail 'A' - Typical Joint Pocket**

- 12 structural steel floor plate flush with floor in 30 wide rebate fixed with four countersunk screws to floor. Cut ø25 lifting hole centrally and affix an "ENERGEX" insignia with 50 high lettering.

- Disconnection point. Utilux crimp lug, Cat. No.H1423 or equivalent. M12x30ss bolt with nut, 2 flat & 1 lock washer.

- Cadweld or crimp to 13 O.D. copper-clad electrode.

- 100 Deep floor pocket filled with grout after installation of earthwire.

- 19/2.14 Cu. P.V.C. cable to substation

**Notes:**

1. A sufficient number of driven earth electrodes shall be incorporated in the earth grid to obtain the required low earth resistance.

2. Two insulated riser cable connectors shall be provided along separate routes between the grid, (typically located in a basement, ground floor or yard) and the remote substation enclosure.

3. Earthwires may be buried direct with connections to earthrods along conduit routes.