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COMMON SECTION
(SHEETS 01 & 02)

C25	X	X	X						
C26	X	X	X						
C27	X	X	X						
C28	X	X	X						
C29	X	X	X						
C30	X	X	X						
C31	X	X	X						
C32	X	X	X						
C33	X								
C34	X								
C35	X								
C36	X								

TRANSMISSION SECTION
(SHEETS 04)

REV.	0	1	2	3	4	5	6	7	8
SHT.									
T1	X	X	X	X					
T2	X	X	X	X					
T3	X	X	X	X					
T4	X	X	X	X					
T5	X	X	X	X					
T6	X	X	X	X					
T7	X	X	X	X					
T8	X	X	X	X					
T9	X	X	X	X					
T10	X	X	X	X					
T11	X	X	X	X					
T12	X	X	X	X	X	X			
T13	X	X	X	X	X	X			
T13A	X	X	X	X	X	X			
T14	X	X	X	X					
T14A	X	X	X	X					
T14B	X	X	X	X					
T15	X	X	X	X					
T16	X	X	X	X					
T17	X								
T18	X								
T18	X								

POWER STATION SECTION
(SHEETS 03)

REV.	0	1	2	3	4	5	6	7	8
SHT.									
P1	X	X	X	X					
P2	X	X	X	X					
P3	X	X	X	X					
P4	X	X	X	X					
P5	X	X	X	X					
P6	X	X	X	X					
P7	X	X	X	X					
P8	X	X	X	X					
P9	X	X	X	X					
P10	X	X	X	X					

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NOTE:
THE SCHEDULE CONSISTS
OF THIS COVER SHEET
AND DETAIL SHEETS AS
SHOWN ABOVE

C = COMMON DETAILS
P = POWER STATION DETAILS
T = TRANSMISSION DETAILS

27	SHEETS 04, C5A AND C5B ADDED.	<i>JMV</i>	<i>KN</i>	<i>TM</i>	30/05/2022
26	ALL SHEETS REPLACE WITH NEW DRG SHEET. SHEET 01, 02 & 03 ADDED. SHEETS C1-C33, P1-P10 AND T1-T14B REDRAWN AND UPDATED.	JMV	KN	TM	30/07/2019

E

APPROVED BY: P PEARCE		Eskom Holdings SOC Limited REG No. 2002/015527/30
DATE: 29/03/1979		

F

CHECKED BY: RJ COOPER	<h1>EARTHING STANDARDS</h1>	©	
DATE: 29/03/1979			
DRAWN BY: Z FOUKAL			
DATE: 23/01/1979			
SCALE: NTS			
0.54/393		SHEET NUMBER 0	REVISION 27

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4 SIZE GROOTTE A4L

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SHEET	DESCRIPTIONS	REV
00	COVER SHEET	27
01	THIS SHEET	1
02	DESCRIPTIONS	1
03	DESCRIPTIONS	1
04	DESCRIPTIONS	0
C1	EARTH MAT AND TAILS	7
C2	EARTH MAT AND TAILS	6
C3	EARTH MAT AND TAILS	6
C3A	EARTH MAT AND TAILS/SURFACE LAYER COVERING	4
C3B	EARTH MAT AND TAILS	4
C4	COPPER CRIMPET	4
C5	BRAZED COPPER JOINTS; CRIMPET JOINTS	5
C5A	EXOTHERMIC JOINTS	0
C5B	EXOTHERMIC JOINTS	0
C6	EARTHTAIL CLAMP	2
C6A	EARTHTAIL CLAMPING PLATE	1
C7	EARTHTAIL CLAMP (TYPICAL APPLICATIONS)	3
C8	SADDLE FOR 2x ϕ 10mm, EARTHING Cu RODS	1
C9	BOLTED JOINTS: T-JOINT AND STRAIGHT JOINT	2
C10	EARTH STRAP FIXING - DETAIL 'A' CONTROL ROOM TRENCH STRAP - DETAIL 'B'	2
C11	TYPICAL EARTH MAT CONNECTION TO COLUMN AND TAIL FOR EQUIPMENT EARTHING	4
C12	METHOD OF EARTHING ALUMINIUM OR GALVANISED STEEL CLADDING	1
C13	SAFETY FENCE EARTHING: STEEL POST	3
C14	SAFETY FENCE EARTHING: CONCRETE POSTS WITH ALUMINIUM WIRE FENCE	3
C15	FENCE EARTHING WOODPOLE WITH GALVANISED WIRE FENCE	1
C16	TANKS, BASES, ETC. & NEUTRALS OF ALL EQUIPMENT MOUNTED ON NON-METALLIC SUPPORTS	2
C17	PAINTED TANKS, BASES ETC. OF EQUIPMENT MOUNTED ON EARTHED STEELWORK	2
C18	GALVANISED TANKS, BASES ETC. OF EQUIPMENT MOUNTED ON EARTHED STEELWORK	2
C19	ALL SINGLE CORE CABLE SEALING ENDS	1
C20	SWITCHBOARDS (WITH THERMOPLASTIC INSULATED CABLES)	2
C21	SWITCHBOARDS (WITH PAPER INSULATED CABLES)	1
C22	ARMOURED MULTICORE CONTROL, TELEPHONE AND POWER CABLES & G.P.O. UNARMOURED TYPE 'Z' CABLE	2
C23	EARTHING FOR JUCTION BOX	2
C24	ARMOURED TELEPHONE AND SCREENED CONTROL CABLES AT JUNCTION BOX	2
C25	TYPICAL TRANSFORMER AND SA EARTHING	2
C26	BOLTED CONNECTION BETWEEN 50x3mm Cu STRAP AND 2 x ϕ 10 Cu RODS	1

1	SHEET ADDED FOR TRANSMISSION SECTION.	JMV	KN	TM	30/05/2022
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0	FIRST ISSUE.	JMV	KN	TM	30/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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INDEX OF
EARTHING STD'S

0.54/393

SHEET NUMBER	REVISION
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SIZE GROOTTE A4L

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SHEET	DESCRIPTION	REV
C27	TYPICAL LAYOUT OF SUBSTATION SHOWING REQUIRED EARTHING CONNECTIONS	1
C28	EARTHING OF TELEPHONE OR PROCESS CONTROL CABLES	1
C29	EARTHING OF PROCESS CONTROL COMPUTERS	1
C30	EARTHING OF ELECTRIC ENCLOSURES	1
C31	EARTHING OF STEEL STRUCTURES	1
C32	EARTHMAT RUNNING UNDER EXISTING REVETMENT	1
C33	TYPICAL LAYOUT FOR EARTHING OF BARRIER FENCES WITH STONE VERGE	0
C34	SECURITY LIGHTING POLE EARTHING	0
C35	EARTHING TO TILED ROOF BUILDINGS	0
C36	EARTHING TO CLADDED STORE BUILDING COLUMN	0

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1	MOVED POWER STATION (P1 TO P10) TO SHEET 03 AND TRANSMISSION SECTION (T1 TO T10) TO NEW SHEET 04.	<i>JMV</i>	<i>KN</i>	<i>TM</i>	30/05/2022
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0	FIRST ISSUE.	JMV	KN	TM	30/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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SHEET NUMBER	REVISION
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4 SIZE GROOTTE A4L

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4

SHEET	DESCRIPTION	REV
P1	OIL TYPE AUXILIARY TRANSFORMERS IN POWER STATION & DRY TYPE AUXILIARY TRANSFORMERS IN POWER STATION	3
P2	MOTORS FED BY XLPE OR THERMOPLASTIC INSULATED CABLES	2
P3	MOTORS FED BY MICC, CONDUIT OR PILCSWA CABLES MOUNTED ON EARTHED MATERIAL	1
P4	MOTORS FED BY MICC, CONDUIT OR PILCSWA CABLES MOUNTED ON UNEARTHED MATERIAL	1
P5	CONTROL EQUIPMENT & MOTOR STARTERS (CONNECTED BY ARMOURED OR UNARMOURED PVC INSULATED CABLES)	2
P6	CONTROL EQUIPMENT AND MOTOR STARTERS (CONNECTED BY MICC, CONDUIT OR PILCSWA CABLES)	1
P7	POWER STATION AUXILIARY BAY SIGNAL EARTH TERMINATION BOX	1
P8	EARTHING OF SIGNAL DISTRIBUTION FRAMES	1
P9	EARTHING OF SMALLER 3 PHASE CONSUMERS WITHOUT NEUTRAL WITH 4 CORE UNARMOURED CABLE	1

C		C	
D		D	
E		E	

1	SHEET UPDATED WITH POWER STATION ONLY. MOVED TRANSMISSION SECTION TO NEW SHEET 04.	<i>JMV</i>	<i>KN</i>	<i>TM</i>	30/05/2022
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0	FIRST ISSUE.	JMV	KN	TM	30/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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		SHEET NUMBER	REVISION
		03	1

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3

4 SIZE GROOTTE A4L

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SHEET	DESCRIPTION	REV
T1	ISOLATOR WITHOUT EARTHING BLADES	3
T2	ISOLATOR WITH ONE EARTHING BLADE	3
T3	ISOLATOR WITH TWO EARTHING BLADES	3
T4	EARTHING SWITCH	3
T5	NEUTRALS OF EQUIPMENT MOUNTED ON EARTHED STEELWORK	3
T6	CVT (GALVANISED & PAINTED TANKS) MOUNTED ON EARTHED STEELWORK WITHOUT CARRIER COUPLING EQUIPMENT (LME)	2
T7	CVT (GALVANISED & PAINTED TANKS) MOUNTED ON EARTHED STEELWORK WITH CARRIER COUPLING EQUIPMENT (LME)	2
T8	EARTHING OF SURGE ARRESTERS FITTED WITH DISCHARGE COUNTERS	2
T9	EARTHING OF SURGE ARRESTERS FITTED WITH CONDITION MONITORING DEVICE	3
T10	HV YARD AUXILIARY TRANSFORMER	2
T11	BASIC EARTHING ARRANGEMENT IN COMMS ROOMS	1
T12	SACRIFICIAL EARTHMAT ANODE	5
T13	CAPACITOR BANK EARTH STUD ADAPTOR PLATE	1
T13A	CAPACITOR BANK EARTH STUD ADAPTOR PLATE	1
T14	EARTHING OF SURGE ARRESTER MOUNTED ON INSULATED BASE WITH PROVISION FOR CONDITION MONITORING DEVICE	3
T14A	EARTHING OF SURGE ARRESTER MOUNTED ON INSULATED BASE WITH PROVISION FOR CONDITION MONITORING DEVICE	1
T14B	EARTHING OF SURGE ARRESTER MOUNTED ON INSULATED BASE WITH PROVISION FOR CONDITION MONITORING DEVICE	1
T15	EARTH STUD	1
T16	ADAPTOR PLATE FOR EARTH STUD	1
T17	TYPICAL LAYOUT OF OPERATING EARTHING SHOWING REQUIRED CONNECTIONS	0
T18	CLADDED STORE EARTHING DETAIL AND SPECIFICATION	0
T19	CONTROL BUILDING EARTHING DETAIL AND SPECIFICATION	0

	1	SHEET UPDATED WITH TRANSMISSION ONLY. SHEETS T18 AND T19 ADDED.	<i>JMV</i>	<i>KN</i>	<i>TM</i>	30/05/2022	
	0	FIRST ISSUE.	JMV	KN	TM	30/07/2019	
	REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	
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						04	1

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SIZE GROOTTE A4L

EARTH MAT AND TAILS

A 1. ALL EARTHING CONDUCTOR TO COMPLY WITH EN13601 (2013 OR LATER)
ITEM ANNEALED Cu-OFE (CW009A)

A

2. EARTHING CONDUCTOR APPLICATION.

2.1 MAIN EARTH MAT SHOWN  TO BE $\phi 10\text{mm}$ ANNEALED COPPER (UNLESS OTHERWISE INDICATED) BURIED AT LEAST 1000mm BELOW FINISHED GROUND LEVEL WHEREVER POSSIBLE. WHERE PASSING UNDER DEEPER FOUNDATIONS AND DRAINS, IT IS TO BE 150mm BELOW CONCRETE. BACKFILLING AROUND SUCH EARTH RODS TO BE WELL COMPACTED WITH SIFTED SELECTED SOIL.

B WHERE A CONCRETE BLINDING IS CAST UNDER BUILDING FOUNDATIONS THE EARTH MAT MESHES ARE TO BE INSTALLED ON TOP OF THE BLINDING AND UNDER THE CONCRETE FOOTING OF COLUMNS ETC.

B

WHERE PASSING OVER DRAINS WITH LESS THAN 1000mm OF COVER, IT IS TO BE BURIED AS DEEPLY AS POSSIBLE, TO BE 600mm OUTSIDE SAFETY FENCE, AS INDICATED ON FOUNDATION AND/OR EARTH MAT LAYOUT.

ROD TRANSVERSE CROSSINGS ARE INDICATED THUS \oplus AND THESE CROSSINGS MUST BE JOINTED USING CRIMPET, (SEE NOTE 5) BY THE METHOD SHOWN ON SHEET C5/3.

ROD TO ROD PERIMETER JOINTS (TEE) MUST BE MADE USING THE METHOD SHOWN ON SHEET C5/2 AND ARE INDICATED THUS \oplus .

C 2.2 EARTH TAILS SHOWN THUS  TO BE 2x SEPARATE $\phi 10\text{mm}$ ANNEALED COPPER RODS (UNLESS OTHERWISE INDICATED). TAILS TO BE

C

VERTICAL AT COLUMN OR EQUIPMENT SUPPORT EARTHING POINTS (SHEET C31) CLAMPED TO THE STEELWORK USING CLAMP (SHEET C31) BY THE METHOD SHOWN ON SHEET C7, DROPPING DOWN AND JOINTED TO MAIN EARTH MAT AT POINTS SHOWN THUS \oplus USING CRIMPETS (SHEET NOTE 5) AND BY THE METHOD SHOWN ON SHEET C5/2.

3. WHERE EARTH TAILS CROSS THEY SHOULD BE CRIMPED TOGETHER.

D 4. WHERE MAIN EARTH MAT IS NOT DIMENSIONED, IT IS TO BE PLACED AS CLOSE TO THE MAIN COLUMN FOUNDATIONS AS POSSIBLE.

D

5. ONLY CONNECTIONS COMPLYING TO IEEE STD 837-1989 "IEEE STANDARD FOR QUALIFYING PERMANENT CONNECTIONS USED IN SUBSTATION GROUNDING" OR APPROVED EQUIVALENT ARE ACCEPTABLE. CRIMPED CONNECTIONS THAT COMPLY ARE SHOWN IN THE TABLE WITH IT'S ASSOCIATED COMPRESSION TOOL AND DIE.

MAKE	CONNECTOR	COMPRESSION TOOL	DIE	NO. OF CRIMPING OPERATIONS
SIMEL	C75E	SIMABLOC C12	12SX260CU	1
SIMEL	C75E	BURNDY Y35	U-F	1
BURNDY	YGHC26C26	BURNDY Y35	U-O	1
BURNDY	YC26C26	BURNDY Y35	U-O	1
BURNDY	YC26C26	BURNDY Y35	U-E	3

E

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7 DRG SHEET REPLACED. FONT CHANGED TO FONT 80. JMV KN TM 28/06/2019

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EARTHING STANDARDS

0.54/393

SHEET NUMBER REVISION

C1 7

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EARTH MAT AND TAILS

A

- 5.1 COMPRESSION TOOL SHALL NOT RELEASE UNTIL THE FULL COMPRESSION OF 12 TON HAS BEEN ACHIEVED.
- 5.2 THE CORRECT TOOL AND DIE, AS GIVEN IN THE TABLE, SHALL BE USED FOR CRIMPING THE CHOSEN CONNECTOR.
- 5.3 INTERNAL SURFACES OF THE CONNECTOR SHALL BE WIPED CLEAN BEFORE INSTALLATION, EXCEPT IN CASES WHERE CONNECTORS ARE FILLED WITH ANTI-OXIDISING GREASE.

A

B

- 6. BRAZED JOINTS TO BE OXY -ACETYLENE BRAZED USING A 3MM FILLER METAL ROD AS PER SPECIFICATION EN 1044 ITEM 105, NO FLUX IS REQUIRED.
- 7. WHERE AN EARTH CLAMP (SHEET C6) IS USED TO CLAMP EARTH TAILS TO EQUIPMENT STEELWORK A BOLT TORQUE OF 75NM IS TO BE USED.
- 8. ALL ABOVE GROUND CONNECTIONS TO BE MADE WITH STEEL BOLTS, WASHERS AND NUTS THAT ARE HOT DIP GALVANISED FOR OUTDOOR INSTALLATIONS, (SUPPLIED BY CIVIL CONTRACTOR) AND ELECTROGALVANISED FOR INDOOR INSTALLATIONS (SUPPLIED BY THE CONTRACTOR RESPONSIBLE FOR RELEVANT EARTH MAT PORTIONS). THE MINIMUM THICKNESS OF ZINC COATING TO BE IN ACCORDANCE WITH THE LATEST ISSUE OF SANS 121.

B

C

- 9. NUMBER OF SUPPORT STEEL EARTHING CONNECTIONS (UNLESS OTHERWISE STATED) TO BE:

C

- 12,5 KA - ONE CONNECTIONS PER SUPPORT
- 16KA } - TWO CONNECTIONS PER SUPPORT
- 20KA }
- 25KA }
- 31,5KA } - THREE CONNECTION PER SUPPORT
- 40KA }
- 50KA } - FOUR CONNECTION PER SUPPORT
- 63KA }
- MAIN STEEL GANTRY SYSTEM } - ONE CONNECTION PER COLUMN FOR ALL FAULT LEVELS

D

D

NOTE - EACH CONNECTION TO BE 150mm² MIN. CROSS SECTIONAL AREA. ONE CONNECTION CONSISTS OF 2X ϕ 10mm CU RODS OR 1X50X3mm FLAT COPPER BAR.

E

- 10. SACRIFICIAL EATHMAT ANODES SHOWN THUS $\textcircled{\text{S}}_{\text{EA}}$ ARE TO BE MANUFACTURED AND CONNECTED TO THE MAIN EARTH MAT AS PER SHEET T12 FOR MILD TO VERY SEVERE CORROSIVE SOIL CONDITIONS. THE APPLICATION OF THESE ANODES WILL BE DETERMINED BY THE RESULTS OF SOIL TESTS CARRIED OUT BY ESKOM OR AN APPOINTED REPRESENTATIVE.

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6	DRG SHEET REPLACED. FONT CHANGED TO FONT 80.	JMV	KN	TM	28/06/2019
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EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		C2		6	

EARTH MAT AND TAILS

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22. ISOLATOR AND EARTH SWITCH DRIVE SHAFTS ARE TO BE EARTHED THROUGH A FLEXIBLE COPPER STRAP CONNECTED BETWEEN A POINT JUST ABOVE THE MECHANISM BOX AND THE STEEL SUPPORT STRUCTURE. PANTOGRAPH ISOLATOR DRIVE SHAFTS (ROTATING NOT MORE THAN 90°) ARE TO BE EARTHED THROUGH A FLEXIBLE COPPER STRAP CONNECTED BETWEEN THE DRIVE SHAFT/INSULATOR FLANGE AND THE STEEL SUPPORT STRUCTURE. WHERE THE DRIVE SHAFT ROTATES MORE THAN 90° A METHOD OF EARTHING WILL BE SPECIFIED TO SUIT SUCH CASES INDIVIDUALLY.

B

B

23. FLEXIBLE PROTECTIVE EARTH CONNECTIONS TO EQUIPMENT MUST BE EITHER OF BRAIDED COPPER OR OF FINELY STRANDED COPPER WIRE WITH GREEN/YELLOW INSULATION. THE RATED CONDUCTOR AREA SHALL NOT BE LESS THAN ONE HALF OF THE MAIN CONDUCTORS FEEDING THE EQUIPMENT WITH A MAXIMUM OF 70mm² (75mm²). THE LENGTH OF SUCH FLEXIBLE CONNECTION SHALL NOT EXCEED 1000mm.

C

C

24. TWO EXTERNAL EARTHS ON LV MOTORS ARE NOT NECESSARY. ONE EARTH VIA A FOURTH CABLE CORE OR ONE VISIBLE EXTERNAL EARTH IS SUFFICIENT. FOR LARGE MOTORS (MV + LV) LOCAL EARTHING VIA FLEXIBLE EARTH CONNECTION IS REQUIRED.

25. EARTHING REQUIREMENTS FOR EQUIPMENT SUCH AS METALCLAD SF₆ SWITCHGEAR INSTALLATION, PHASE ISOLATED BUSBARS AND GENERATORS WILL BE SHOWN ON DETAILED PROJECT DRAWINGS.

D

D

26. TYPICAL EARTH STRAP DETAILS FOR POWER STATIONS ARE COVERED IN THE APPROPRIATE INFORMATION MANUALS.

27. SURFACE LAYER COVERING

AS INDICATED IN THE EARTHING STANDARD, THE SURFACE RESISTIVITY PLAYS AN IMPORTANT PART IN ENSURING THE SAFETY OF PERSONNEL AS REQUIRED BY THE O.H.S. ACT.

H.V. YARDS SHOULD HAVE A SURFACE LAYER COVERING OF AT LEAST 100mm THICK TO ACHIEVE SAFE "STEP AND TOUCH" POTENTIALS.

THIS SURFACE LAYER COVERING SHOULD BE FORMED FROM CLEAN, HARD, SOUND CRUSHED STONE OF 26,5mm NOMINAL SIZE AS OUTLINED IN THE STANDARD FOR HV YARD STONES IN ESKOM SUBSTATION: 240-108982466.

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4 DRG SHEET REPLACED. FONT CHANGED TO FONT 80.

REV

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JMV

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30/07/2019

BY

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AUTH

DATE

EARTHING
STANDARDS

0.54/393

SHEET NUMBER

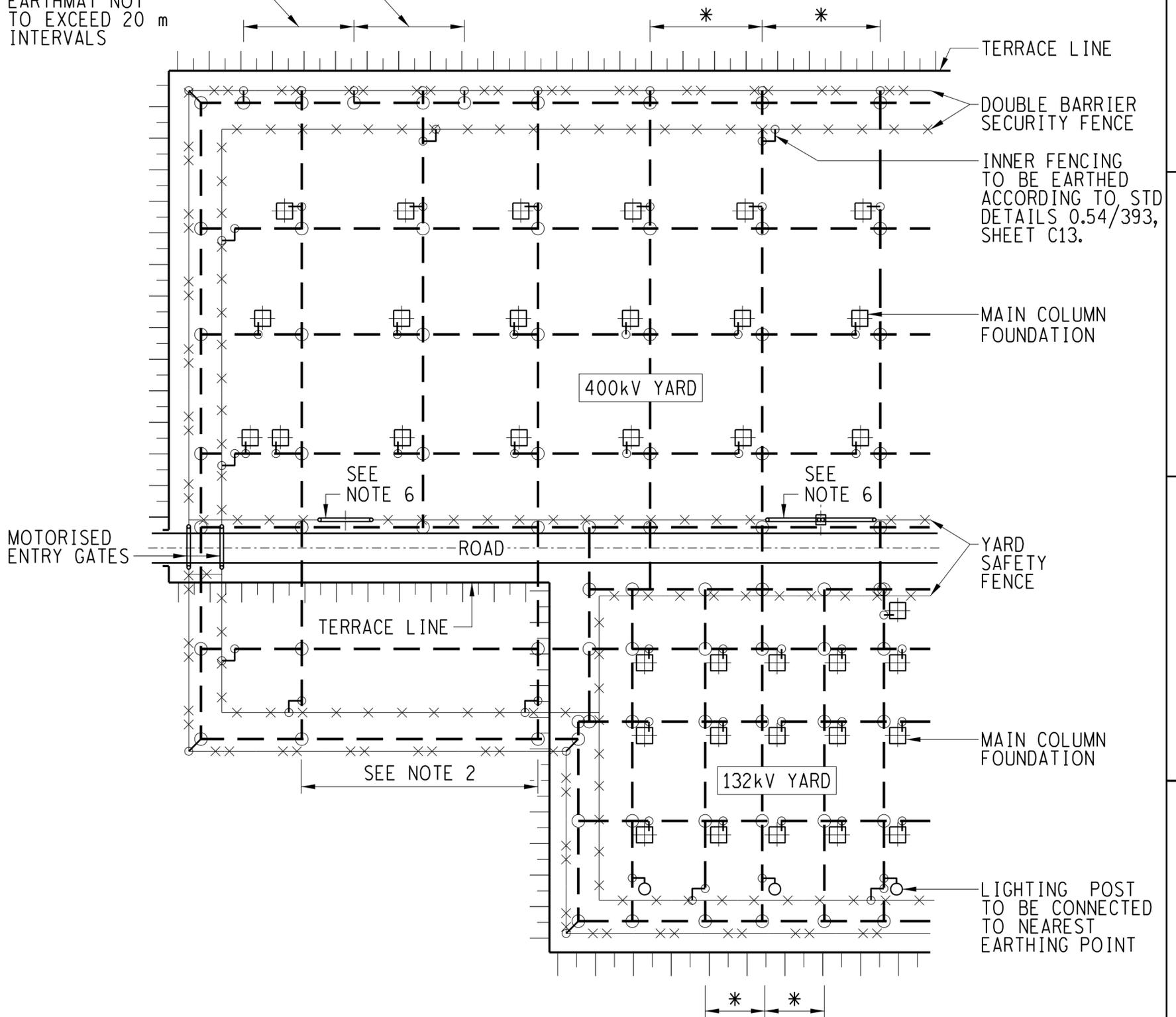
REVISION

C3A

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EARTH MAT AND TAILS

OUTER FENCE CONNECTIONS TO EARTH MAT NOT TO EXCEED 20 m INTERVALS



TYPICAL EARTH MAT APPLICATION FOR NEW SUBSTATIONS

1. * AS A MINIMUM THE INTERVALS BETWEEN EARTHING RUNS TO COINCIDE WITH MAIN COLUMN FOUNDATIONS IN THE SUBSTATION YARDS. eg. 400kV = 24m; 132kV = 12m or 15m.
2. IF THE SECURITY FENCING IS OFF THE TERRACE THEN THE EARTHGRID BEYOND THE SUBSTATION SAFETY FENCE NEEDS ONLY TO BE AT ± 45 M INTERVALS.
3. WHERE THERE ARE TWO OR MORE YARDS IN CLOSE PROXIMITY, THE EARTH GRIDS ARE TO BE INTEGRATED.
4. FOR SECURITY AND SAFETY FENCING APPLICATIONS REFER TO S.L.D.G. 16-3; "SUBSTATION FENCING".
5. FOR EARTHING DETAILS REFER TO THIS STANDARD ie. 0.54/393.
6. ALL GATES AND REMOVABLE PANELS ARE TO BE BONDED WITH AN EARTH CONNECTION IN ACCORDANCE TO 0.54/4963.



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REG No. 2002/015527/30

4 DRG SHEET REPLACED.

REV REVISION DESCRIPTION

JMV KN TM 28/06/2019

BY CHKD AUTH DATE

EARTHING
STANDARDS

0.54/393

SHEET NUMBER REVISION

C3B

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EARTH MAT AND TAILS

- | | | |
|---|---|---|
| A | 11. ROOF EARTHING STRAP OF AT LEAST 25 X 3mm ANNEALED FLAT COPPER TO BE RUN ON OUTSIDE SURFACE OF BRICK BUILDING WALL TO THE ROOF AND JOINED TO METAL ROOF SHEETING WITH AT LEAST M8 BOLTS. | A |
| | 12. EARTH CONNECTIONS TO SHEET METAL CLAD BUILDING SIDEWALLS CAN BE DONE ON INSIDE AS DETAILED ON SHEET C12. | |
| B | 13. WHERE CONNECTION IS MADE TO PAINTED STEELWORK THE PAINT SHALL BE REMOVED OVER A MINIMUM AREA TO ALLOW GOOD CONTACT BETWEEN SURFACES. SURFACES SHALL BE COATED WITH ANTI OXIDISING ELECTRICAL COMPOUND BEFORE BOLTING. AFTER BOLTING ANY SCRAPED AREA NOT COVERED BY THE COPPER CONNECTION SHALL BE MADE GOOD BY USING THE ORIGINAL TYPES AND COLOURS OF PAINTS. | B |
| | 14. WHERE CONNECTION IS MADE TO GALVANISED STEELWORK THE SURFACE SHALL BE COATED WITH ANTI OXIDISING ELECTRICAL COMPOUND PRIOR TO BOLTING. | |
| C | 15. FLAT COPPER STRAP IS TO BE SECURED TO DETAIL "A" ON SHEET C10, AT ALL CORNERS, INTERSECTIONS AND AT NOT MORE THAN 1000MM INTERVALS WHERE THE STRAP RUNS ACROSS VERTICAL OR HORIZONTAL FLAT SURFACES OF CONCRETE PLINTHS OR BRICKWALLS. | C |
| | 16. FOR EARTH STRAP ARRANGEMENT IN CABLE RACKING SEE DETAIL "B" ON SHEET C10. FOR EARTH MAT PORTIONS RUN ALONG CABLE RACKING, SEPARATE INSTRUCTIONS WILL BE ISSUED. | |
| | 17. WHERE FLAT COPPER EARTH STRAPS HAVE TO RUN ON TOP OF THE FINISHED FLOOR SURFACE ACROSS WALKWAYS THE STRAP IS TO BE SCREWED TO THE FLOOR AS SHOWN ON SHEET C10 DETAIL "A". | |
| D | 18. EARTHTAILS AT FOUNDATIONS WHERE NO EQUIPMENT STEELWORK IS FITTED ARE TO BE CLAMPED TOGETHER. | D |
| | 19. CONNECTIONS OF 10mm DIA CU ROD ONTO MILD STEEL EARTHTAILS PROVIDED BY THE CIVIL CONTRACTOR FOR BONDING REINFORCING STEEL IN COLUMNS AND FLOORS ARE TO BE DONE BY AN EXOTHERMIC WELDING PROCESS (CADWELD, EXOWELD OR EQUIVALENT). REFER TO DETAIL SHEET C11. | |
| | 20. ELECTRICAL APPARATUS MOUNTED ON ANY STRUCTURE SHALL BE EARTHED IN ACCORDANCE WITH THE APPARATUS SHEETS IN THIS STANDARD. | |
| E | 21. A 50x3mm Cu EARTH BAR SHALL BE INSTALLED IN THE CABLE TRENCH OR ON THE CABLE TRAY ALL THE WAY AROUND THE INSIDE PERIMETER OF THE CONTROL BUILDING. THIS EARTH BAR SHALL BE BONDED TO THE MAIN SUBSTATION EARTH GRID AT EACH CABLE ENTRANCE INTO THE BUILDING. | E |

F	 Eskom Holdings SOC Limited REG No. 2002/015527/30	<table border="1"> <tr> <td data-bbox="526 1814 582 1870">6</td> <td data-bbox="590 1814 1085 1870">DRG SHEET REPLACED. FONT CHANGED TO FONT 80.</td> <td data-bbox="1093 1814 1173 1870">JMV</td> <td data-bbox="1181 1814 1260 1870">KN</td> <td data-bbox="1268 1814 1348 1870">TM</td> <td data-bbox="1356 1814 1508 1870">28/06/2019</td> </tr> <tr> <td data-bbox="526 1870 582 1915">REV</td> <td data-bbox="590 1870 1085 1915">REVISION DESCRIPTION</td> <td data-bbox="1093 1870 1173 1915">BY</td> <td data-bbox="1181 1870 1260 1915">CHKD</td> <td data-bbox="1268 1870 1348 1915">AUTH</td> <td data-bbox="1356 1870 1508 1915">DATE</td> </tr> <tr> <td colspan="2" data-bbox="526 1915 1085 2154" rowspan="2">EARTHING STANDARDS</td> <td colspan="4" data-bbox="1093 1915 1508 2027" rowspan="2">0.54/393</td> </tr> <tr> <td colspan="2" data-bbox="1093 2027 1348 2154">SHEET NUMBER</td> <td colspan="2" data-bbox="1356 2027 1508 2154">REVISION</td> </tr> <tr> <td colspan="2"></td> <td colspan="2" data-bbox="1093 2072 1260 2154">C3</td> <td colspan="2" data-bbox="1356 2072 1508 2154">6</td> </tr> </table>	6	DRG SHEET REPLACED. FONT CHANGED TO FONT 80.	JMV	KN	TM	28/06/2019	REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	EARTHING STANDARDS		0.54/393				SHEET NUMBER		REVISION				C3		6		F
6	DRG SHEET REPLACED. FONT CHANGED TO FONT 80.	JMV	KN	TM	28/06/2019																										
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE																										
EARTHING STANDARDS		0.54/393																													
						SHEET NUMBER		REVISION																							
		C3		6																											

1

2

3

4

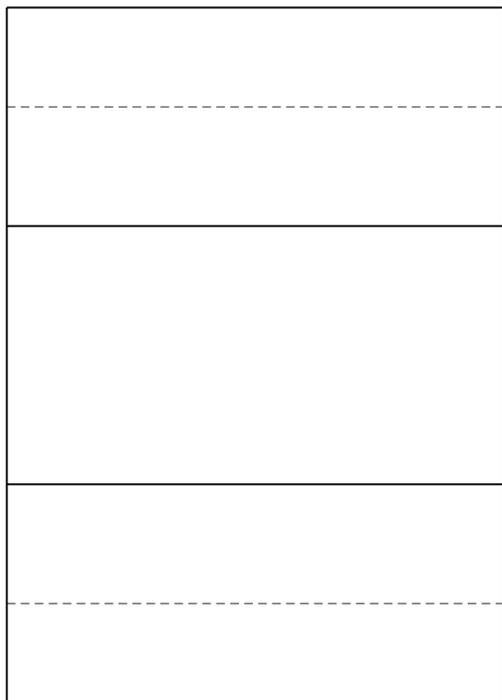
COPPER CRIMPET

A

(FOR CRIMPED JOINTS $\phi 10\text{mm}$ TO $\phi 10\text{mm}$ ANNEALED Cu-OFE (CW099A)
(REFERENCE: EUROPEAN STANDARD 'EN 13601' (2013 OR LATER) WITH
VOLUME RESISTIVITY EQUAL TO OR LOWER THAN $0,0172\Omega\text{mm}^2/\text{m}$)

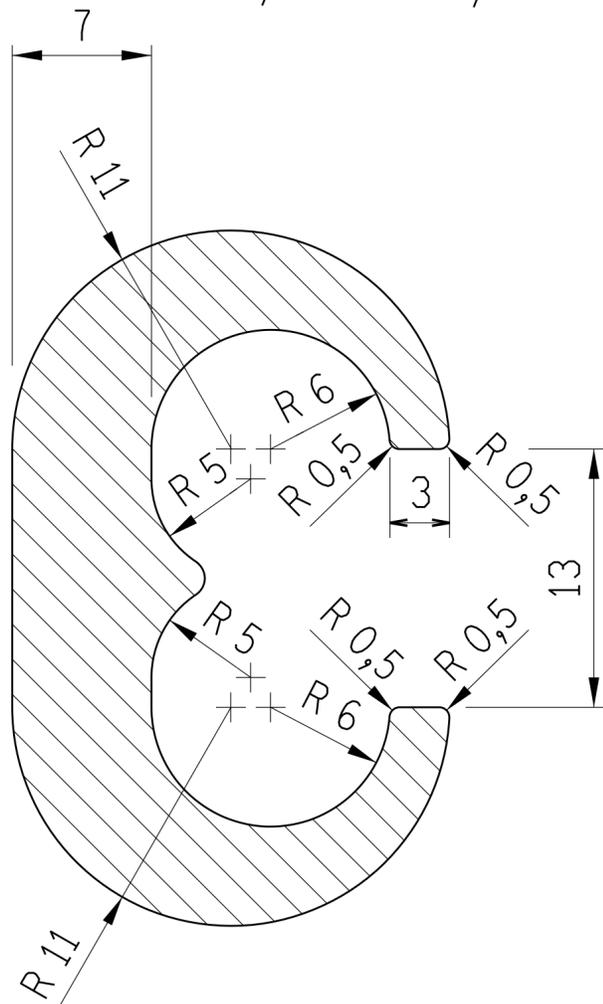
A

B



B

C



C

D

SCALE 2:1

D

MATERIAL: ELECTROLYTIC COPPER (ANNEALED)

MASS: 8 kg/100 UNITS.

NOTE: ALL DIMENSIONS $\pm 0,5\text{mm}$

E

E

SUPERSEDED.
SEE SHEET C1 NOTE 5



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

4 DRG SHEET REPLACED. JMV KN TM 28/06/2019

REV REVISION DESCRIPTION BY CHKD AUTH DATE

EARTHING STANDARDS

0.54/393

SHEET NUMBER REVISION

C4

4

1

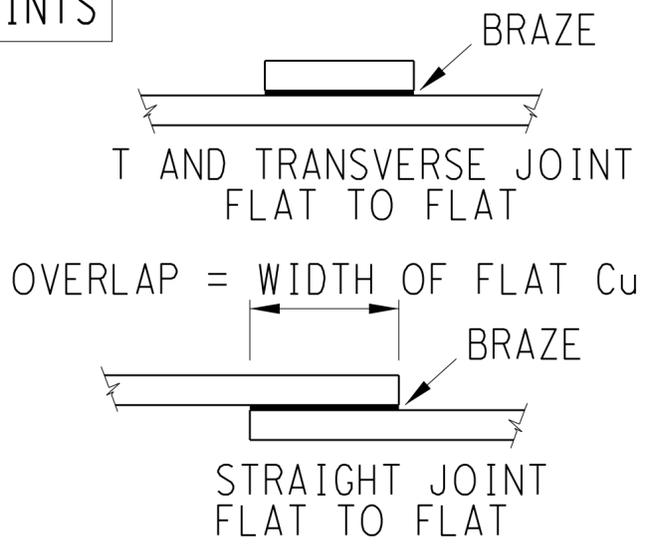
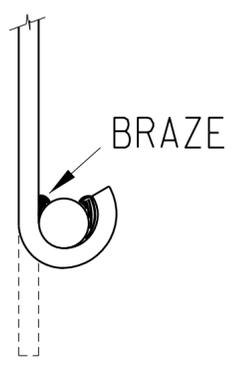
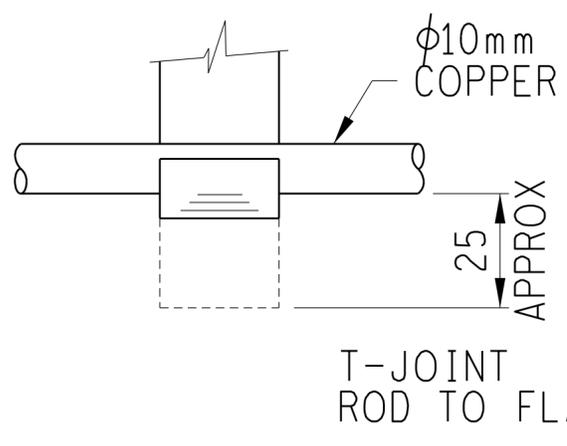
2

3

4 SIZE GROOTTE A4L

BRAZED COPPER JOINTS

A



A

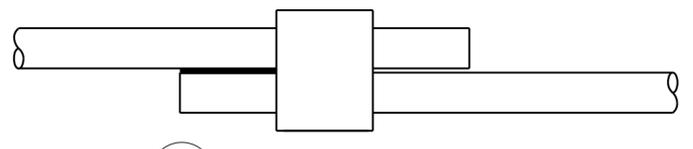
B

1. JOINTS TO BE OXY-ACETYLENE BRAZED, USING $\phi 3\text{mm}$ FILLER METAL EN 1044-CP 105 OR FILLER METAL EN 1044-B-CU92PAG-645/825 (REFERENCE: EUROPEAN STANDARD EN 1044, TABLE 4, ITEM CP 105). NO FLUX IS REQUIRED.
2. EXOTHERMIC WELDING PROCESSES (SEE NOTE 19 ON SHEET C3)

B

CRIMPED JOINTS

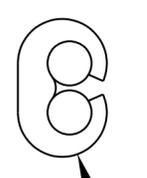
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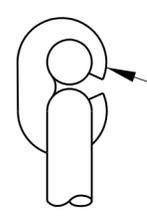
1 STRAIGHT JOINT ROD TO ROD

NOTE:
COPPER CRIMPET (SEE SHT C1, NOTE 5)

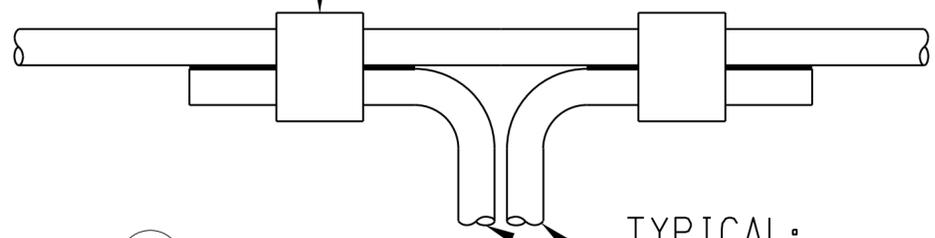
TYPICAL:
MAIN EARTHMAT & EARTHTAIL EXTENSIONS.



D



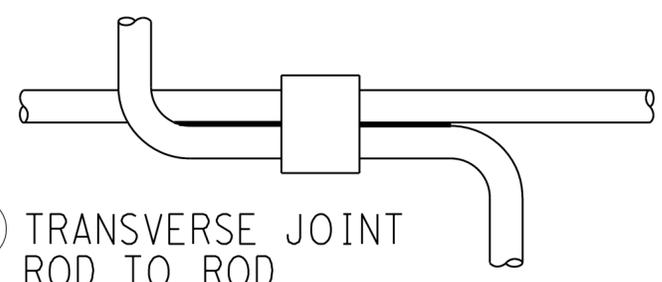
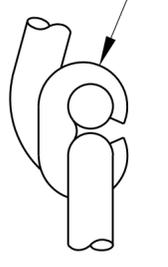
COPPER CRIMPET (SEE SHT C1, NOTE 5)



2 T-JOINT ROD TO ROD

TYPICAL:
ONE FOR MAIN EARTHMAT PERIMETER JOINTS OR FENCE EARTHTAIL. TWO FOR COLUMN AND EQUIPMENT SUPPORTS

E



3 TRANSVERSE JOINT ROD TO ROD

TYPICAL: MAIN EARTHMAT

C

D

E

F



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

5	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS		0.54/393	
		SHEET NUMBER	REVISION
		C5	5

F

1

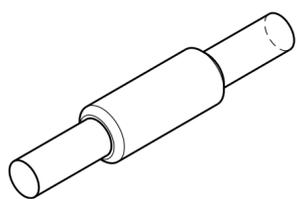
2

3

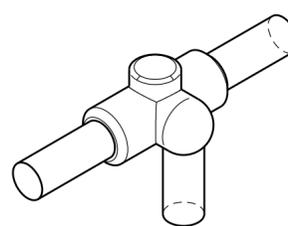
4

EXOTHERMIC JOINTS

A

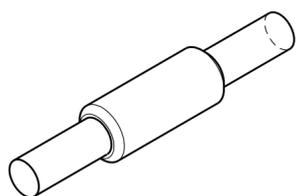


JOINT 1: STRAIGHT
8,5mm & 8,5mm

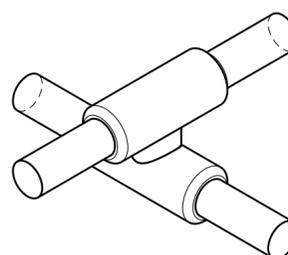


JOINT 5: TEE
RUN 8,5mm & TEE 14,2mm

B

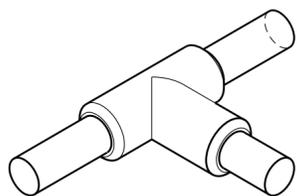


JOINT 2: STRAIGHT
8,5mm & 10,0mm

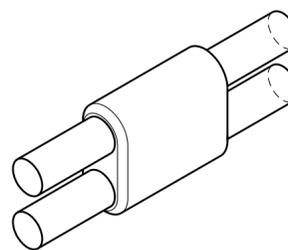


JOINT 6: CROSS (LAPPED)
8,5mm & 8,5mm

C

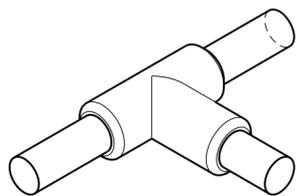


JOINT 3: TEE
RUN 8,5mm & TEE 8,5mm



JOINT 7: DOUBLE (MULTI)
2x 8,5mm

D



JOINT 4: TEE
RUN 10,0mm & TEE 8,5mm

E

(CONTINUED ON 0.54/393 SHT 5B)

F



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

0 FIRST ISSUE.

REV REVISION DESCRIPTION

BY *Jm* CHKD *Wm* AUTH *Jm* DATE 30/05/2022

EARTHING
STANDARDS

0.54/393

SHEET NUMBER REVISION

C5A 0

1

2

3

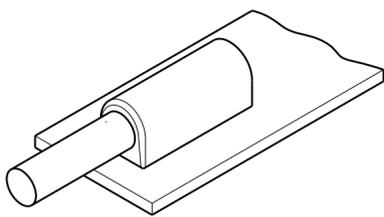
4 SIZE GROOTTE A4L

EXOTHERMIC JOINTS

(CONTINUED FROM 0.54/393 SHT 5A)

A

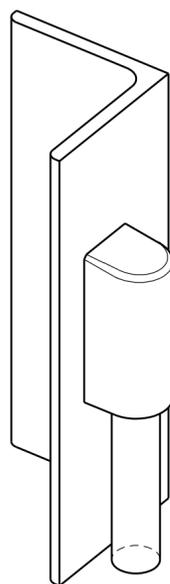
A



JOINT 8: STRIP
 8,5mm TO 50x3mm Cu STRIP
 8,5mm TO 80x6mm GALVANISED STEEL STRIP

B

B



C

C

JOINT 9: STRUCTURE
 8,5mm TO GALVANISED STEEL STRUCTURE

D

D

NOTE:

1. ALL JOINTS SHALL BE EXOTHERMICALLY WELDED USING MOULDS AND WELD-METALS IN ACCORDANCE WITH ESKOM STANDARD 240-170000535.
2. SEE D-DT-6367 FOR MOULD DETAILS.
3. SEE D-DT-6368 FOR WELD-METAL DETAILS.
4. CONDUCTOR DETAILS:
 - 8,5mm DIAMETER: Cu-CLADDED STEEL ROD
 - 10,0mm DIAMETER: Cu ROD
 - 14,2mm DIAMETER: Cu COATED STEEL ROD

E

E



Eskom Holdings
 SOC Limited
 REG No. 2002/015527/30

0	FIRST ISSUE.	<i>Jm</i>	<i>W</i>	<i>W</i>	30/05/2022
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE

EARTHING
 STANDARDS

0.54/393

SHEET NUMBER

REVISION

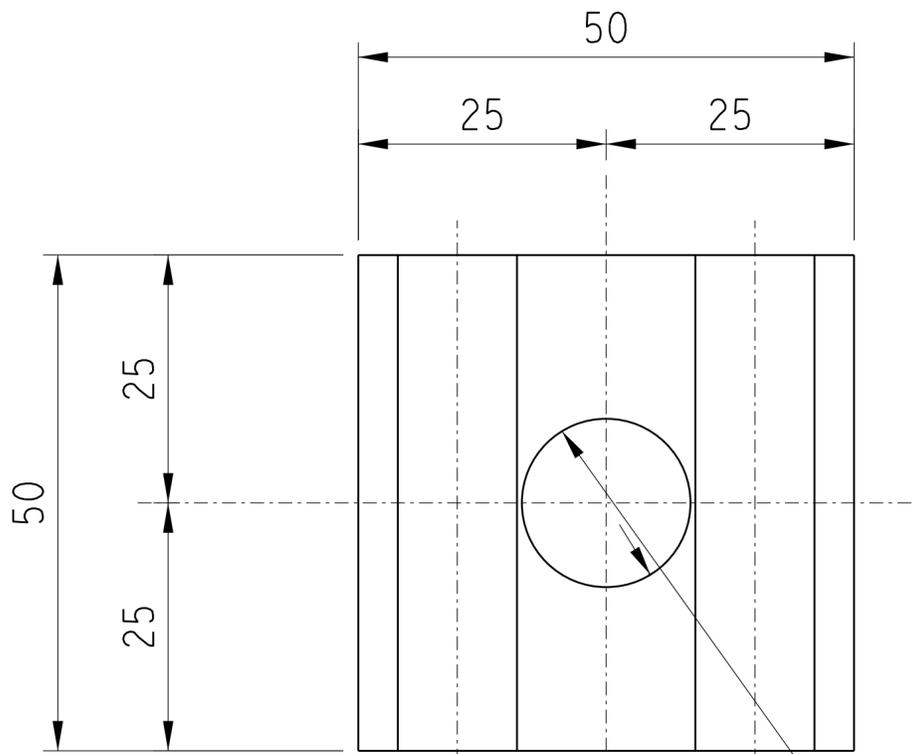
C5B

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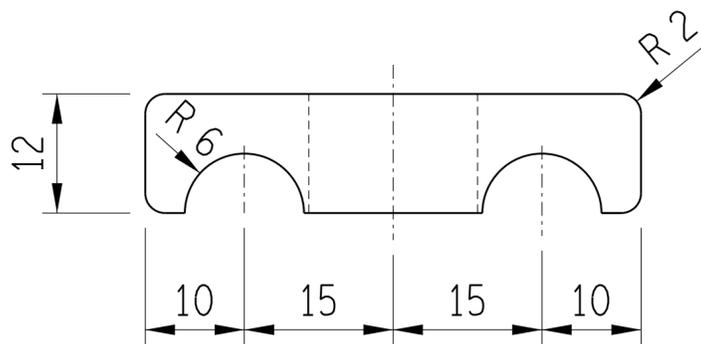
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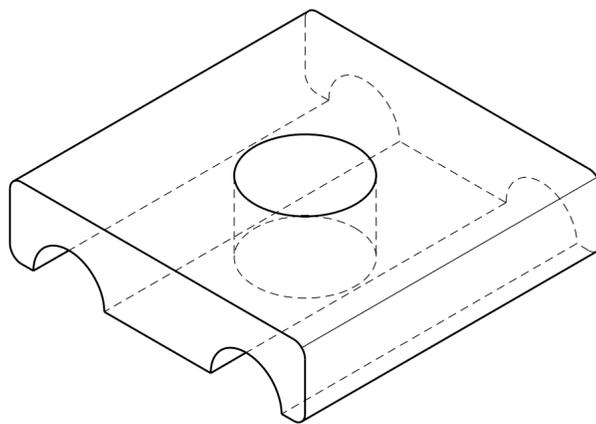
EARTHTAIL CLAMP



17mm DIA HOLE FOR M16 BOLT



MATERIAL: ELECTROLYTIC COPPER
MASS: 16kg/100 UNITS
 (FOR TYPICAL APPLICATIONS - SEE SHT C7)



END PRODUCT - ISOMETRIC VIEW
 (NOT TO SCALE)



Eskom Holdings
 SOC Limited
 REG No. 2002/015527/30

3	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/08/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		C6		3	

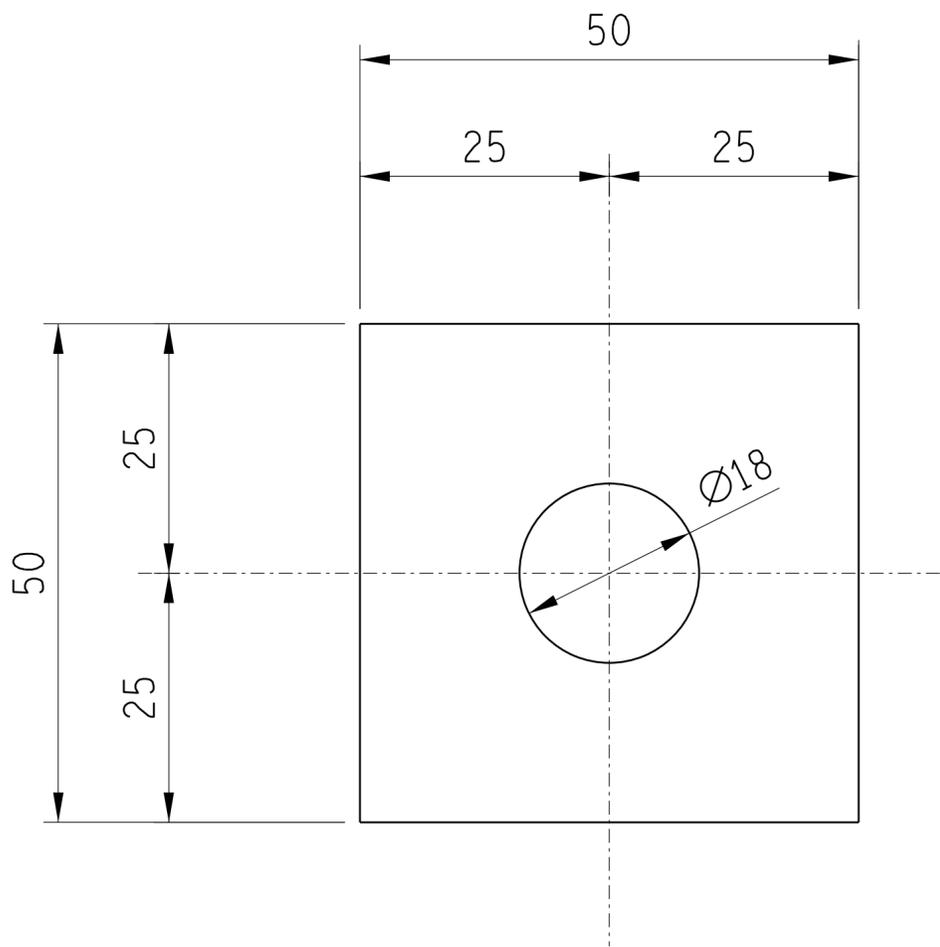
1

2

3

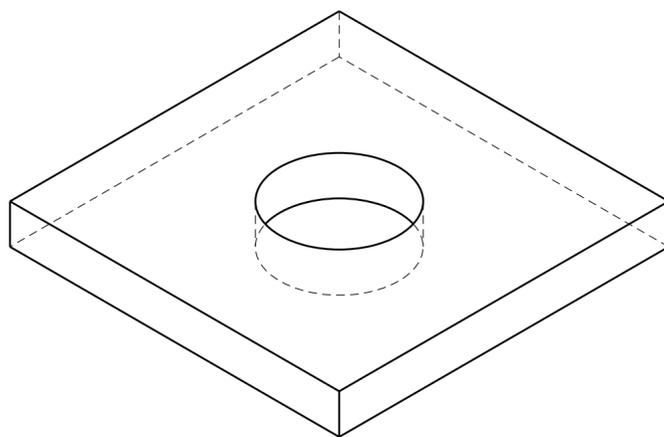
4

EARTHTAIL CLAMPING PLATE



MATERIAL: 6TH M.S. PLATE HOT DIP GALVANISED TO SABS

APPLICATION: USED WITH EARTHTAIL CLAMP SHEET C6 TO CLAMP TOGETHER SPARE EARTHTAILS IN ORDER TO MAINTAIN EARTHING CONTINUITY.



END PRODUCT - ISOMETRIC VIEW
(NOT TO SCALE)



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		C6A		1	

1

2

3

4 SIZE GROOTTE A4L

1

2

3

4

EARTHTAIL CLAMP (TYPICAL APPLICATIONS)

A

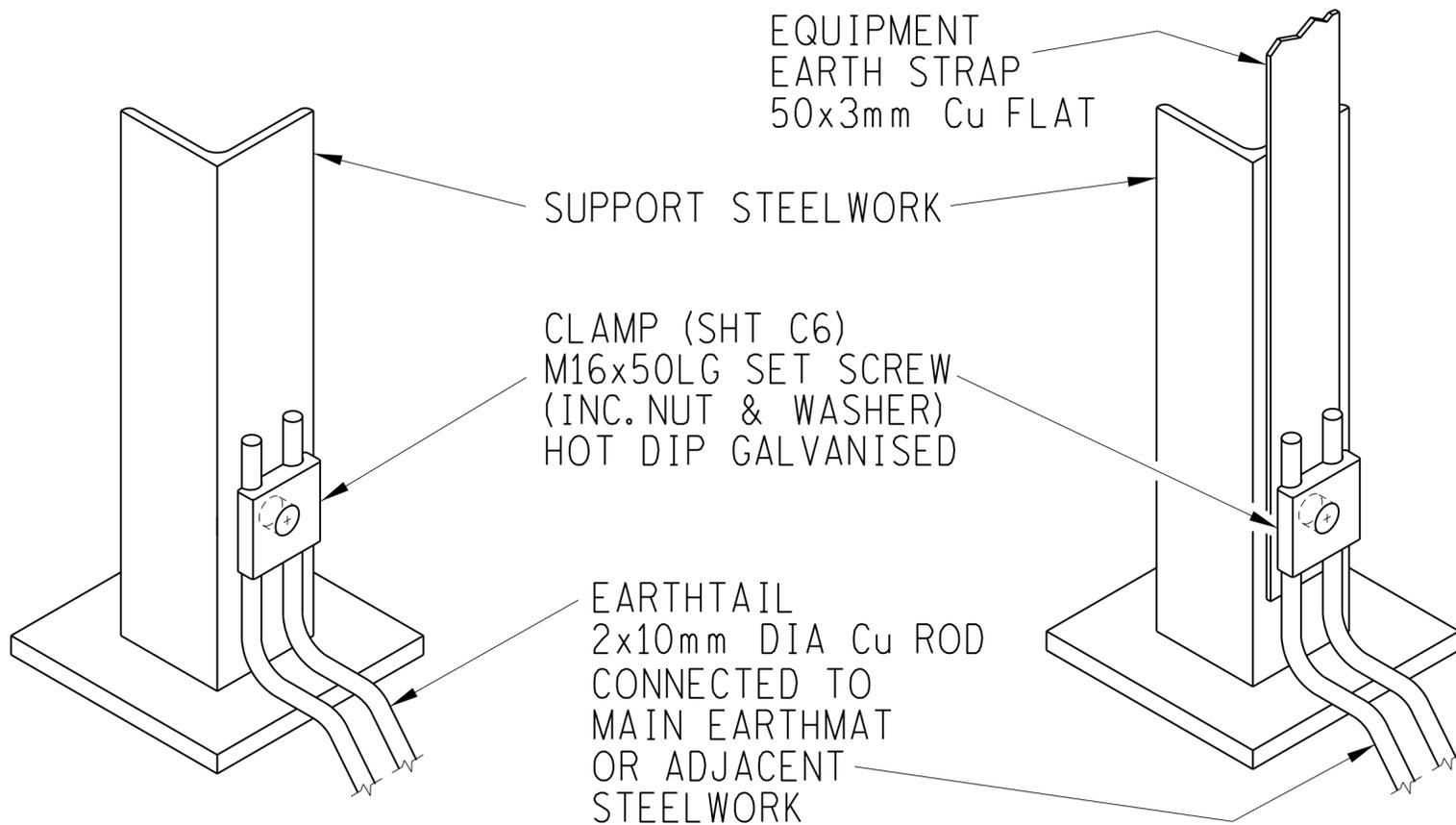
A

B

B

C

C



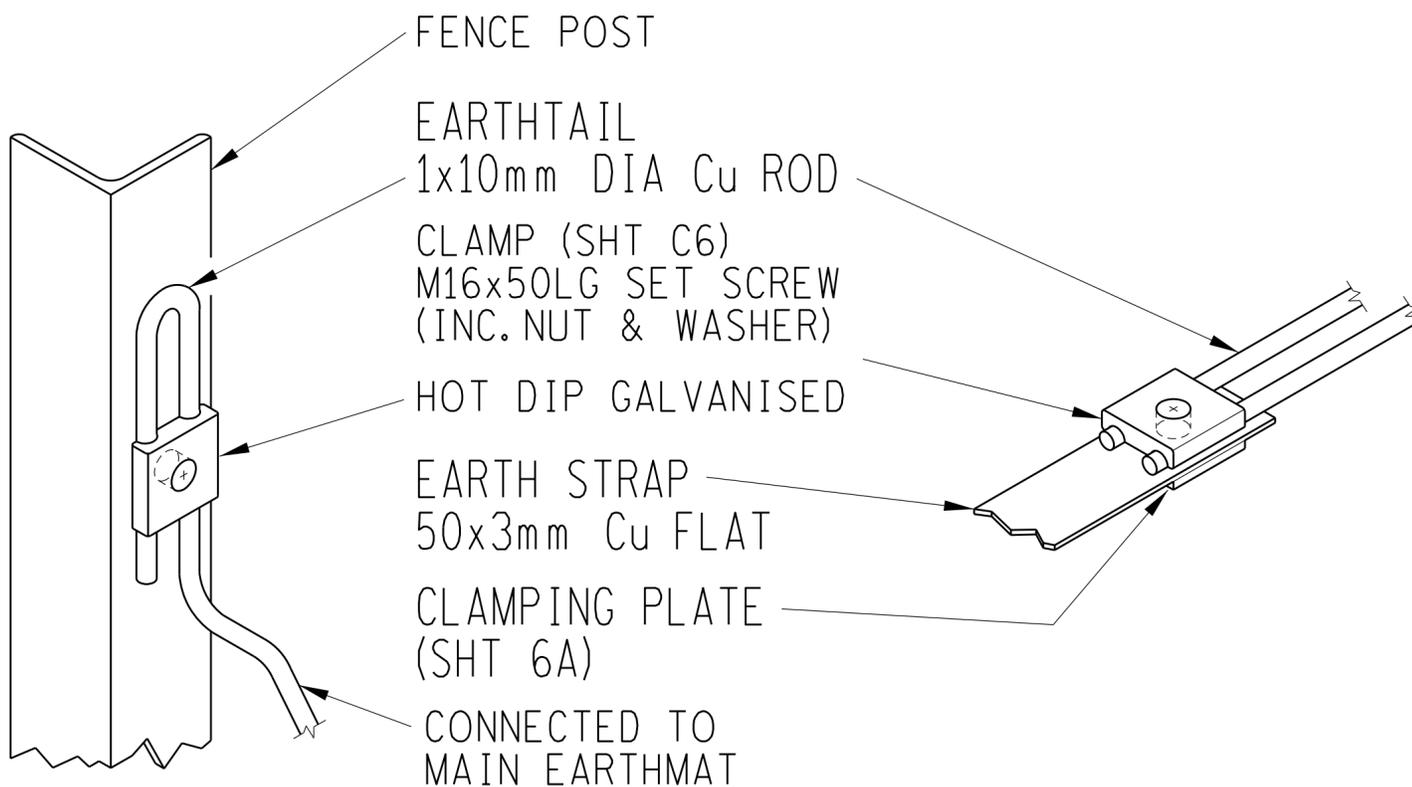
SUPPORT STEELWORK EARTHING (SEE ALSO SHEET C31)

D

D

E

E



STEEL POST FENCE EARTHING



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

3	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C7	3
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1

2

3

4 SIZE GROOTTE A4L

1

2

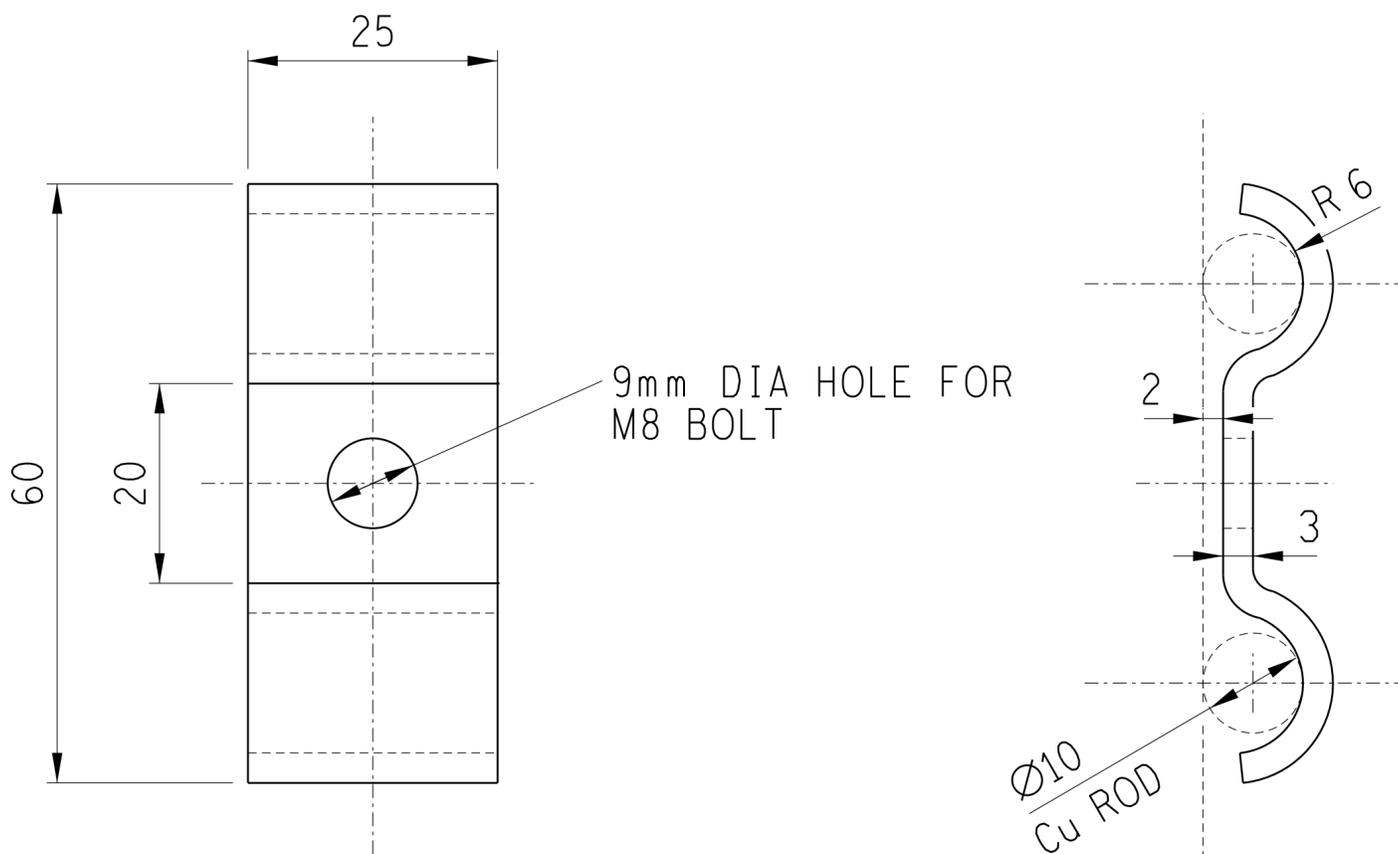
3

4

SADDLE FOR 2x10mm DIA, EARTHING Cu RODS

A

A



B

B

C

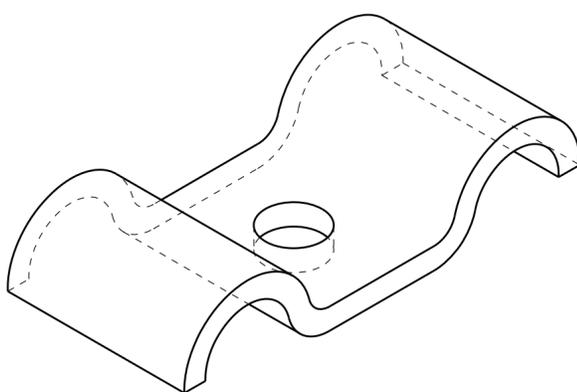
C

MATERIAL: HOT DIP GALVANISED STEEL

SCALE 1:1

D

D



E

E

END PRODUCT - ISOMETRIC VIEW

(NOT TO SCALE)

F

F



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C8

1

1

2

3

4 SIZE GROOTTE A4L

1

2

3

4

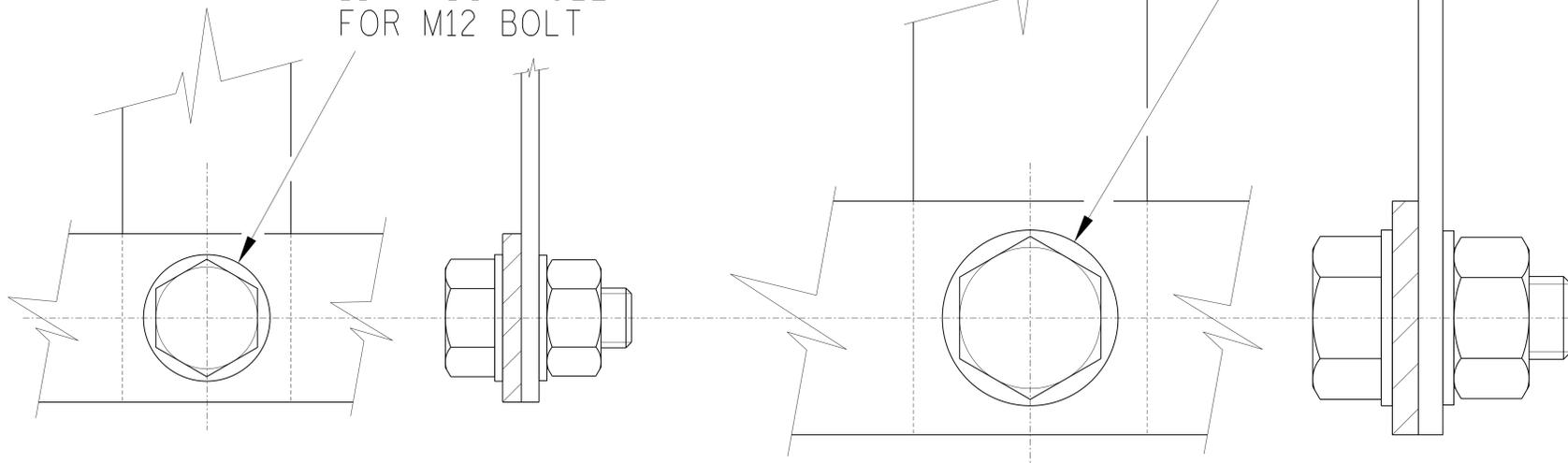
BOLTED JOINTS

17mm DIA HOLE FOR M16 BOLT

13mm DIA HOLE FOR M12 BOLT

A

A



B

B

T-JOINT

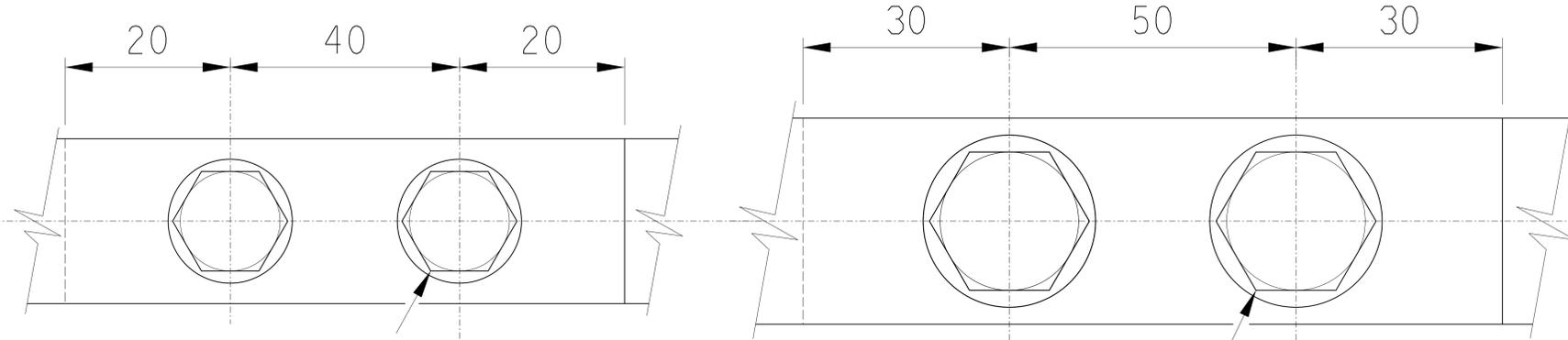
25x3mm FLAT BOLTED TO 25x3mm FLAT

T-JOINT

50x3mm FLAT BOLTED TO 50x3mm FLAT
40x3mm FLAT BOLTED TO 40x3mm FLAT

C

C

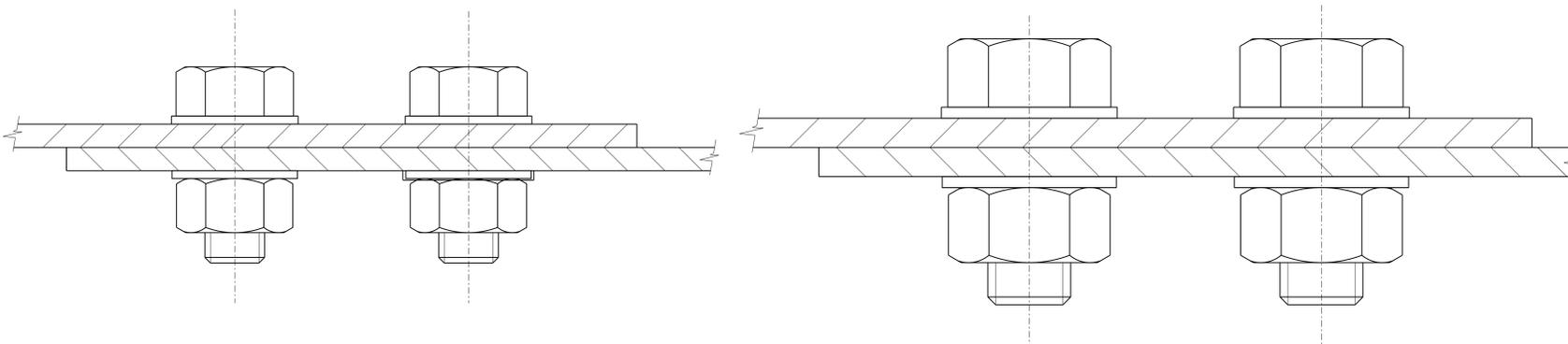


13mm DIA HOLE FOR M12 BOLT

17mm DIA HOLE FOR M16 BOLT

D

D



STRAIGHT JOINT

25x3mm FLAT BOLTED TO 25x3mm FLAT

STRAIGHT JOINT

50x3mm FLAT BOLTED TO 50x3mm FLAT
40x3mm FLAT BOLTED TO 40x3mm FLAT

E

E

1. CONNECTIONS TO CONSIST OF STEEL BOLTS, 2 FLAT WASHERS AND A NUT.
2. CONNECTION SURFACES TO BE CLEANED AND COATED WITH ANTI OXIDISING ELECTRICAL COMPOUND BEFORE BOLTING.
3. SEE SHEET C2 NOTE 8 FOR FURTHER NOTES.



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

2	DRG SHEET REPLACED. GENERAL REDAWN.	<i>Mtiamlenze</i>	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C9

2

1

2

3

4 SIZE GROOTTE A4L

F

F

1

2

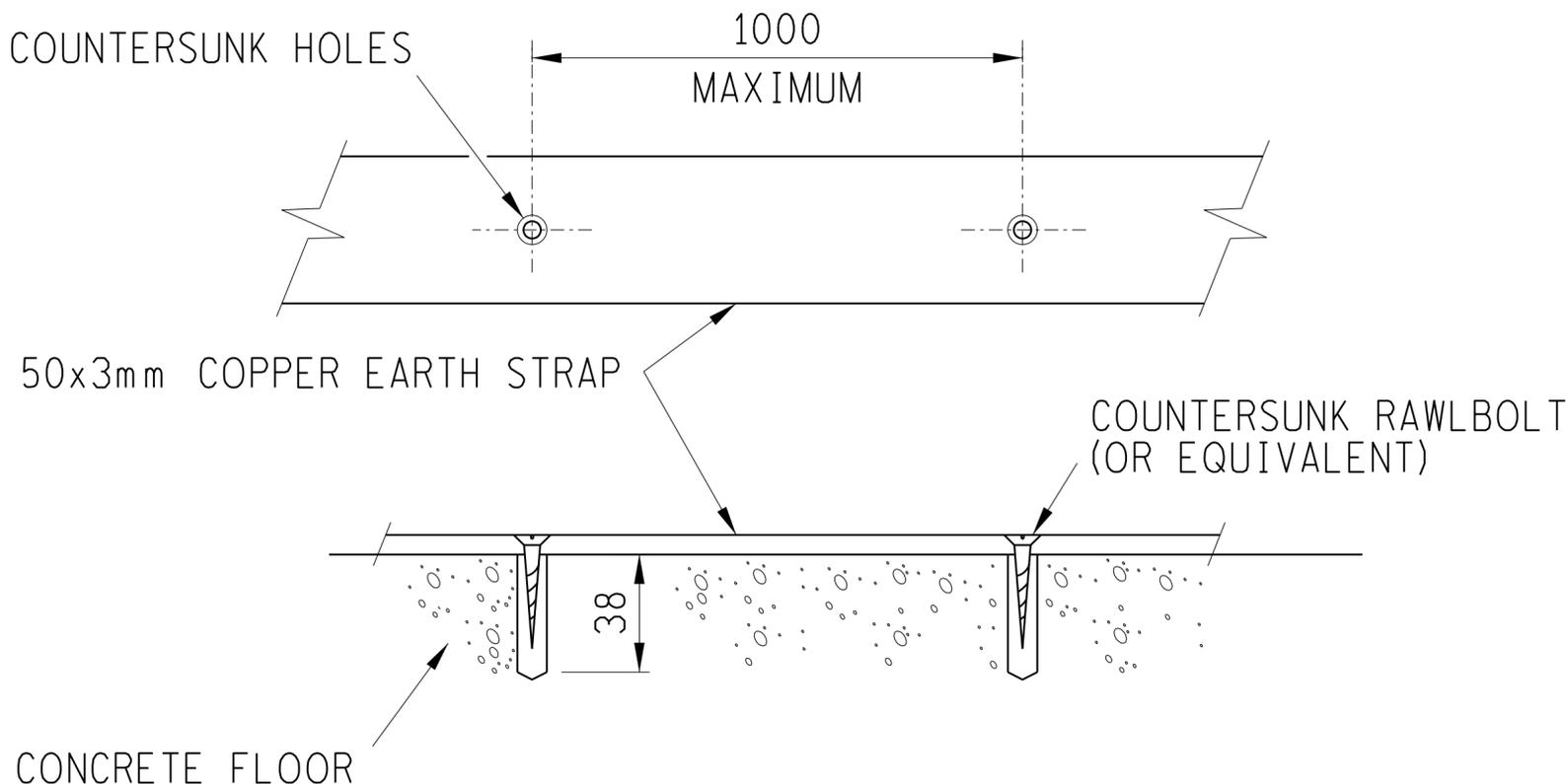
3

4

EARTH STRAP FIXING - DETAIL 'A'

A

USED WHERE STRAP HAS TO RUN ON TOP OF FINISHED FLOOR IN WALKWAYS. ONLY COUNTERSUNK SCREWS TO BE USED.

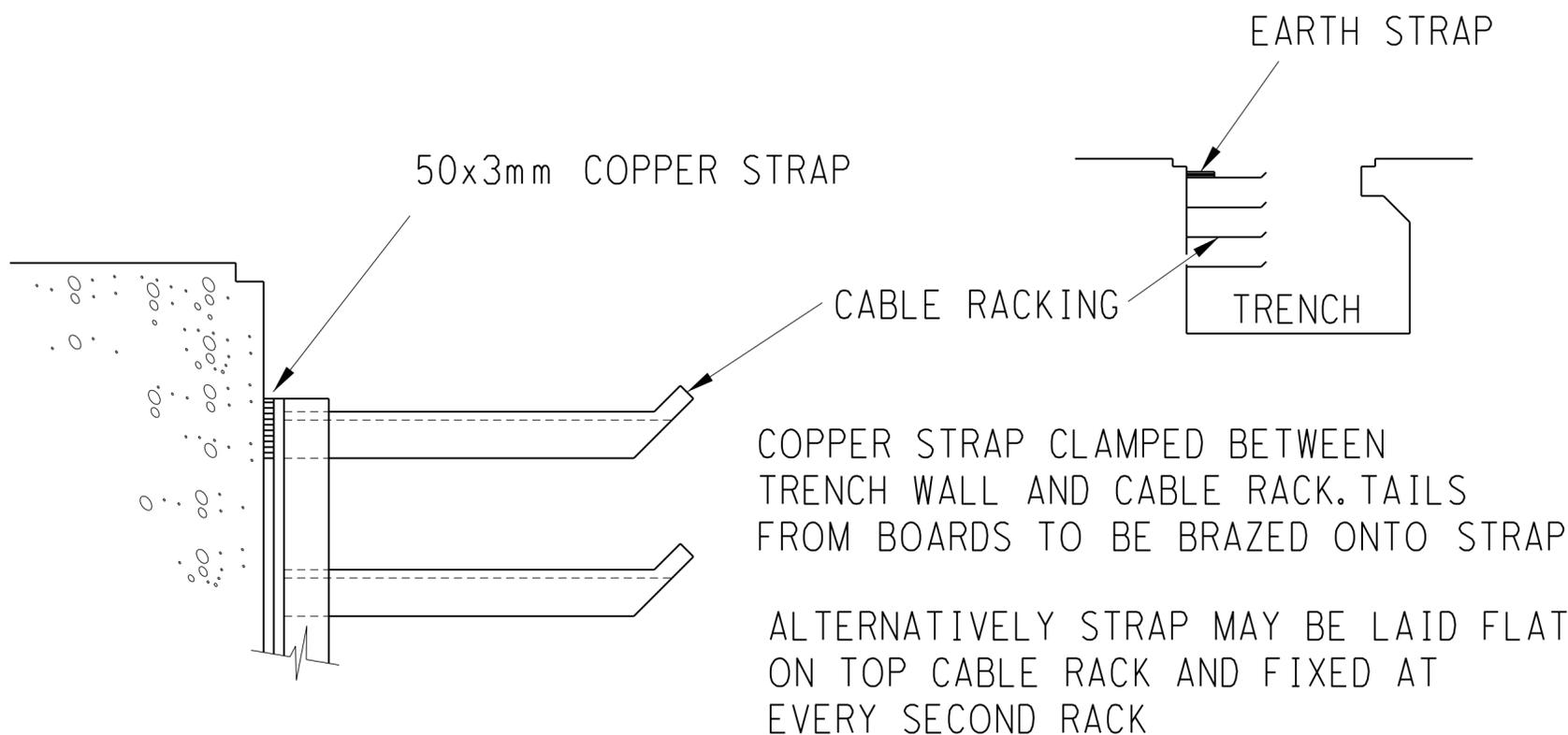


B

C

CONTROL ROOM TRENCH EARTH STRAP - DETAIL 'B'

D



E



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

2	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C10

2

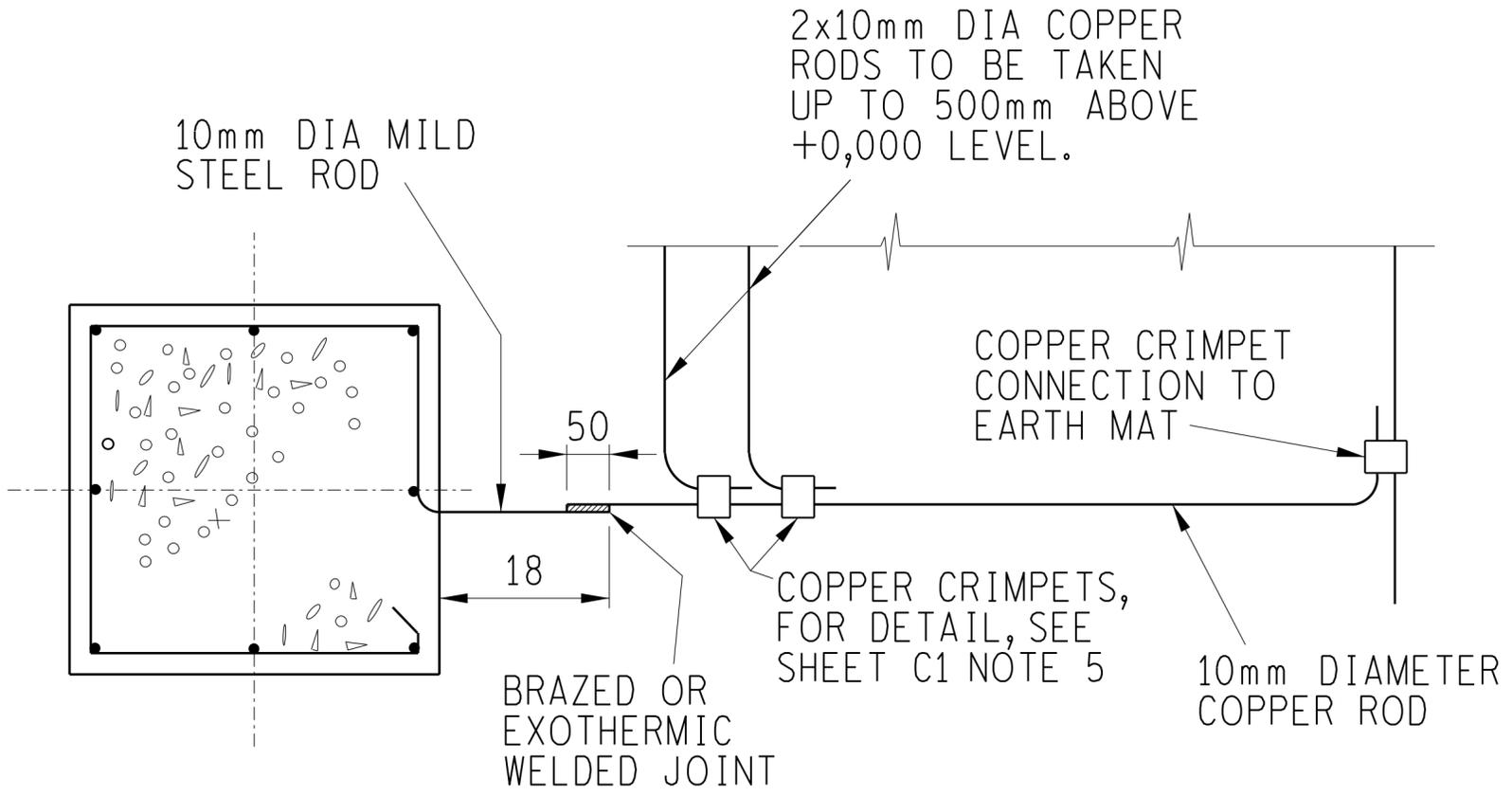
1

2

3

4 SIZE GROOTTE A4L

TYPICAL EARTH MAT CONNECTION TO COLUMN AND TAIL FOR EQUIPMENT EARTHING.



NOTE:
 ONE 10mm DIAMETER REINFORCING ROD TO BE CONNECTED TO MAJOR VERTICAL REINFORCING RODS BY MEANS OF BINDING WIRE AND TO SERVE AS EARTH CONNECTION.
 THE FREE LENGTH OF THE MILD STEEL ROD TO BE 200mm OUTSIDE THE CONCRETE. THIS TAIL MUST BE WRAPPED WITH DENSOMASTIC TAPE, OVERLAPPING BY HALF IT'S WIDTH, TO AT LEAST 50mm ON EITHER SIDE OF ITS PENETRATION POINT INTO THE CONCRETE.
 THE BRAZED JOINT, OR EXOTHERMIC WELD (SEE NOTE 19 ON SHT C3) MUST ALSO BE COVERED WITH DENSOMASTIC TAPE, TO AT LEAST 30mm BEYOND EITHER SIDE OF THE JOINT.



Eskom Holdings
 SOC Limited
 REG No. 2002/015527/30

4	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
 STANDARDS

0.54/393

SHEET NUMBER	REVISION
C11	4

1

2

3

4

METHOD OF EARTHING ALUMINIUM OR GALVANISED STEEL CLADDING

A

AL OR Cu
FLATCLAMP (SEE
SHEET C6 & 6A)

M16 BOLT

2x10mm DIA
Cu RODS

B

BIMETAL
Cu/Al SPACER
FOR AL FLAT

C

D

E

F

A

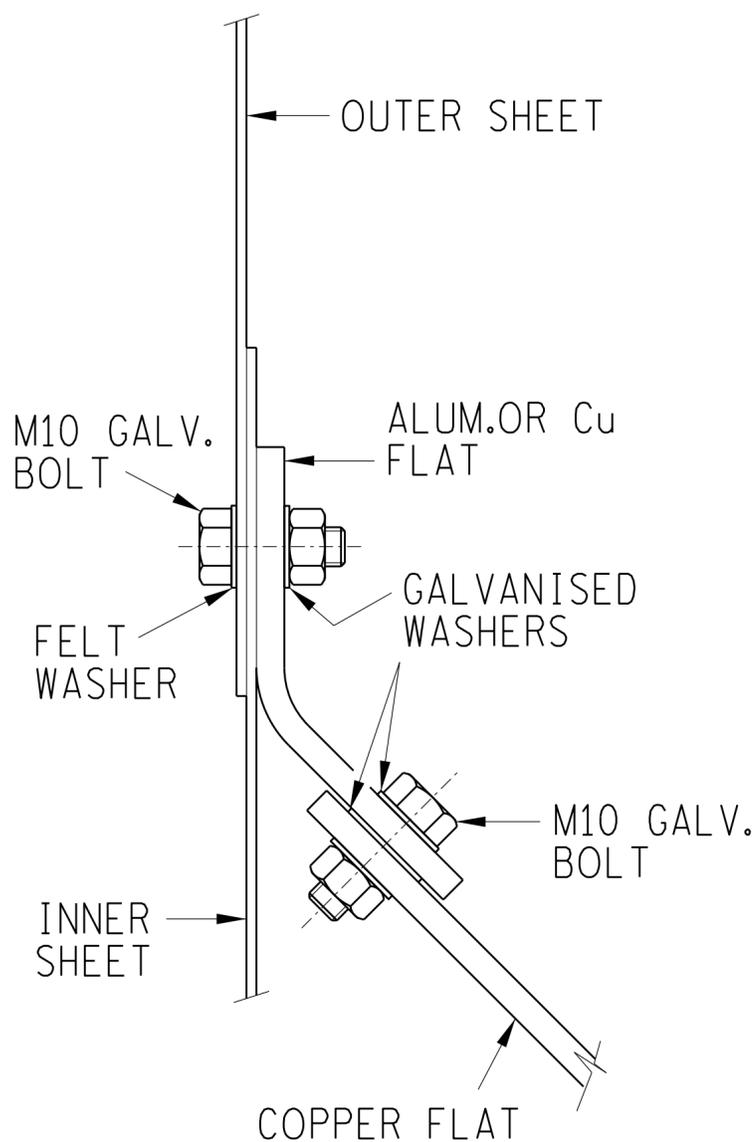
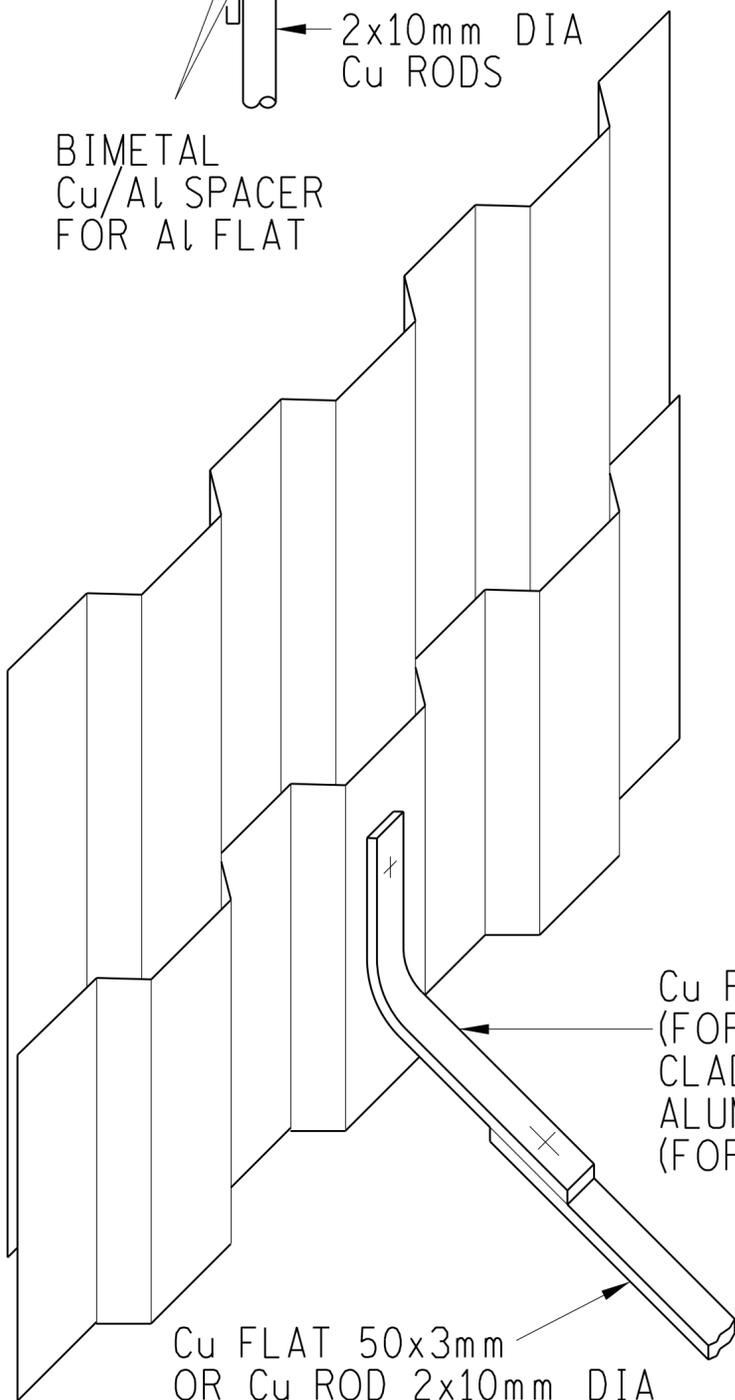
B

C

D

E

F



EARTH CONNECTIONS TO BE MADE NEAR TOP OF
LOWEST SHEET OF CLADDING AT 10000mm INTERVALS.
THE ALUMINIUM TO ALUMINIUM JOINT SHALL BE MADE
WITH USE OF JOINTING COMPOUND AS USED
IN HIGH VOLTAGE YARD JOINTS.



Eskom Holdings
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REG No. 2002/015527/30

1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C12

1

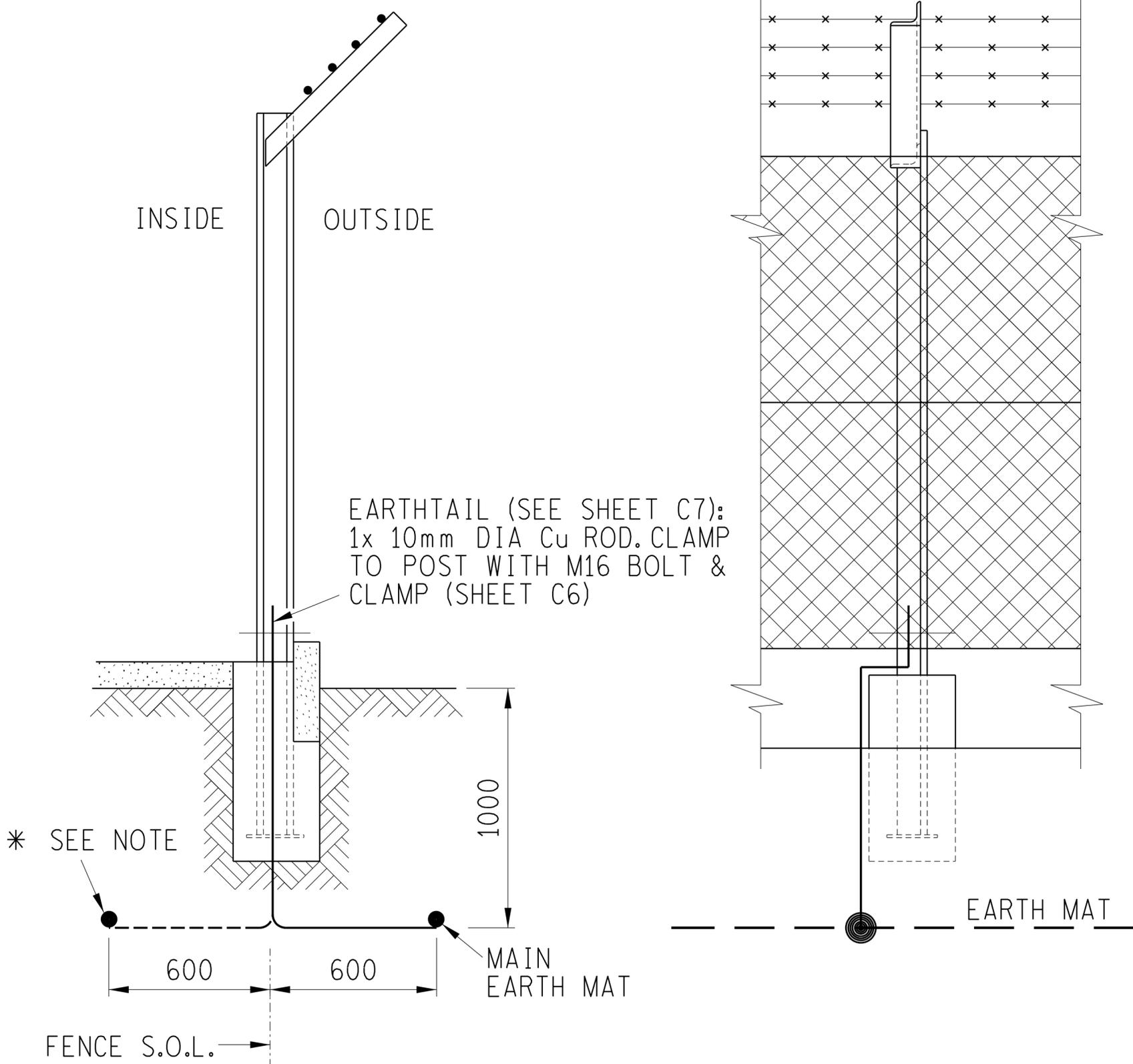
1

2

3

4 SIZE
GROOTTE A4L

SAFETY FENCE EARTHING



STEEL POSTS

FENCE TO BE EARTHED ON BOTH SIDES OF ANY GATE OR REMOVABLE PANEL AND AT INTERVALS NOT EXCEEDING 20000mm

* NOTE:
WHEN THE BARRIER SECURITY FENCE IS SITUATED ON THE SUBSTATION TERRACE THE MAIN EARTH MAT FINISHES 600mm ON THE INSIDE OF THE FENCE. REFER TO SHEET C3B.



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

3	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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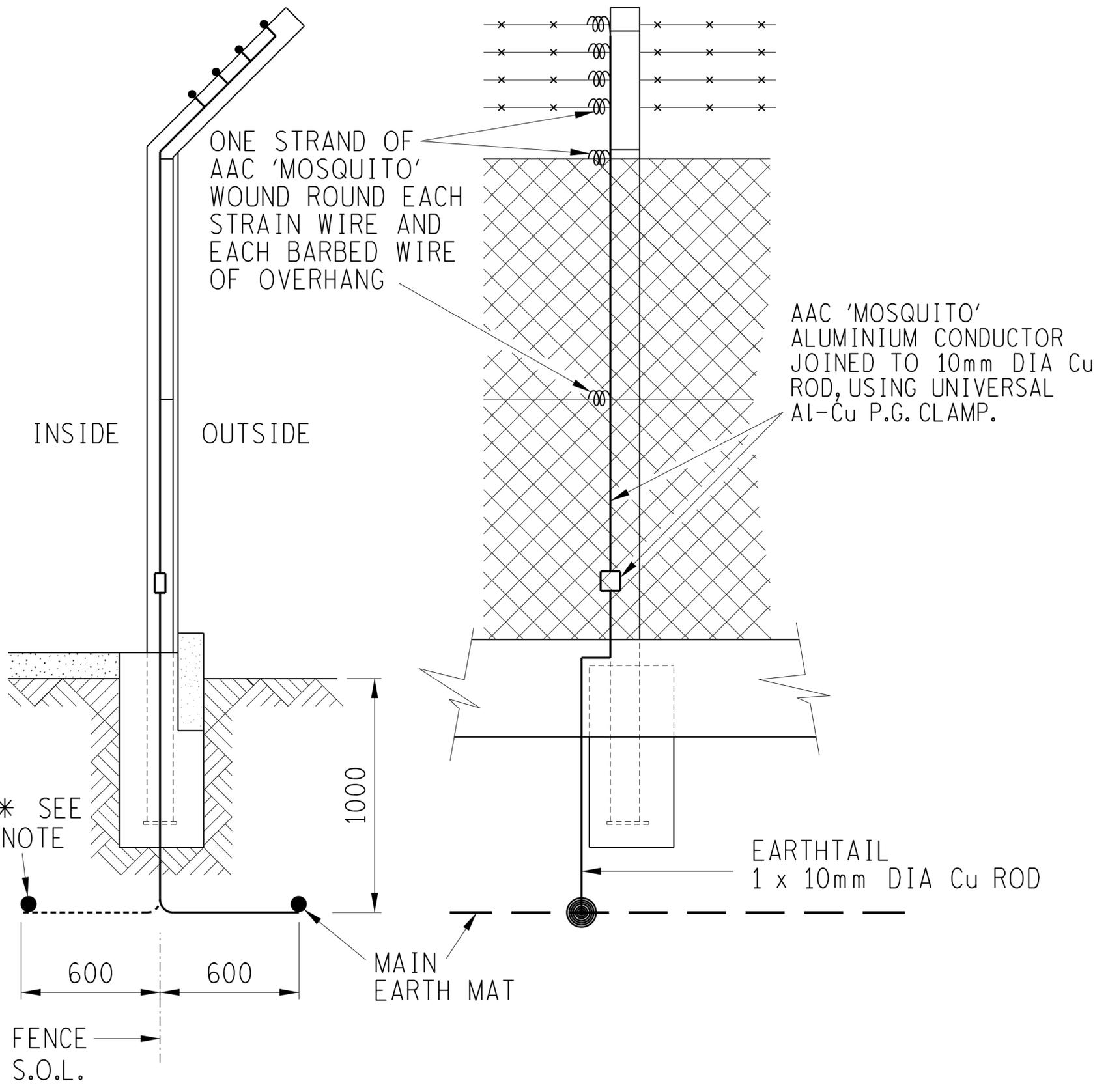
EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C13	3
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SAFETY FENCE EARTHING
CONCRETE POSTS WITH ALUMINIUM WIRE FENCE



FENCE TO BE EARTHED ON BOTH SIDES OF ANY GATE OR REMOVABLE PANEL AND AT INTERVALS NOT EXCEEDING 20000mm



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

3	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
<h1>EARTHING STANDARDS</h1>		0.54/393			
		SHEET NUMBER		REVISION	
		C14		3	

1

2

3

4

FENCE EARTHING WOODPOLE WITH GALVANISED WIRE FENCE

A

A

B

B

C

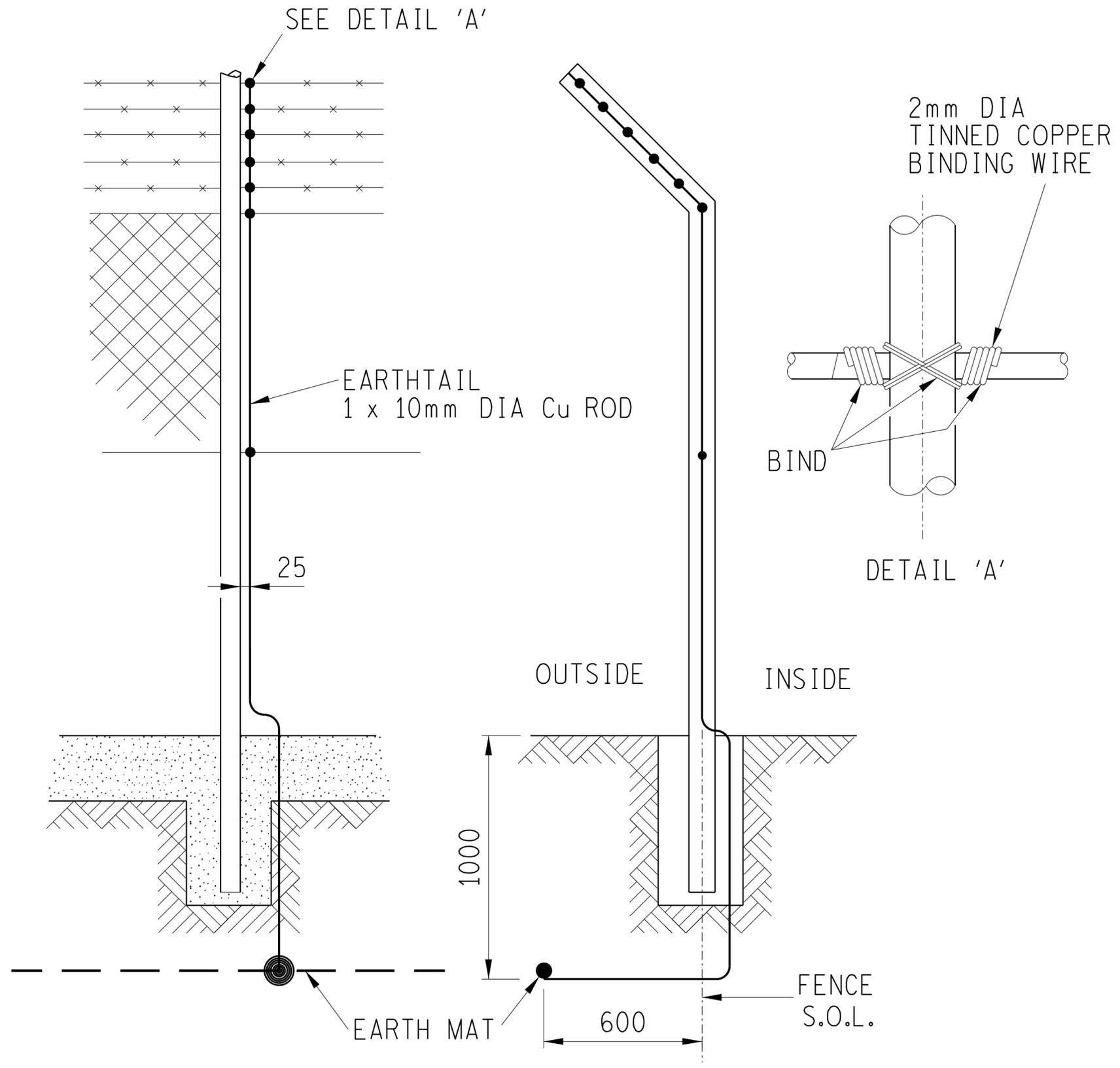
C

D

D

E

E



FENCE TO BE EARTHED ON BOTH SIDES OF ANY GATE OR REMOVABLE PANEL AND AT INTERVALS NOT EXCEEDING 20000mm



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1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		C15		1	

1

2

3

4 SIZE GROOTTE A4L

1

2

3

4

TANKS, BASES, ETC. & NEUTRALS OF ALL EQUIPMENT MOUNTED ON NON-METALLIC SUPPORTS

A

A

B

B

EXAMPLES

PLUG BOXES, JUNCTION BOXES, ETC.

C

C

EQUIPMENT EARTHING STRAP 50x3mm Cu FLAT

FOR CONNECTION SEE SHT C7

EARTHTAIL (ONE CONNECTION)

NON-MATELLIC SUPPORT

EARTH MAT

D

D

E

E



Eskom Holdings SOC Limited
REG No. 2002/015527/30

2

DRG SHEET REPLACED. GENERAL REDAWN.

JMV

KN

TM

28/06/2019

REV

REVISION DESCRIPTION

BY

CHKD

AUTH

DATE

F

F

EARTHING STANDARDS

0.54/393

SHEET NUMBER

REVISION

C16

2

1

2

3

4

SIZE GROOTTE A4L

1

2

3

4

PAINTED TANKS, BASES ETC. OF EQUIPMENT MOUNTED ON EARTHED STEELWORK

A

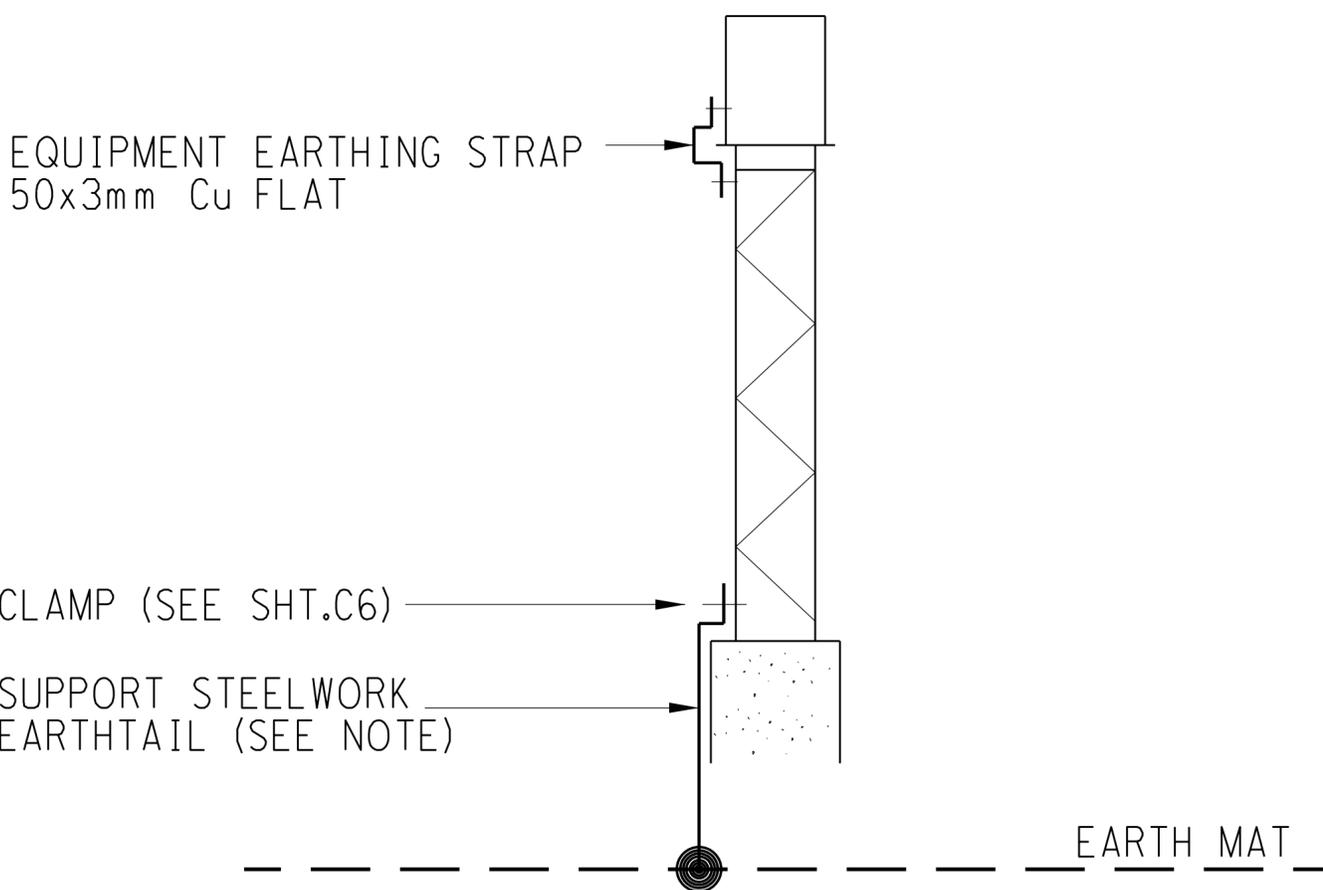
A

B

B

EXAMPLES

CURRENT TRANSFORMERS, AUXILIARY TRANSFORMERS, CIRCUIT BREAKERS, ETC.



C

C

D

D

EQUIPMENT EARTHING STRAP
50x3mm Cu FLAT

CLAMP (SEE SHT.C6)

SUPPORT STEELWORK
EARTHTAIL (SEE NOTE)

EARTH MAT

E

E

NOTE:
SUPPORT STEEL EARTHING.
NUMBER OF EARTHING CONNECTIONS TO EARTH MAT AS PER APPLICABLE SUBSTATION BAY EARTHING SHEETS.

F

F



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EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		C17		2	

1

2

3

4 SIZE GROOTTE A4L

1

2

3

4

GALVANISED TANKS, BASES ETC. OF EQUIPMENT MOUNTED ON EARTHED STEELWORK

A

EXAMPLES

POST INSULATORS, CURRENT TRANSFORMERS, ETC.

A

B

B

EQUIPMENT EARTHED THROUGH H.D. BOLTS

C

C

FOR CONNECTION (SEE SHT.C7)

SUPPORT STEELWORK EARTHTAIL (SEE NOTE)

D

D

EARTH MAT

E

E

NOTE: SUPPORT STEEL EARTHING. NUMBER OF EARTHING CONNECTIONS TO EARTH MAT AS PER APPLICABLE SUBSTATION BAY EARTHING SHEETS.



Eskom Holdings SOC Limited
REG No. 2002/015527/30

2 DRG SHEET REPLACED. GENERAL REDAWN. JMV KN TM 01/07/2019

REV REVISION DESCRIPTION BY CHKD AUTH DATE

EARTHING STANDARDS

0.54/393

SHEET NUMBER REVISION

C18

2

1

2

3

4 SIZE GROOITE A4L

1

2

3

4

ALL SINGLE CORE CABLE SEALING ENDS

A

A

B

B

C

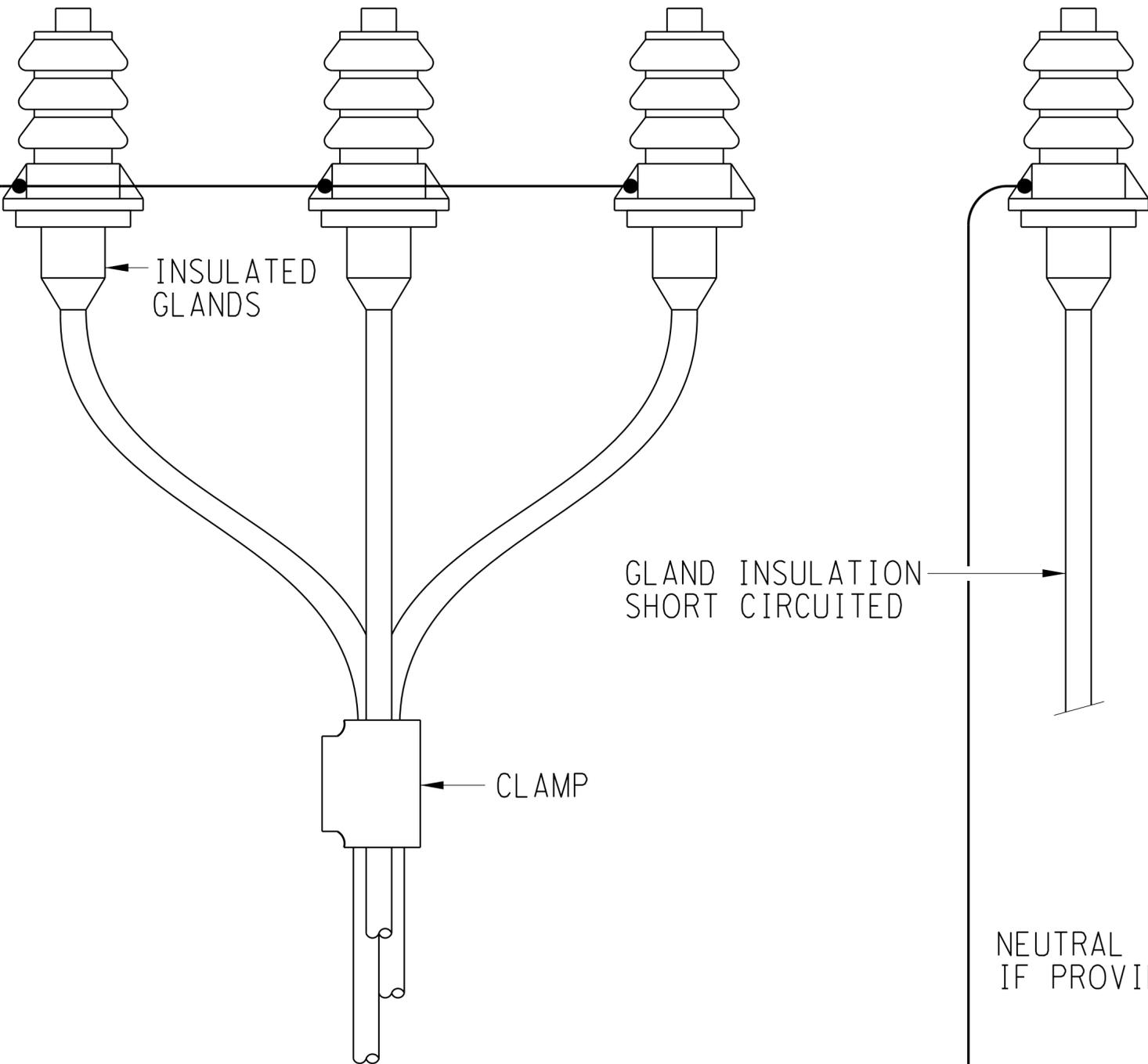
C

D

D

E

E



EARTH MAT

TRANSFORMER LV SINGLE CORE BARE CABLE TERMINATIONS



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1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C19

1

1

2

3

4

SIZE GROOTTE A4L

1 2 3 4

SWITCHBOARDS (WITH THERMOPLASTIC INSULATED CABLES)

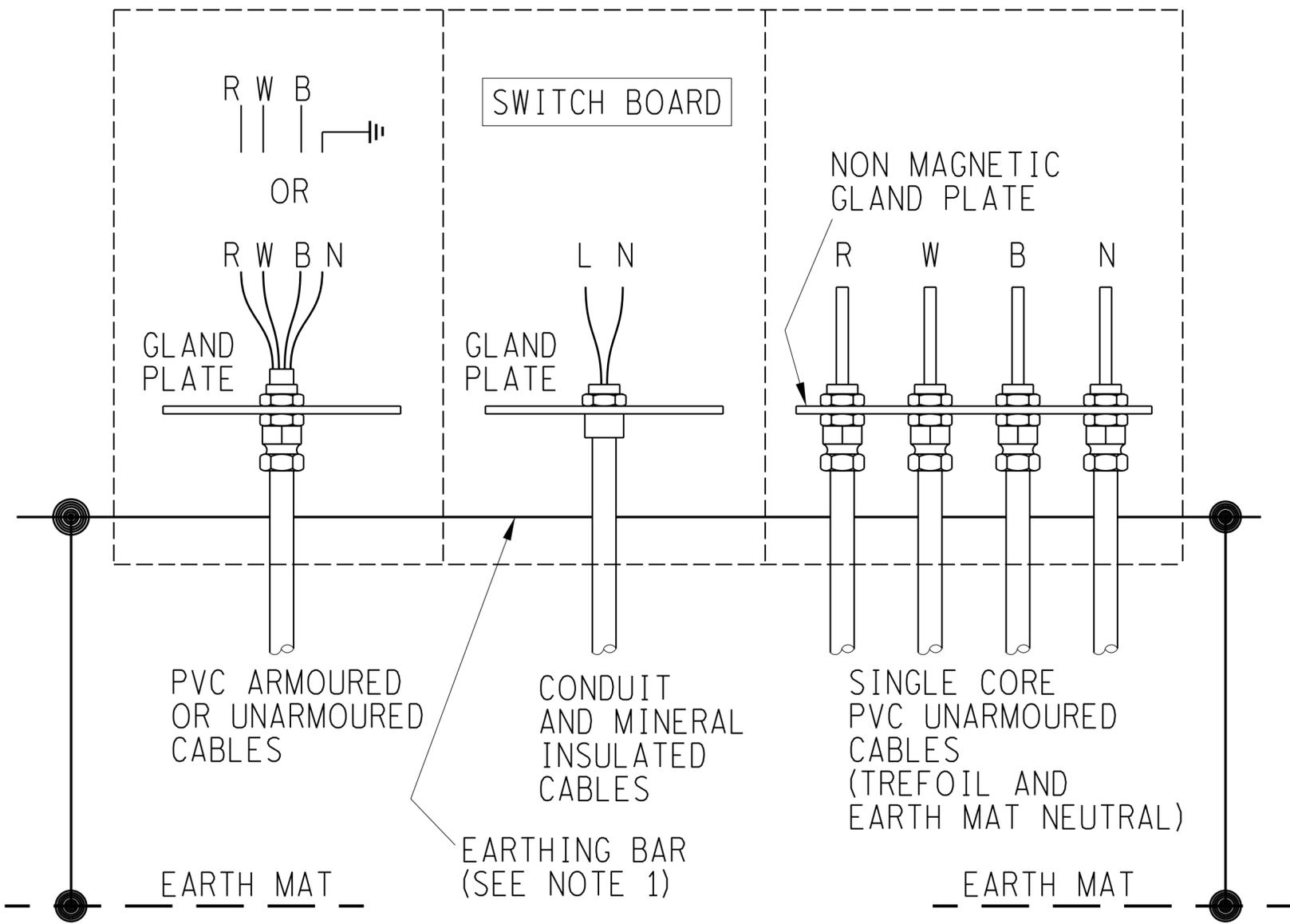
A A

B B

C C

D D

E E



NOTE:
 1. EARTHING BAR.
 NUMBER OF EQUIPMENT EARTHING STRAPS AS PER CABLING AND EARTHING SPECIFICATION FOR STATION.
 2. ARMOURING OF SINGLE CORE CABLES AND SCREENS OF POWER AND CONTROL CABLES TO BE EARTHED ON ONE END ONLY.



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2	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
 STANDARDS

0.54/393

SHEET NUMBER	REVISION
C20	2

1 2 3 4 SIZE GROOTTE A4L

1

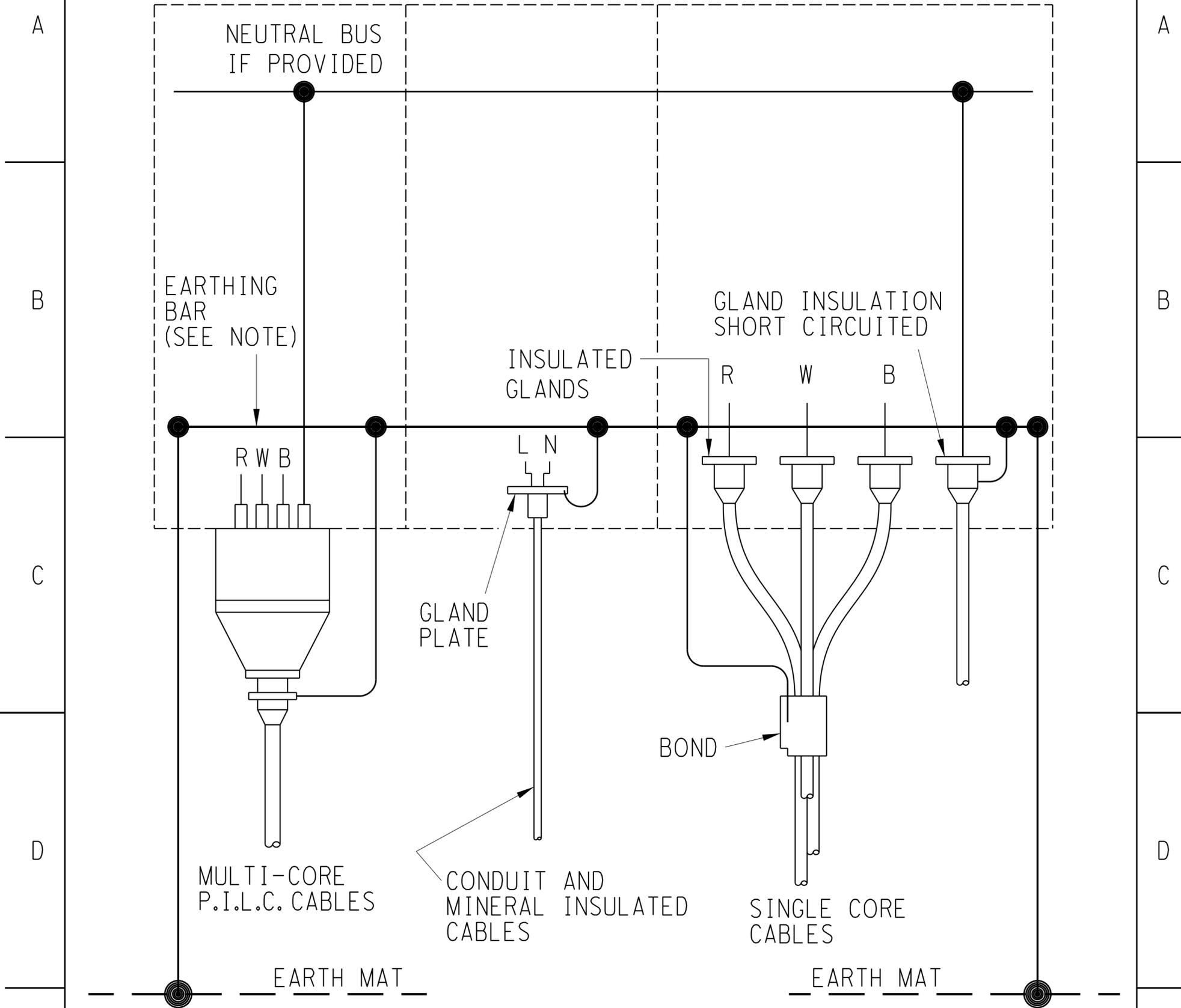
2

3

4

SWITCHBOARDS (WITH PAPER INSULATED CABLES)

LV SWITCHBOARD - PILC



NOTE:
 1. EARTHING BAR.
 NUMBER OF EQUIPMENT EARTHING STRAPS AS PER CABLING AND EARTHING SPECIFICATION FOR STATION.
 2. FOR DISTRIBUTION AND TRANSMISSION.
 MV CABLE CONNECTED SOURCE SYSTEM ONLY



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1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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		SHEET NUMBER		REVISION	
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1

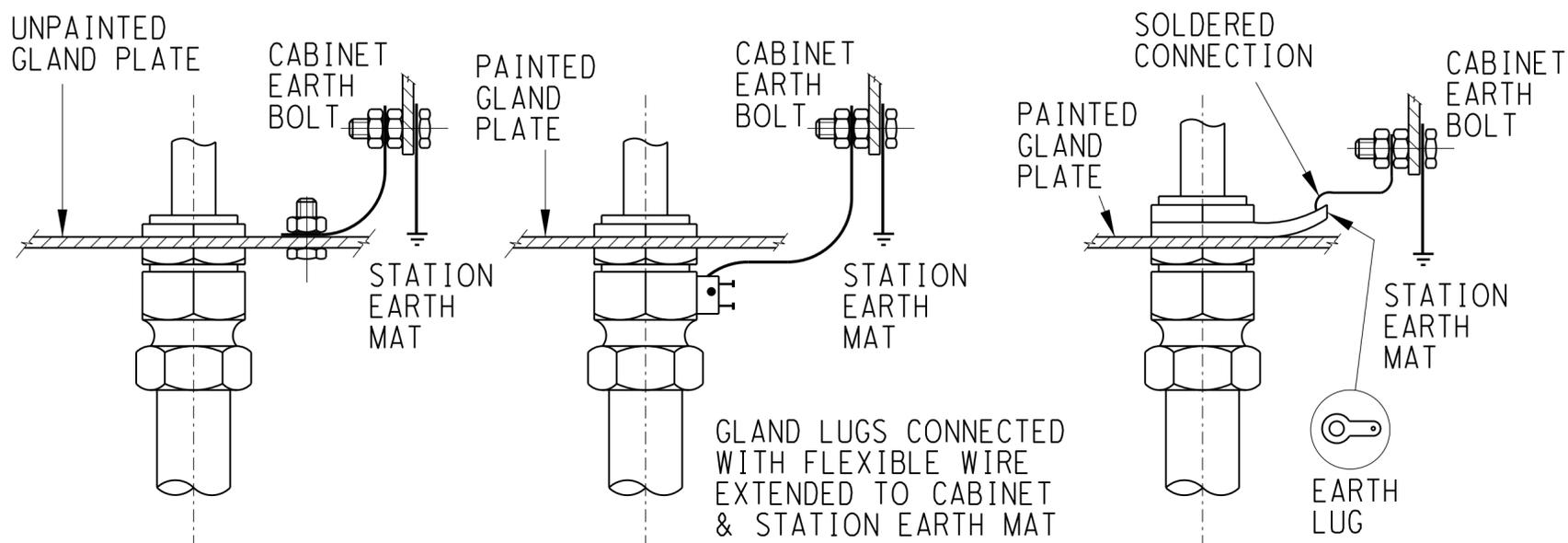
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3

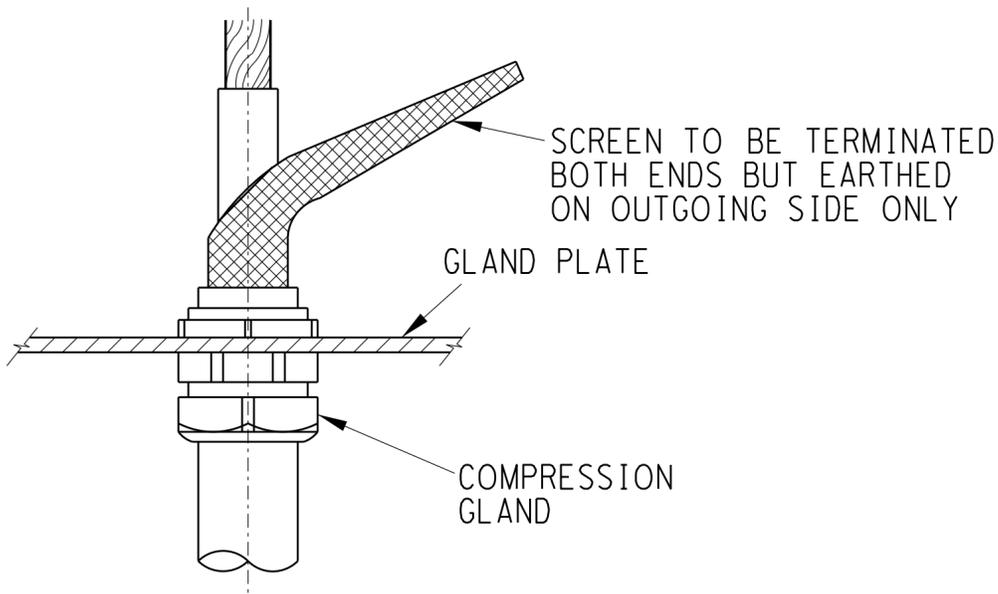
4 SIZE GROOTTE A4L

1 2 3 4

ARMOURED MULTICORE CONTROL, TELEPHONE AND POWER CABLES



G.P.O. UNARMOURED TYPE 'Z' CABLE



NOTE:
ALUMINIUM GLANDS
MUST BE USED ON
ALUMINIUM ARMOURED
CABLES (DOUBLE
LOCK TYPE)



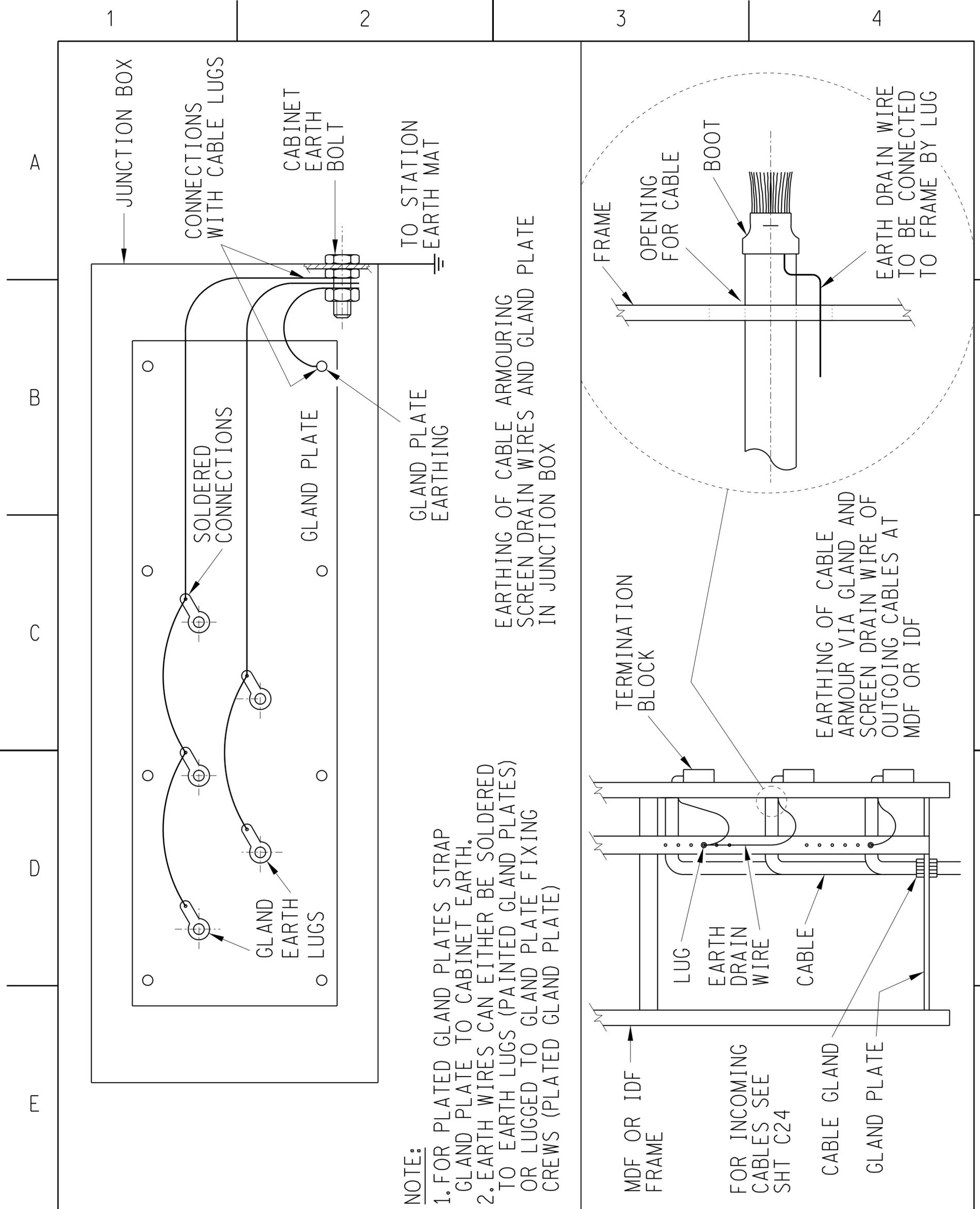
Eskom Holdings
SOC Limited
REG No. 2002/015527/30

2	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE

EARTHING
STANDARDS

0.54/393

SHEET NUMBER	REVISION
C22	2



Eskom Holdings
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2	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
C23	2

1

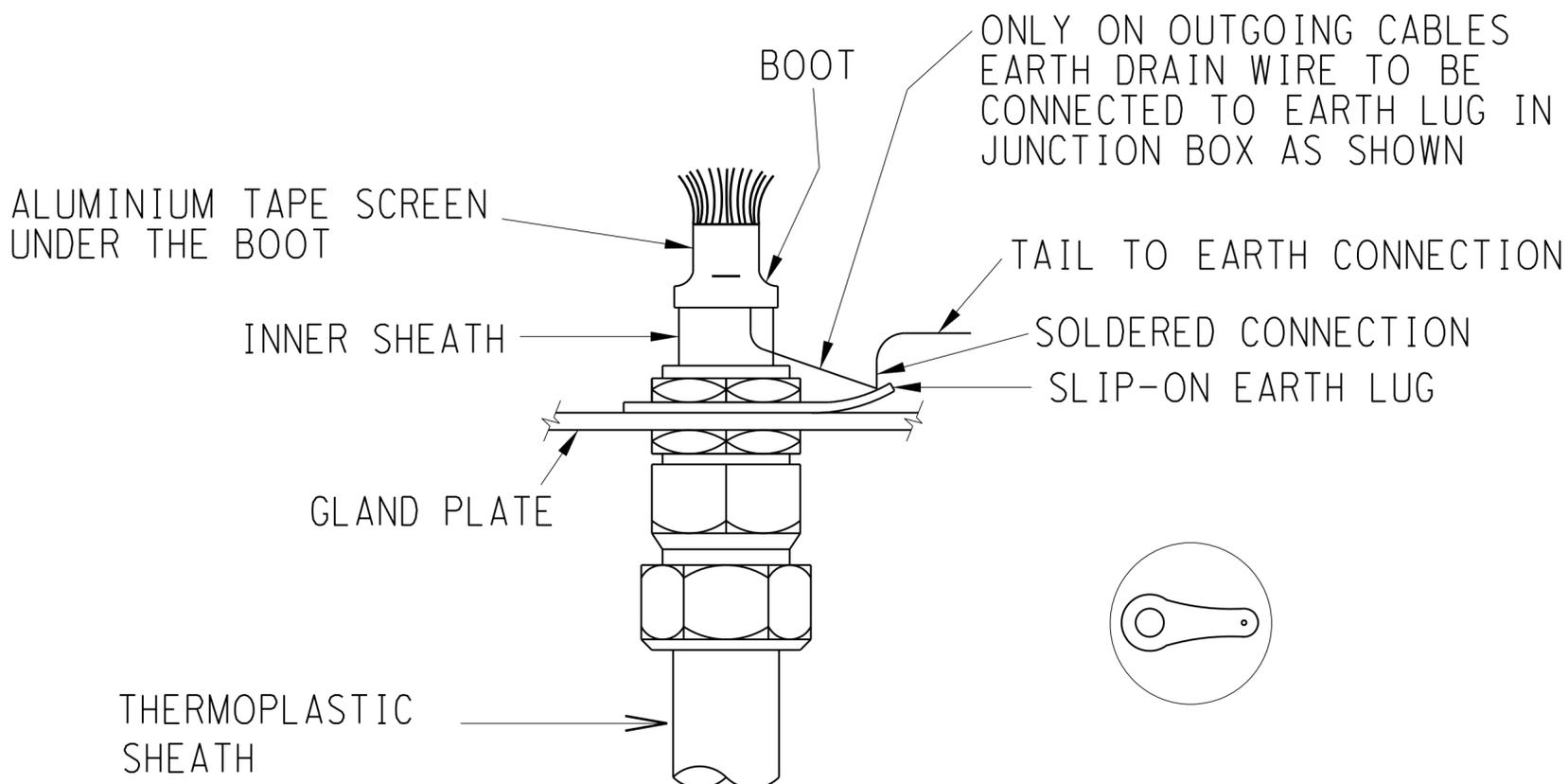
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3

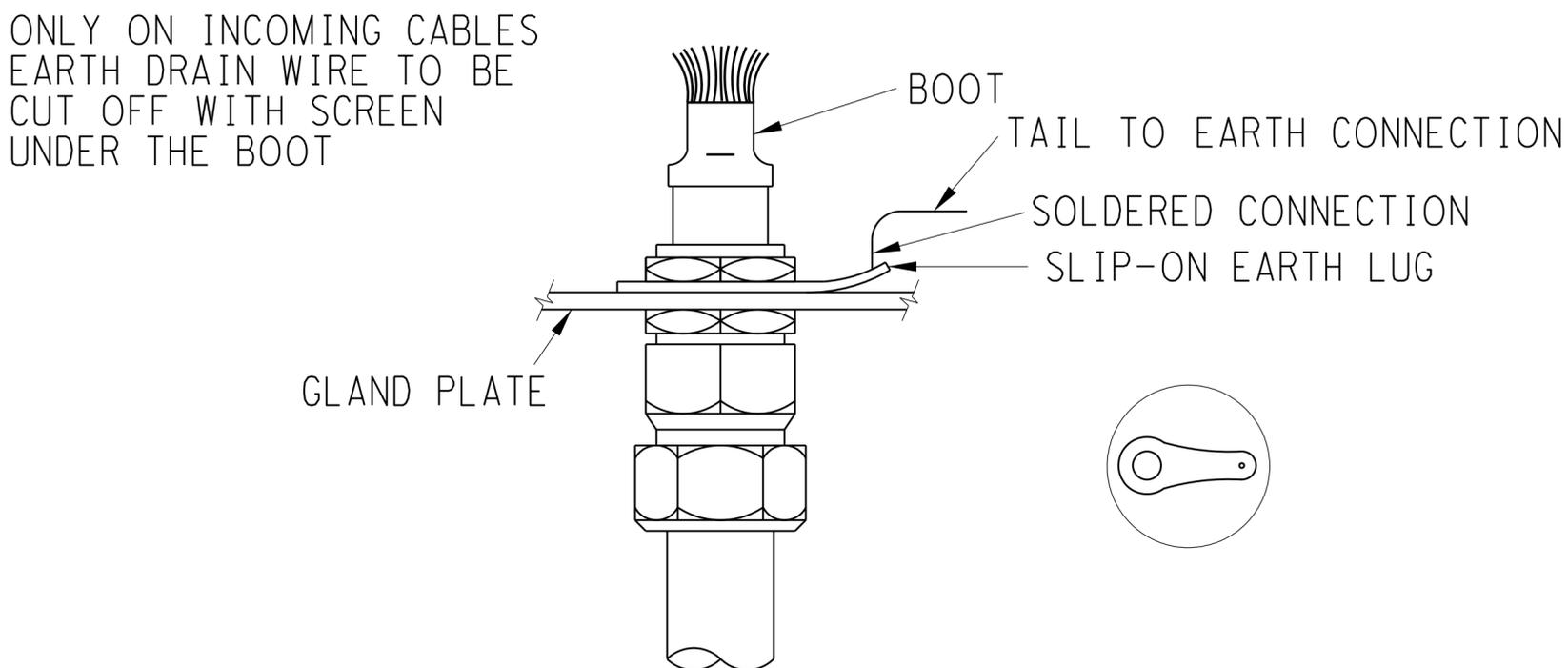
4

ARMoured TELEPHONE AND SCREENED CONTROL CABLES AT JUNCTION BOX

OUTGOING CABLES



INCOMING CABLES



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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C24	2
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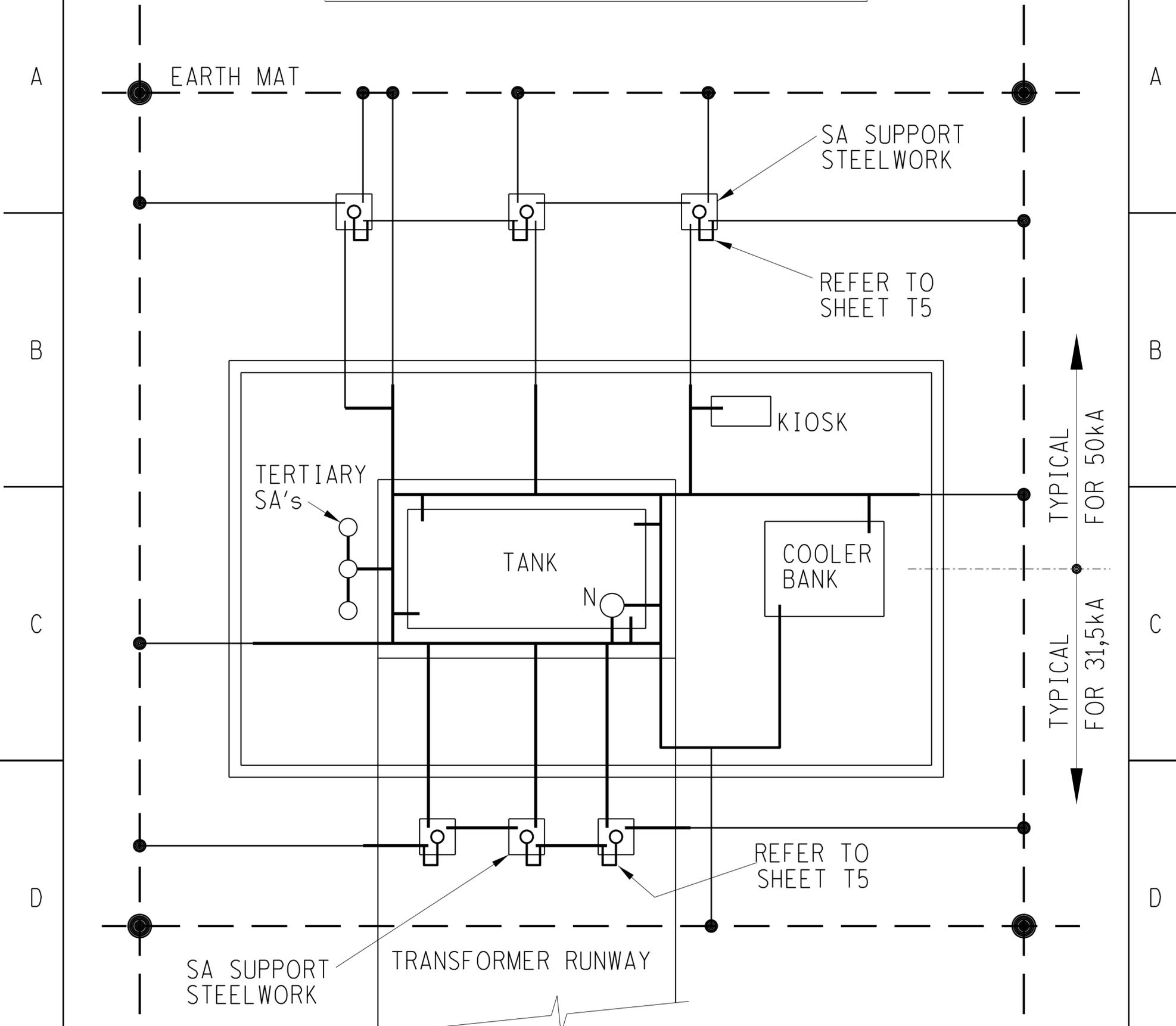
1

2

3

4 SIZE GROOTTE A4L

TYPICAL TRANSFORMER AND SA EARTHING



NOTE:
 TRANSFORMER NUETRAL AND TERTIARY
 EARTHING TO COMPLY WITH 240-76624507

- INDICATES MAIN EARTH MAT
- INDICATES 50 x 3mm Cu STRAP
- INDICATES 2 x 10mm DIA Cu RODS
- INDICATES CONNECTION BETWEEN 50 x 3mm STRAP AND 2 x 10mm DIA RODS (SEE SHEET C26)



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EARTHING
 STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C25

2

4 SIZE GROOTTE A4L

1

2

3

4

BOLTED CONNECTION BETWEEN
50x3mm Cu STRAP AND 2 x ϕ 10 Cu RODS

A

A

B

B

C

C

D

D

E

E

RODS TO PROJECT \pm 150mm
INTO BUND AREA

CLAMP
(SHEET C6)

BUND FLOOR

CLAMP
(SHEET C6A)

50x3mm Cu STRAP
(TO BE LAID AS FLAT
AS POSSIBLE AGAINST
BUND FLOOR)

2x ϕ 10mm Cu RODS
CONNECTED TO MAIN
EARTH MAT



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1

DRG SHEET REPLACED. GENERAL REDAWN.

JMV

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BY

CHKD

AUTH

DATE

EARTHING
STANDARDS

0.54/393

SHEET NUMBER

REVISION

C26

1

1

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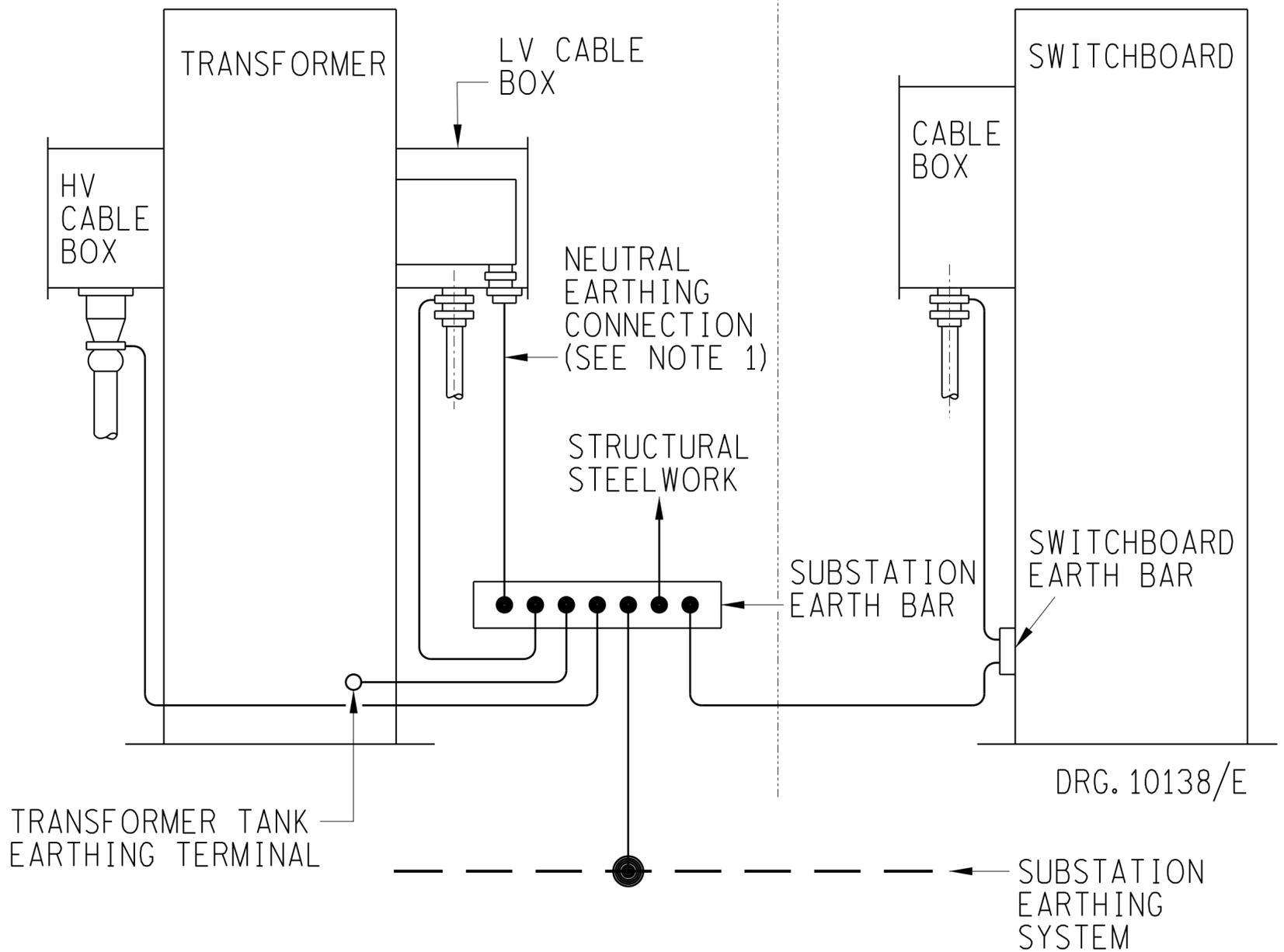
SIZE GROOTTE A4L

TYPICAL LAYOUT OF SUBSTATION
SHOWING REQUIRED EARTHING CONNECTIONS
(SABS 0198: PART III - 1988)

LV SWITCHBOARD SUPPLY CONNECTION

HV ENCLOSURE

LV ENCLOSURE



DRG. 10138/E

NOTES:

1. GENERAL: MAKE EARTH CONNECTIONS TO STRUCTURES AND EQUIPMENT AT POINTS SPECIFICALLY PROVIDED FOR THIS PURPOSE. DO NOT MAKE EARTH CONNECTIONS TO BOLTS OR CLAMPS DESIGNED FOR MECHANICAL SUPPORT BECAUSE THESE MAY BE REMOVED TEMPORARILY OR PERMANENTLY (E.G. DURING MAINTENANCE WORK OR ALTERATIONS TO THE STRUCTURE).
2. NORMAL ESKOM PRACTICE IS TO EARTH THE NEUTRAL AT THE INCOMER IN THE SWITCHBOARD.
3. APPLICABLE ONLY FOR MV CABLE CONNECTED SOURCE SYSTEMS.



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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C27

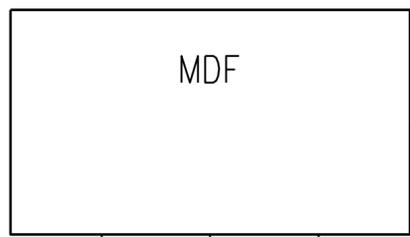
1

EARTHING OF TELEPHONE OR
PROCESS CONTROL CABLES

1 2 3 4

A

A



METAL
GLAND

B

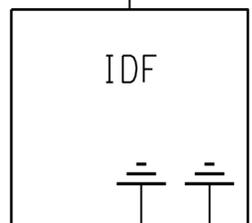
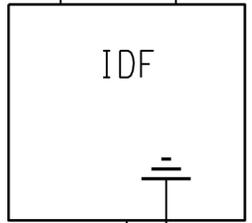
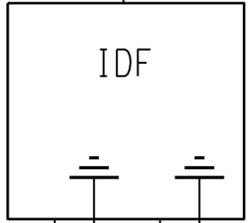
B

INSULATED
FLOATING
GLAND

INSULATED
FLOATING
GLAND

INSULATED
FLOATING
GLAND

INSULATED
FLOATING
GLAND



C

C

METAL
GLAND

METAL
GLAND

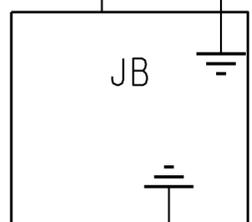
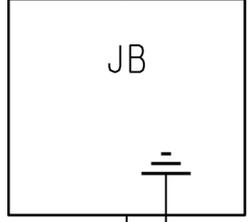
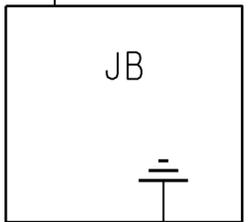
METAL
GLAND

METAL
GLAND

INSULATED
FLOATING
GLAND

INSULATED
FLOATING
GLAND

INSULATED
FLOATING
GLAND



D

D

METAL
GLAND

METAL
GLAND

METAL
GLAND

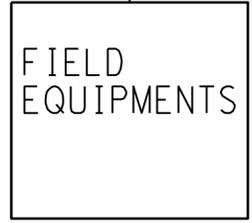
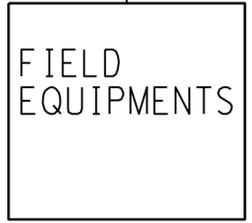
ARMOURING

HV YARD

INSULATED
FLOATING
GLAND

INSULATED
FLOATING
GLAND

INSULATED
FLOATING
GLAND



E

E

FIELD
EQUIPMENTS

FIELD
EQUIPMENTS

FIELD
EQUIPMENTS

F

F



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EARTHING
STANDARDS

0.54/393

SHEET NUMBER REVISION

C28 1

1

2

3

4 SIZE GROOTTE A4L

1

2

3

4

EARTHING OF PROCESS CONTROL COMPUTERS

ELECTRONIC ROOM

COMPUTER ROOM

- THE FOLLOWING ELECTRONIC CIRCUITS ARE CONNECTED TO THE ELECTRONIC EARTH NETWORK:
- REGULATION CABINETS
 - FRAMES OF ANY TELEVISION SETS
 - SLIDE-IN RACKS OF EQUIPMENT FOR DETECTION OF EARTH FAULT
 - MEASUREMENT DISPATCHER
 - MISCELLANEOUS ELECTRONIC MEASURING INSTRUMENTS
 - CENTRALISED DATA PROCESSING (KIT)
 - PROCESS COMPUTER

NOTE:
 EEE = ELECTRONIC EQUIPMENT EARTH
 STE = STATION EARTH MAT



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EARTHING STANDARDS

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SHEET NUMBER REVISION

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1

1

2

3

4

SIZE GROOTTE A4L

1

2

3

4

EARTHING OF ELECTRIC ENCLOSURES

EARTHING OF ELECTRIC ENCLOSURES

A

A

B

B

C

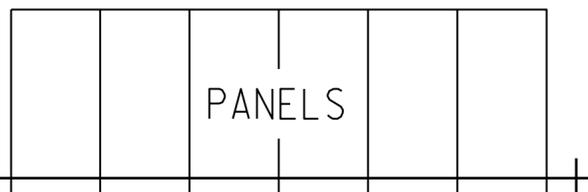
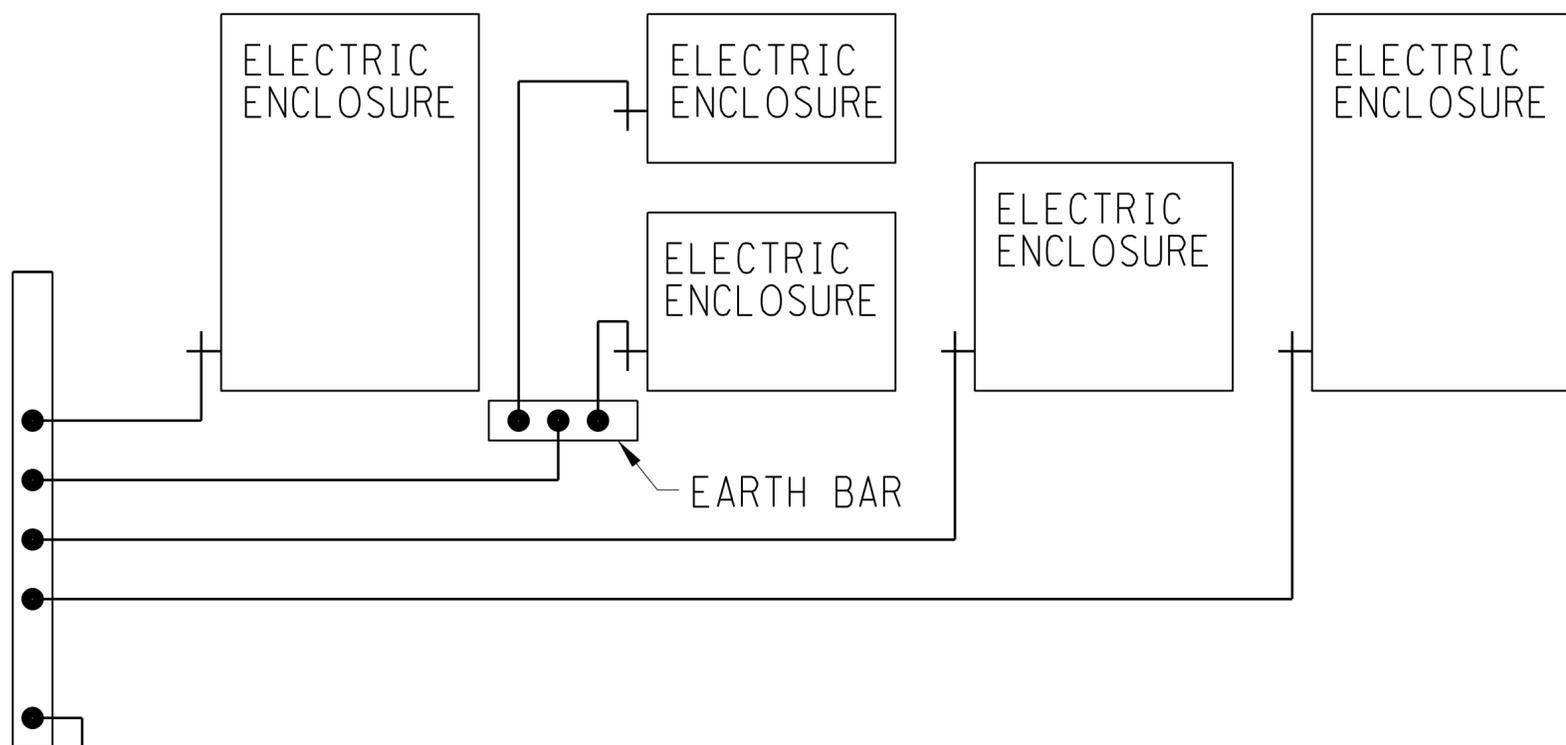
C

D

D

E

E



- A) ONE EARTH CONNECTION FOR SMALLER BOARDS (1 & 2 PANELS)
- B) TWO EARTH CONNECTIONS FOR BOARDS UP TO 15M LENGTH
- C) THREE (OR MORE) EARTH CONNECTIONS FOR BOARDS LONGER THAN 15M

EARTH MAT



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1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C30

1

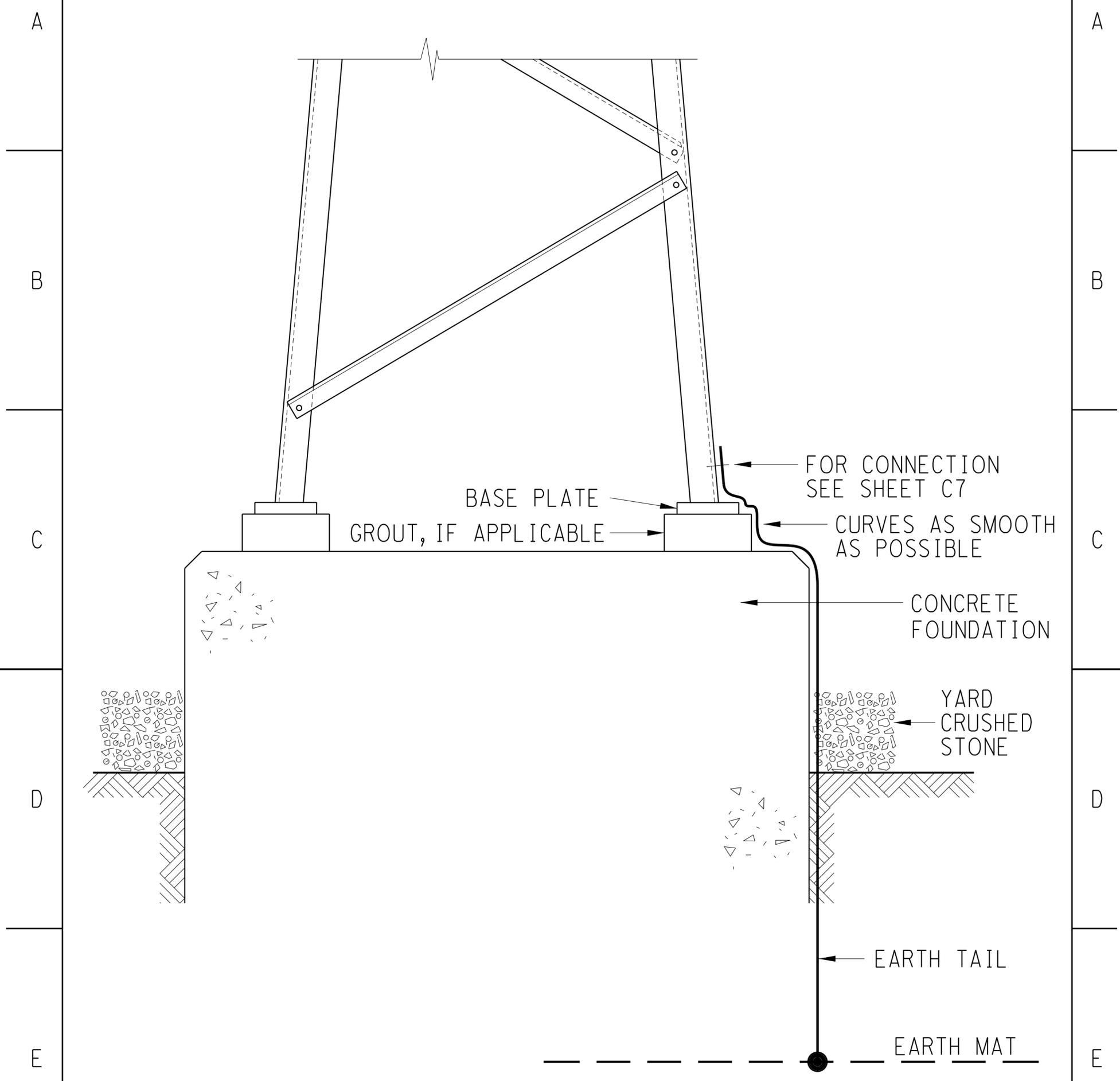
1

2

3

4 SIZE GROOTTE A4L

EARTHING OF STEEL STRUCTURES



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1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	28/06/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
<h2 style="margin: 0;">EARTHING STANDARDS</h2>		<h1 style="margin: 0;">0.54/393</h1>			
		SHEET NUMBER		REVISION	
		C31		1	

1

2

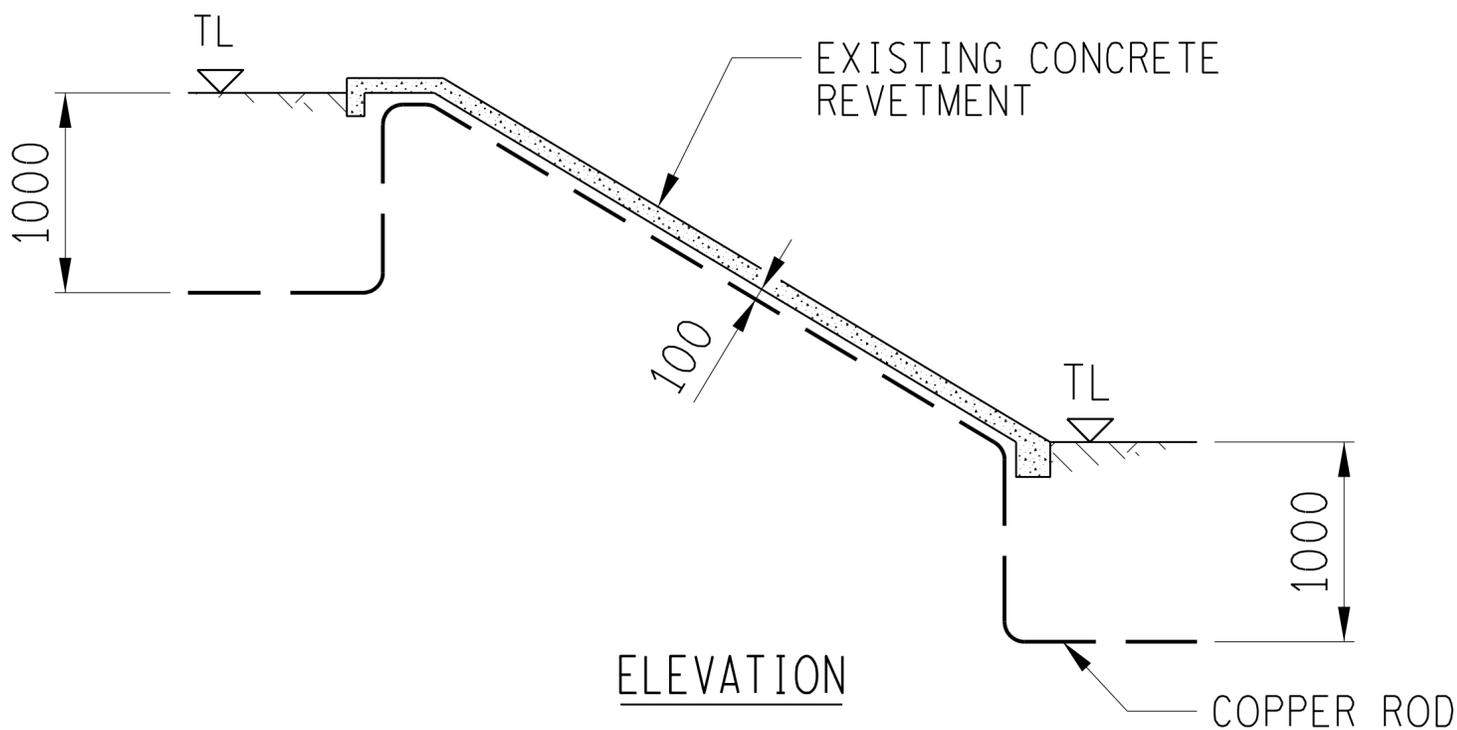
3

4

EARTHMAT RUNNING UNDER EXISTING REVETMENT

A

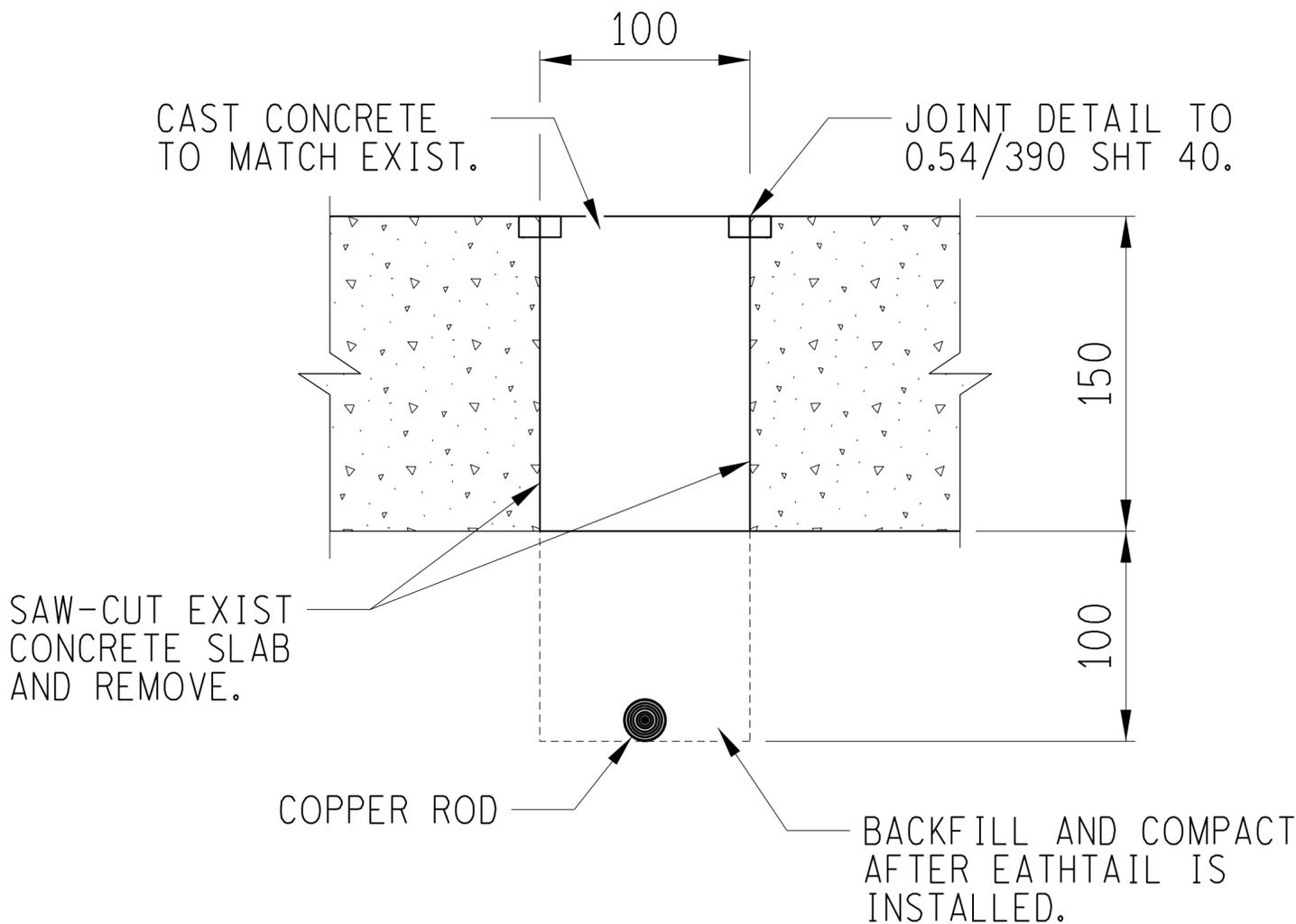
A



ELEVATION

C

C



SECTION THROUGH SAW-CUT REVETMENT

D

D

E

E

F

F



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

1	GENERAL REDAWN.	JMV	KN	TM	17/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C32	1
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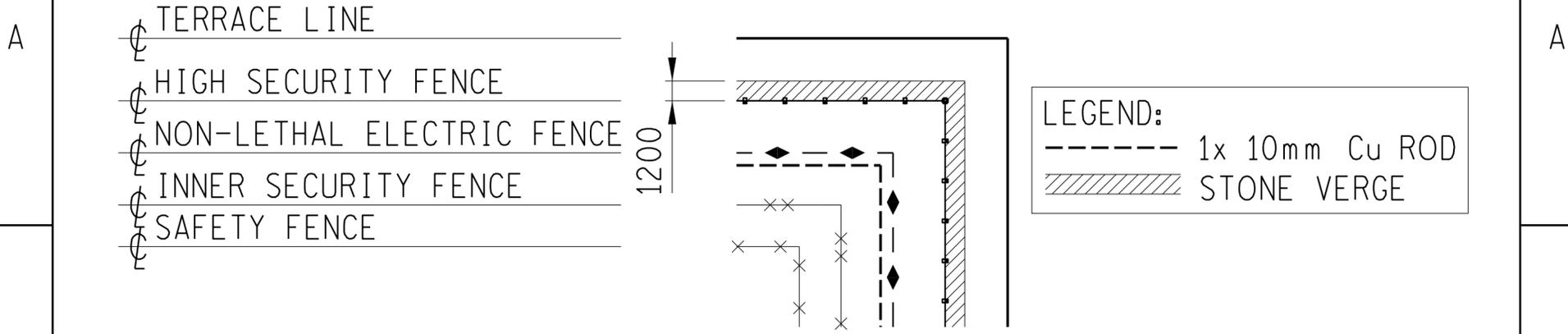
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2

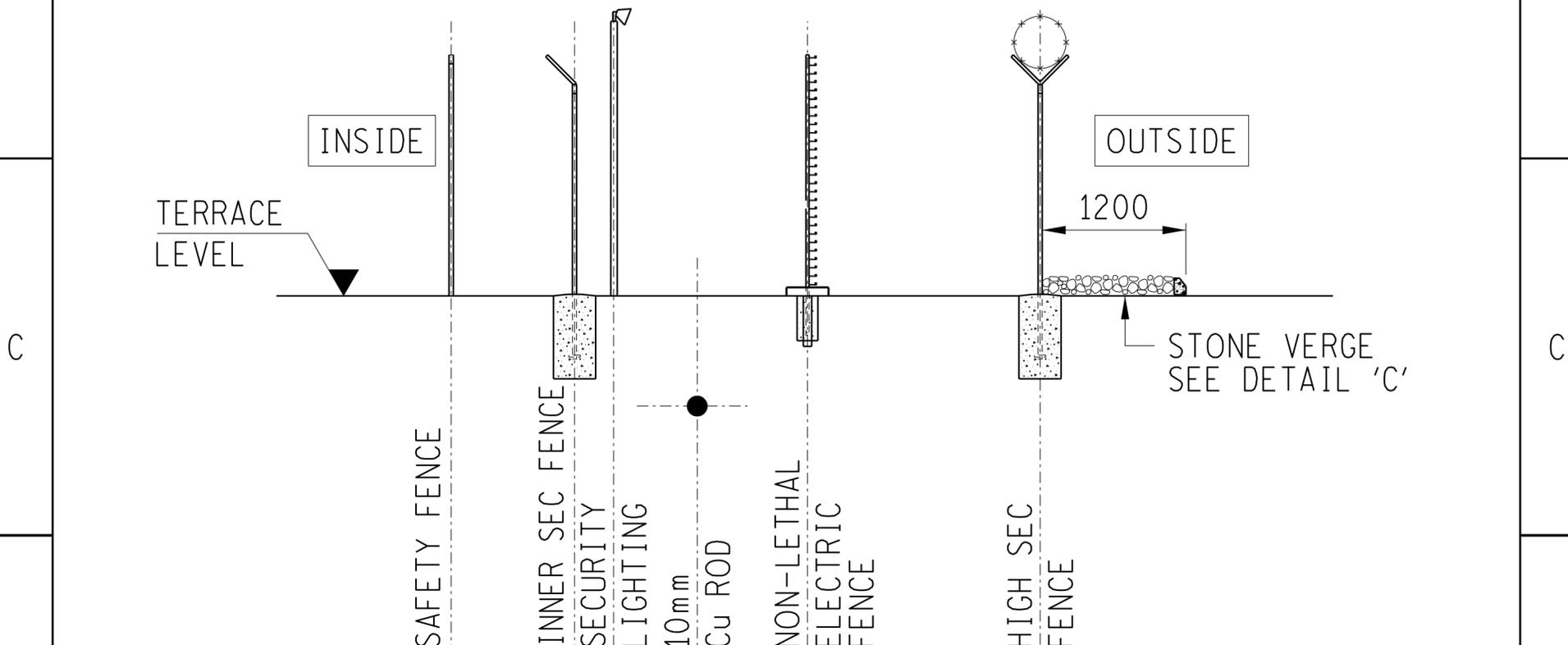
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4 SIZE GROOTTE A4L

TYPICAL LAYOUT FOR EARTHING OF BARRIER FENCES WITH STONE VERGE (NTS)

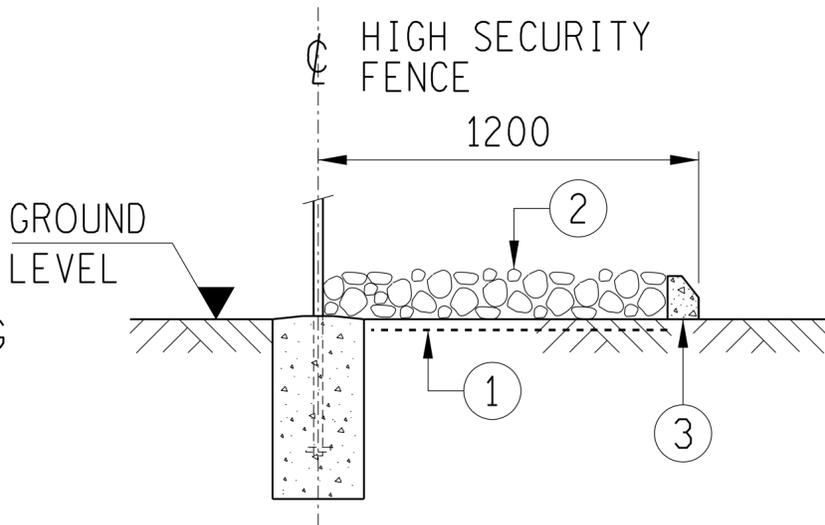


DETAIL A - PARALLELED FENCING (TYPICAL TOP VIEW)



DETAIL B - TYPICAL CROSS SECTION OF FENCES

- ① PLACE WEEDKILLER BEFORE PVC SHEETING (250 MICRON) IS PLACED UNDER STONES.
- ② STONE PITCHING AVERAGE DIAMETER - 150mm
- ③ STANDARD PRECAST CONCRETE KERB FIG 7 FROM SABS 927-1969 (WITH INSITU CONCRETE HAUNCHING AT JOINTS ON BOTH SIDES)



DETAIL C - TYPICAL CROSS SECTION ON STONE VERGE



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

0	REPOSITIONED FROM INCORRECT SHEET C32 DATED 12/10/2018.	JMV	KN	TM	19/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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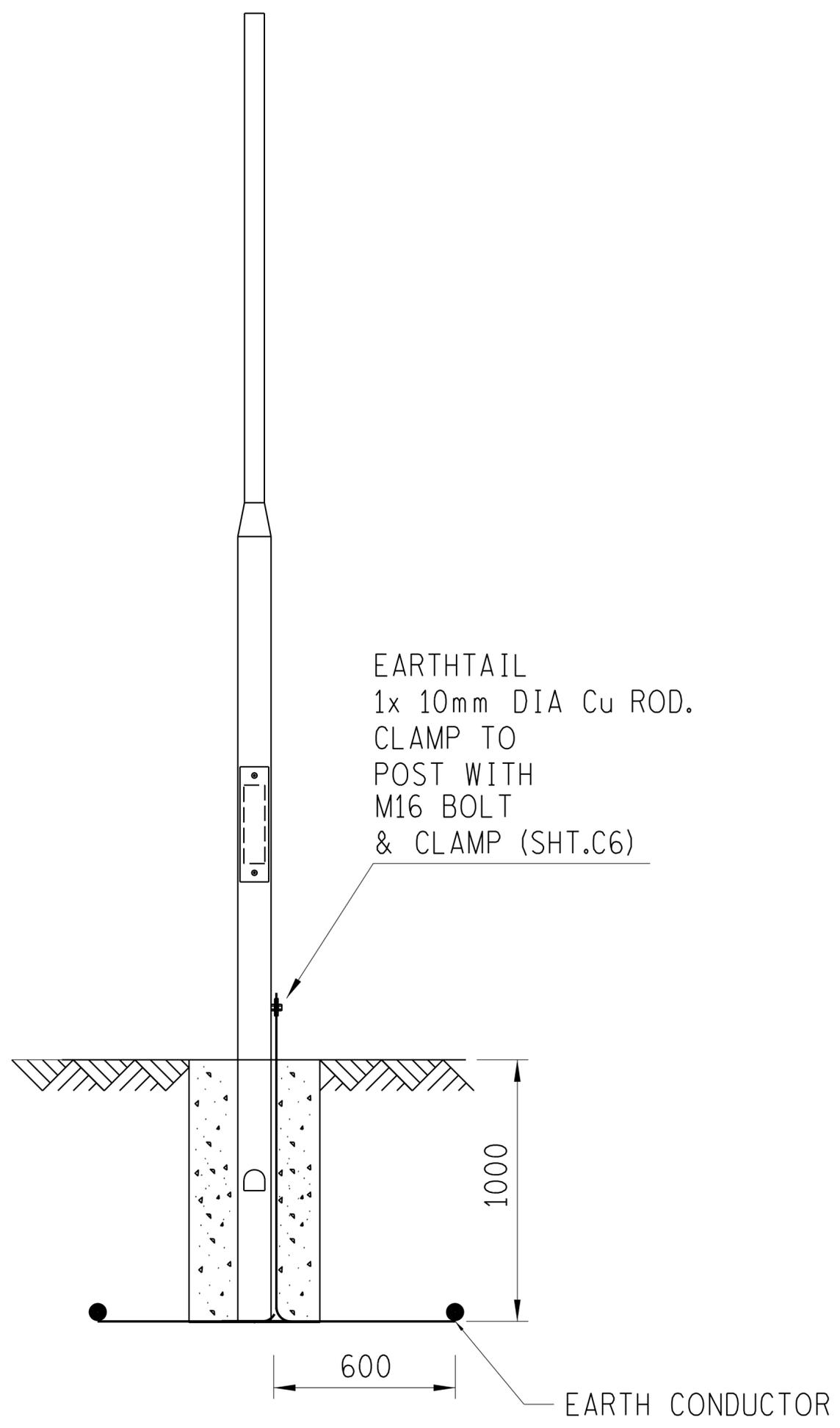
EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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C33	0
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SECURITY LIGHTING POLE EARTHING



Eskom Holdings
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0	FIRST ISSUE	AN	KN	TM	30/07/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
EARTHING STANDARDS		0.54/393			
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		C34		0	

1

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4

A

CONCRETE ROOF TILES

ALUMINIUM GUTTER
M16 BOLT

B

MAKE A 60 x 60 OPENING
IN FASCIA TO FIT A
50 x 50 EARTHTAIL CLAMP
SEE DRG. 0.54/393 SHT.C6

φ10mm COPPER ROD FIXED TO CLAMP
SEE DRG. 0.54/393 SHT.C7

C

φ20mm GALVANISED PIPE
FIXED TO WALL WITH
GALV. SADDLES

φ10mm COPPER ROD FROM MAIN EARTHMAT
TO BE TIED TO EACH INDIVIDUAL GUTTER.

A

B

C

TYPICAL SECTION

D

NOTES

ALL EARTHING IN ACCORDANCE WITH 0.54/393 SERIES.
THE EARTHTAIL CLAMP MUST BE FIXED TIGHTLY AGAINST THE GUTTER
THE 50 x 50mm AREA OF THE CLAMP AT THE GUTTER MUST BE SANDED TO EXPOSED METAL.

AFTER THE CLAMP IS FITTED THE AREA AROUND IT MUST BE SEALED WITH
SIKA SIKAFLEX F1 TO PREVENT THE INGRESS OF WATER.

E

IF GUTTERS IS NOT CONTINIOUS AND IS DEVIDED, EACH MUST BE EARTHED SEPERATELY
AND FIXED TO THE MAIN EARTHMAT

D

E

EARTHING TO TILED ROOF BUILDINGS



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4 SIZE GROOTTE A4L

1

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A

B

C

D

E

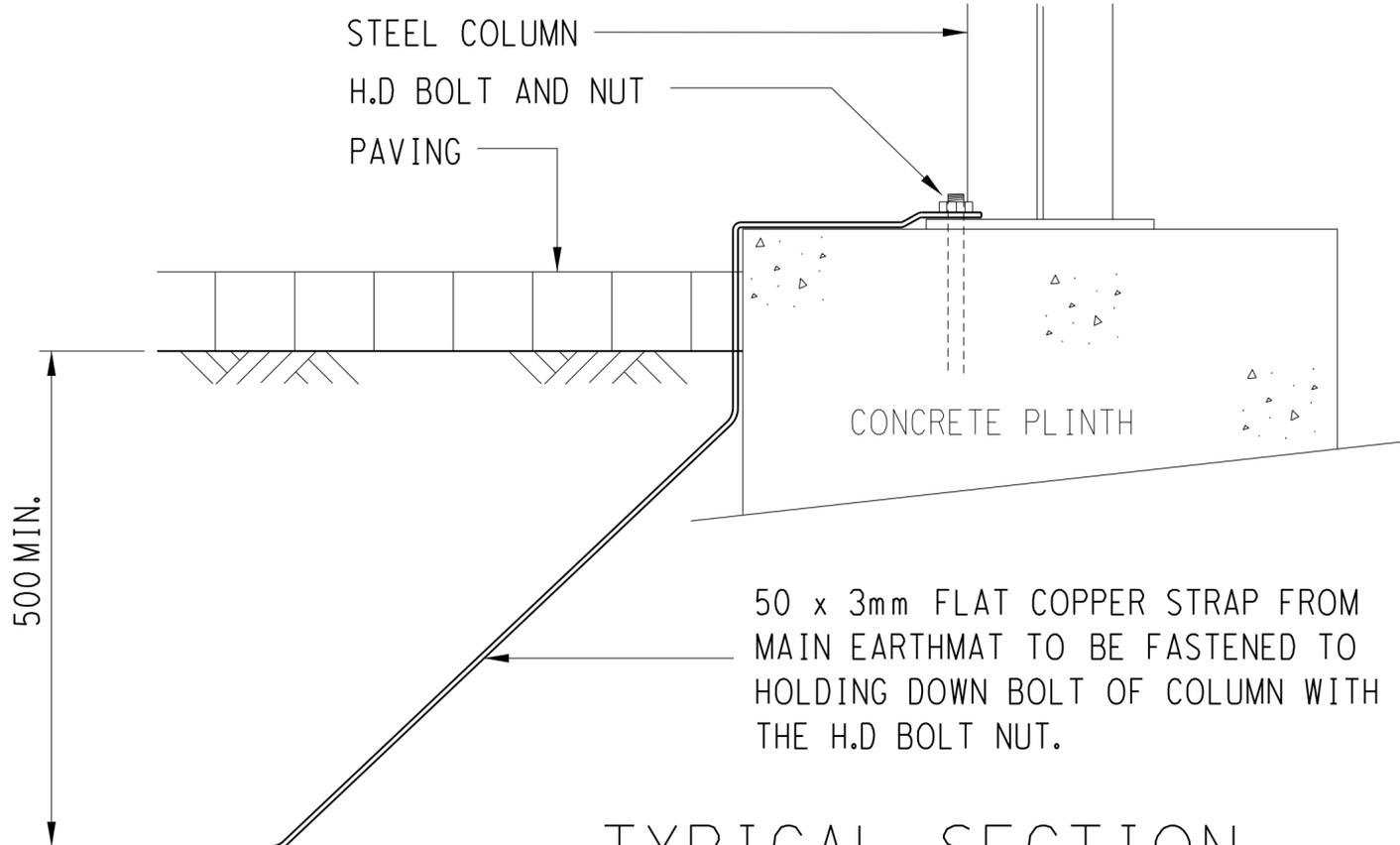
A

B

C

D

E

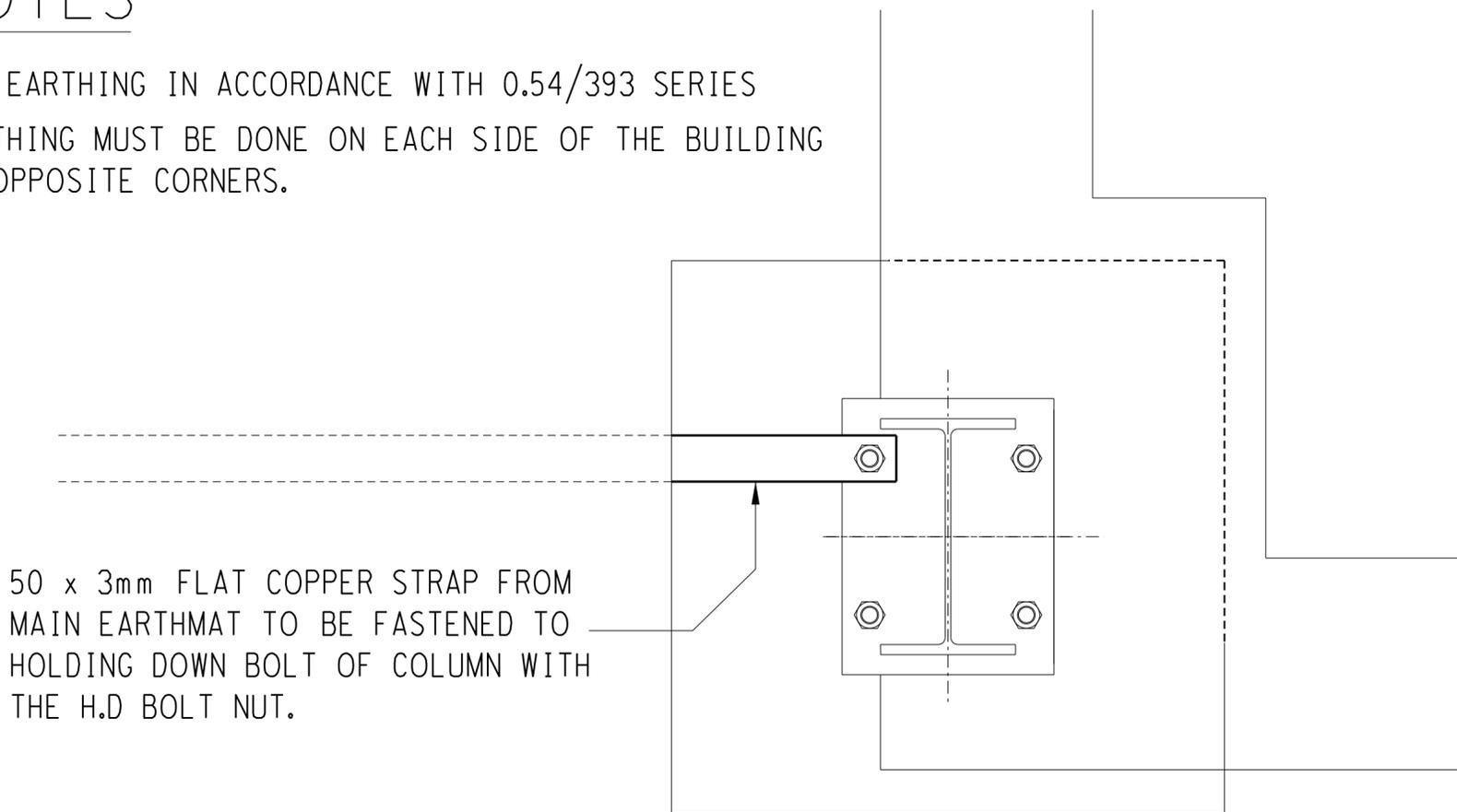


50 x 3mm FLAT COPPER STRAP FROM MAIN EARTHMAT TO BE FASTENED TO HOLDING DOWN BOLT OF COLUMN WITH THE H.D BOLT NUT.

TYPICAL SECTION

NOTES

- 1. ALL EARTHING IN ACCORDANCE WITH 0.54/393 SERIES
- 2. EARTHING MUST BE DONE ON EACH SIDE OF THE BUILDING AT OPPOSITE CORNERS.



50 x 3mm FLAT COPPER STRAP FROM MAIN EARTHMAT TO BE FASTENED TO HOLDING DOWN BOLT OF COLUMN WITH THE H.D BOLT NUT.

PLAN

EARTHING TO CLADDED STORE BUILDING COLUMN



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0.54/393

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4 SIZE GROOTTE A4L

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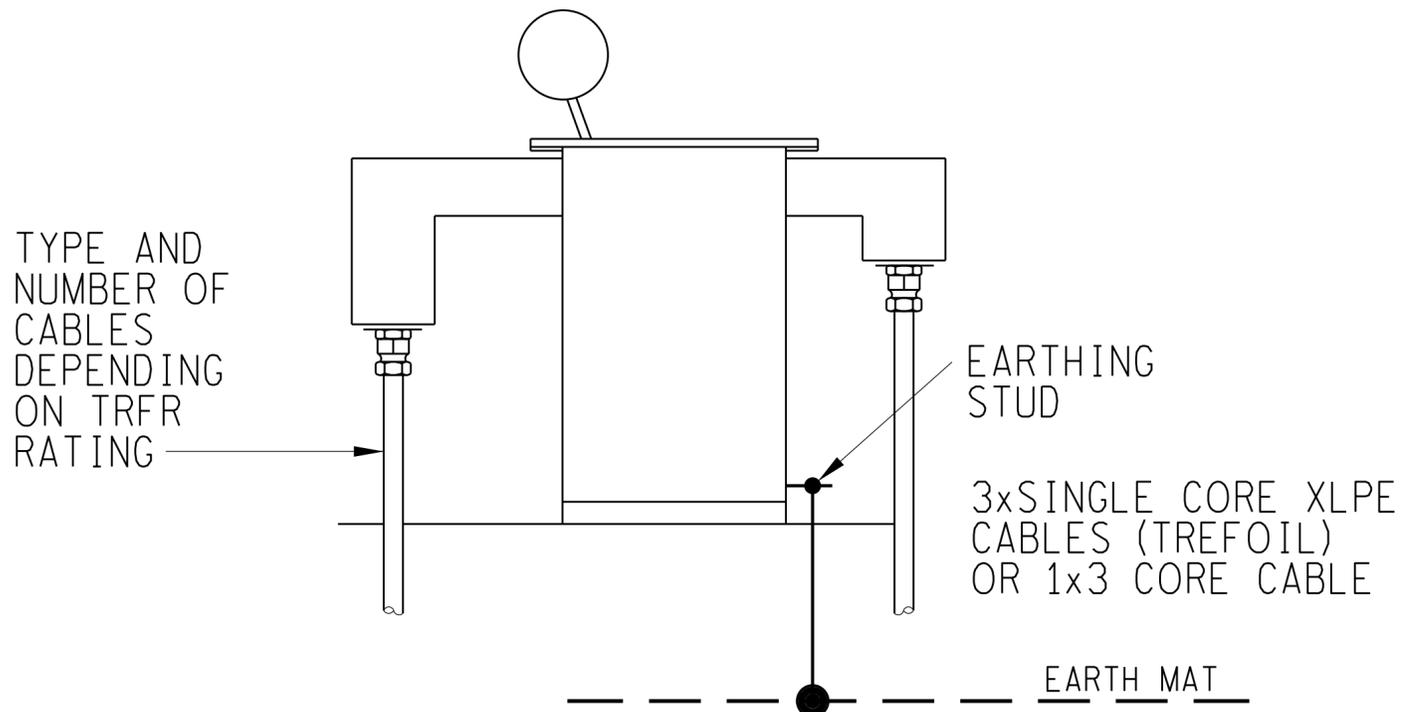
2

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OIL TYPE AUXILIARY TRANSFORMERS IN POWER STATION

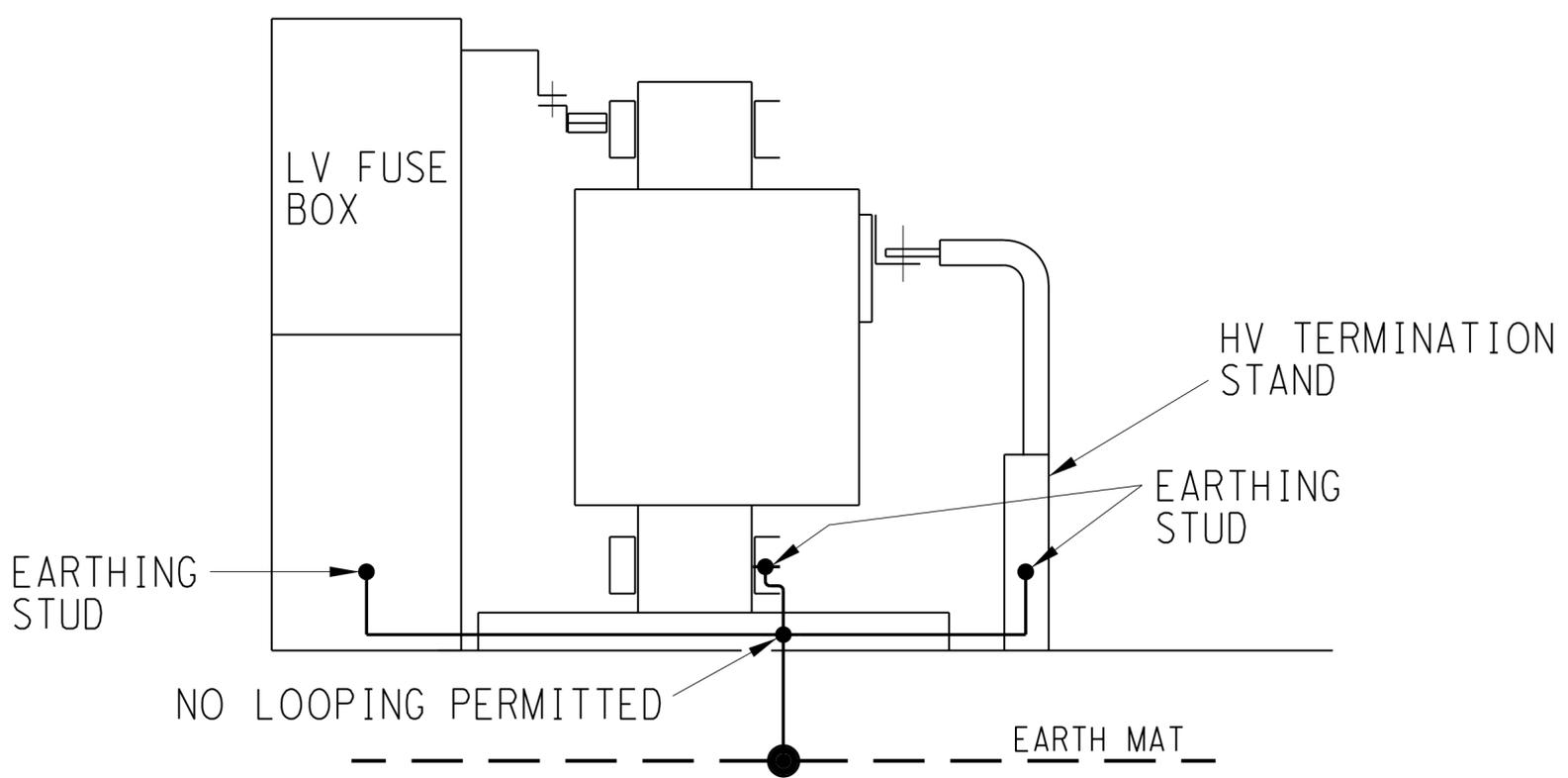
EARTHING OF AUXILIARY TRANSFORMER



NOTES:

1. GLAND PLATES FOR HV AND LV TERMINATION BOXES TO BE NON MAGNETIC IF CONNECTIONS ARE TO BE SINGLE CORE CABLES.
2. MV + LV SINGLE CORE CABLES TO BE SINGLE END POINT BONDED AND EARTHED AT SWITCH BOARDS ONLY.
3. FOR EARTHING OF LARGER TRANSFORMERS REFER TO SPECIFIC EARTH MAT LAYOUT DRAWINGS.

DRY TYPE AUXILIARY TRANSFORMERS IN POWER STATION



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0.54/393

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4 SIZE GROOTTE A4L

1

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4

MOTORS FED BY XLPE OR THERMOPLASTIC INSULATED CABLES

MOTOR CONNECTIONS - XLPE/PVC PN EARTH AND UNEARTHED

A

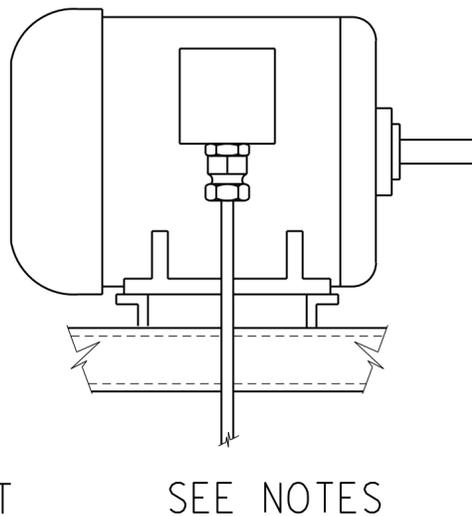
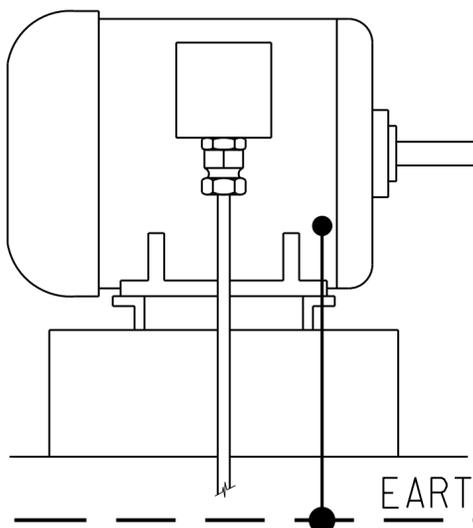
A

MOTORS MOUNTED ON UNEARTHED MATERIAL

MOTORS MOUNTED ON EARTHED MATERIAL

UP TO 1000V

UP TO 1000V



B

B

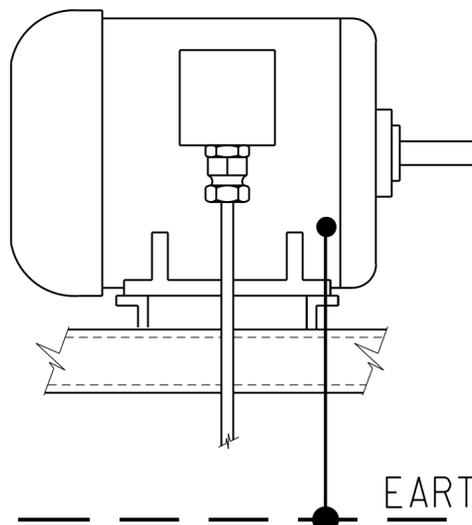
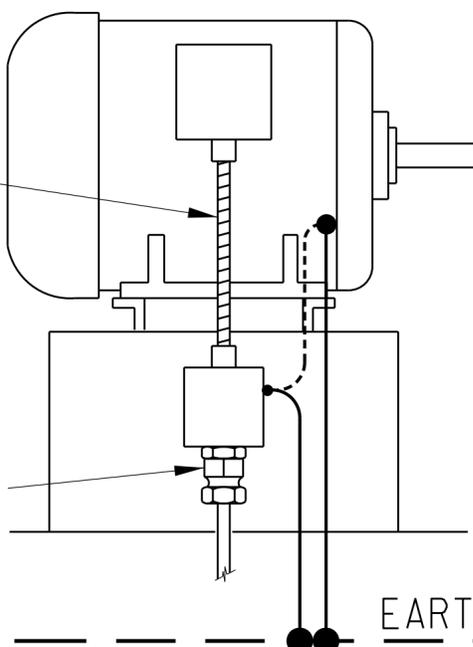
EARTH MAT

SEE NOTES

UP TO 1000V

ABOVE 1000V

FLEXIBLE CONDUIT OR CABLE OF SMALLER RATED AREA



JUNCTION/REDUCTION BOX

EARTH MAT

SEE NOTES

EARTH MAT

FLEX EARTHTAIL <1000mm THEN ONTO COPPER

C

C

D

D

NOTES:

- MOTORS MOUNTED ON EARTHED STEELWORK AND CONNECTED WITH UNARMoured CABLES SHALL BE EARTHED TO EARTH MAT. WHERE A DEDICATED CORE IS PROVIDED FOR EARTHING PURPOSES, THIS CORE IS TO BE CONNECTED TO AN INTERNAL EARTHING POINT.
- FOR EARTHING OF LARGE MOTORS REFER TO SPECIFIC EARTH MAT LAYOUT DRAWINGS.
- FOR MOTORS FED BY CABLES UP TO 16mm² A FOURTH CABLE CAN BE USED AS EARTH CONTINUITY CONDUCTOR. FOR MOTORS FED BY CABLES >25mm² A SEPARATE LOCAL EARTH CONNECTION IS REQUIRED.

E

E

F

F



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EARTHING STANDARDS

0.54/393

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P2

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4 SIZE A4L GROOTTE

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MOTORS FED BY MICC, CONDUIT OR PILCSWA CABLES MOUNTED ON EARTHED MATERIAL

MOTOR CONNECTIONS - PILC ON EARTHED STRUCTURES

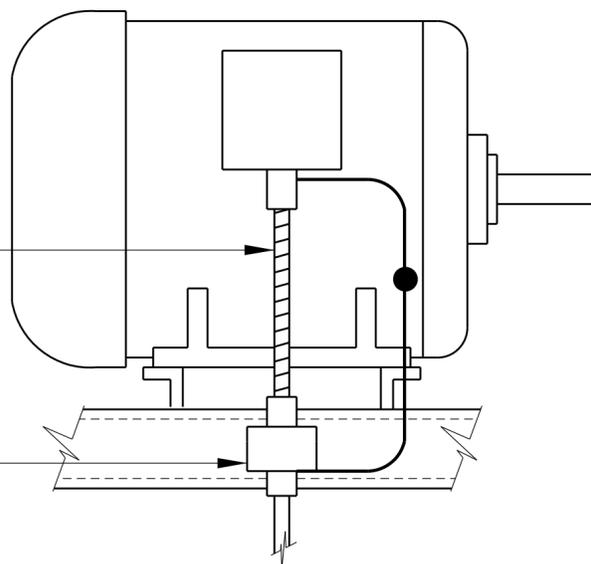
A

A

UP TO 1000V

FLEXIBLE CONDUIT

JUNCTION BOX



B

B

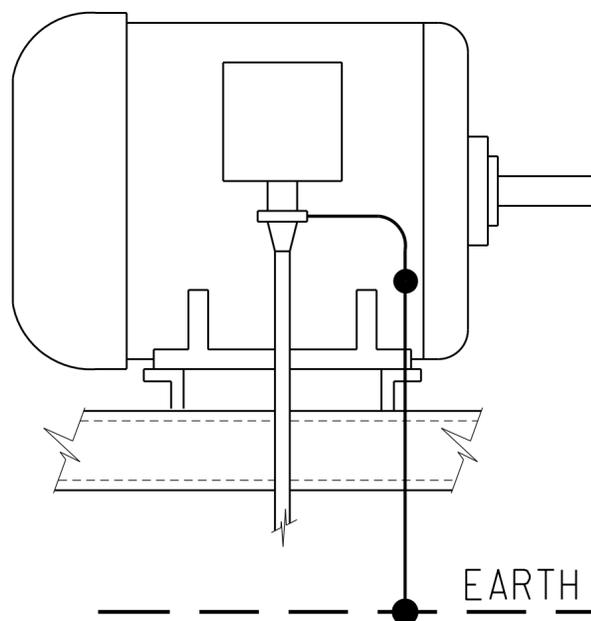
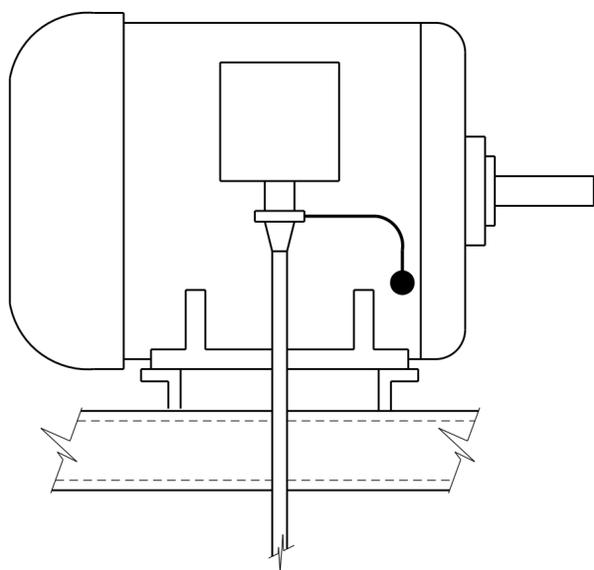
C

C

MINERAL INSULATED CABLES OR CABLES IN CONDUIT

UP TO 1000V

UP TO 1000V



D

D

E

E

P.I.L.C.S.W.A. CABLES

P.I.L.C.S.W.A. CABLES



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EARTHING
STANDARDS

0.54/393

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4 SIZE GROOTTE A4L

F

F

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4

MOTORS FED BY MCC, CONDUIT OR PILCSWA CABLES
MOUNTED ON UNEARTHED MATERIAL

MOTOR CONNECTION - PILC ON UNEARTHED STRUCTURES

A

A

UP TO 1000V

FLEXIBLE
CONDUIT

JUNCTION
BOX

EARTH MAT

MINERAL INSULATED CABLES
OR CABLES IN CONDUIT

B

B

C

C

UP TO 1000V

UP TO 1000V

D

D

E

E

EARTH MAT

EARTH MAT

P.I.L.C.S.W.A. CABLES

P.I.L.C. CABLES



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1

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4

SIZE GROOTTE A4L

1

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CONTROL EQUIPMENT & MOTOR STARTERS
(CONNECTED BY ARMOURED OR UNARMOURED
PVC INSULATED CABLES)

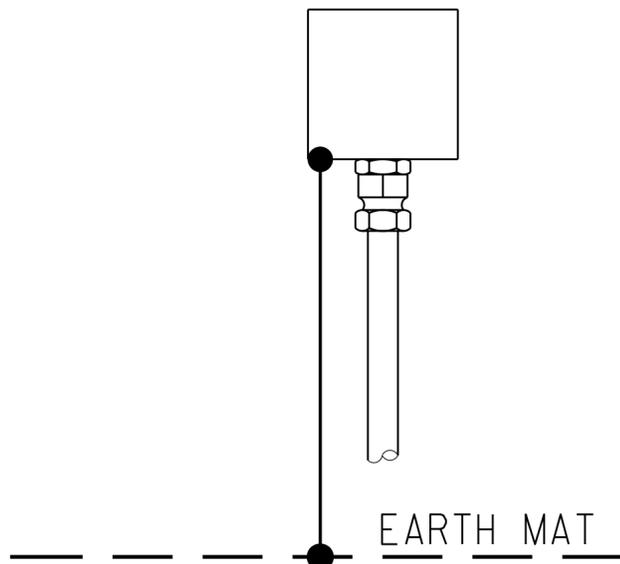
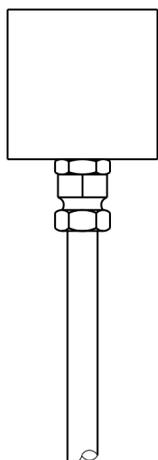
CONTROL PANEL - PVC

A

A

CONTROL EQUIPMENT MOUNTED
ON EARTHED MATERIAL

CONTROL EQUIPMENT MOUNTED
ON UNEARTHED MATERIAL



B

B

SEE NOTE

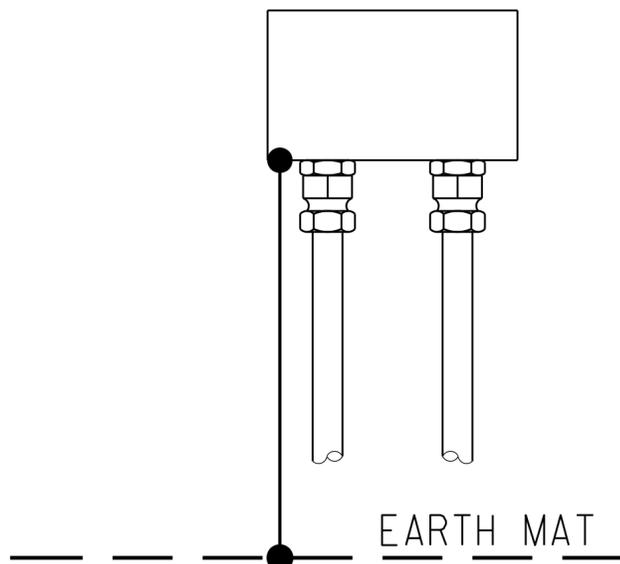
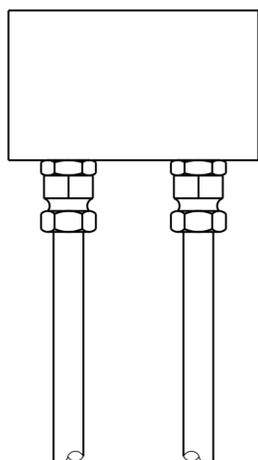
EARTH MAT

C

C

MOTOR STARTERS MOUNTED
ON EARTHED MATERIAL

MOTOR STARTERS MOUNTED
ON UNEARTHED MATERIAL



D

D

SEE NOTE

EARTH MAT

E

E

NOTE:
STEEL ENCLOSURES MOUNTED ON EARTHED MATERIAL AND CONNECTED
WITH UNARMOURED CABLES SHALL BE EARTHED TO EARTH MAT.
WHERE A DEDICATED CORE IS PROVIDED FOR EARTHING PURPOSES,
THIS CORE IS TO BE CONNECTED TO AN INTERNAL EARTHING POINT.

F

F



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EARTHING
STANDARDS

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4 SIZE GROOTTE A4L

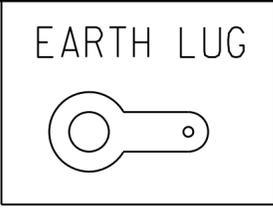
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CONTROL EQUIPMENT AND MOTOR STARTERS
(CONNECTED BY MICC, CONDUIT OR PILCSWA CABLES)



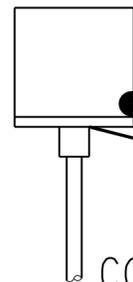
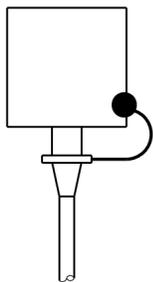
A

CONTROL PANEL - PILC

A

MOUNTED ON EARTHED MATERIAL

P.I.L.C.S.W.A.
CABLES



EARTH LUG

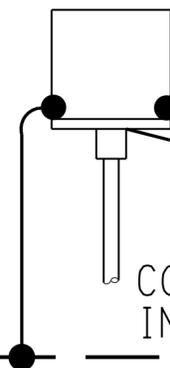
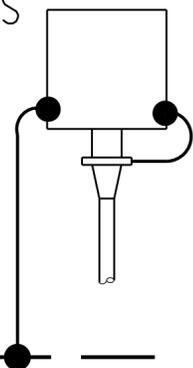
CONDUIT AND
MINERAL
INSULATED CABLES

B

B

MOUNTED ON UNEARTHED MATERIAL

P.I.L.C.S.W.A.
CABLES



EARTH LUG

CONDUIT AND MINERAL
INSULATED CABLES

EARTH MAT

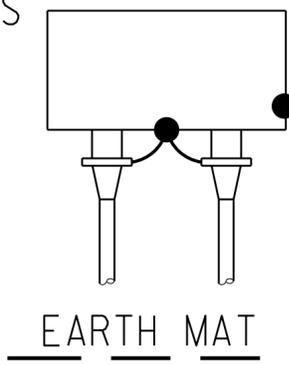
EARTH MAT

C

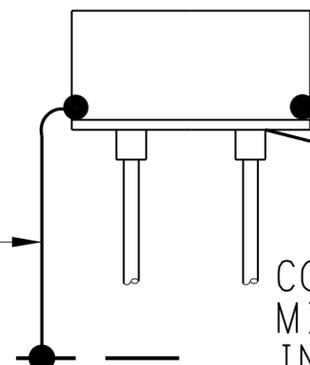
C

MOTOR STARTERS IRRESPECTIVE OF MOUNTING

P.I.L.C.S.W.A.
CABLES



BOND TO EARTH
MAT WHEN MOUNTED
ON UNEARTHED
MATERIAL



EARTH LUG

CONDUIT AND
MINERAL
INSULATED CABLES

EARTH MAT

EARTH MAT

D

D

E

E



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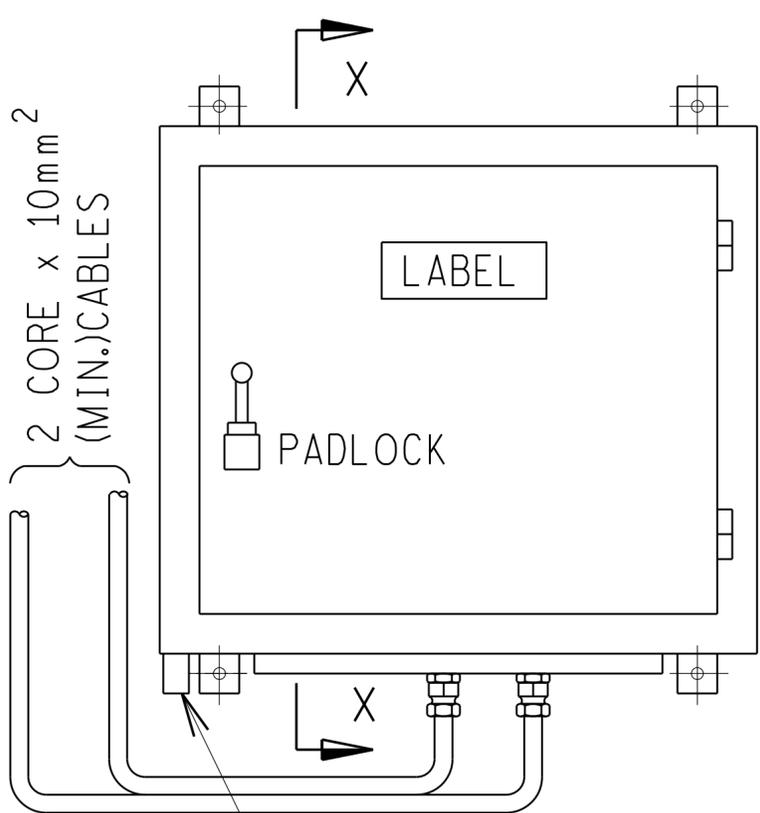
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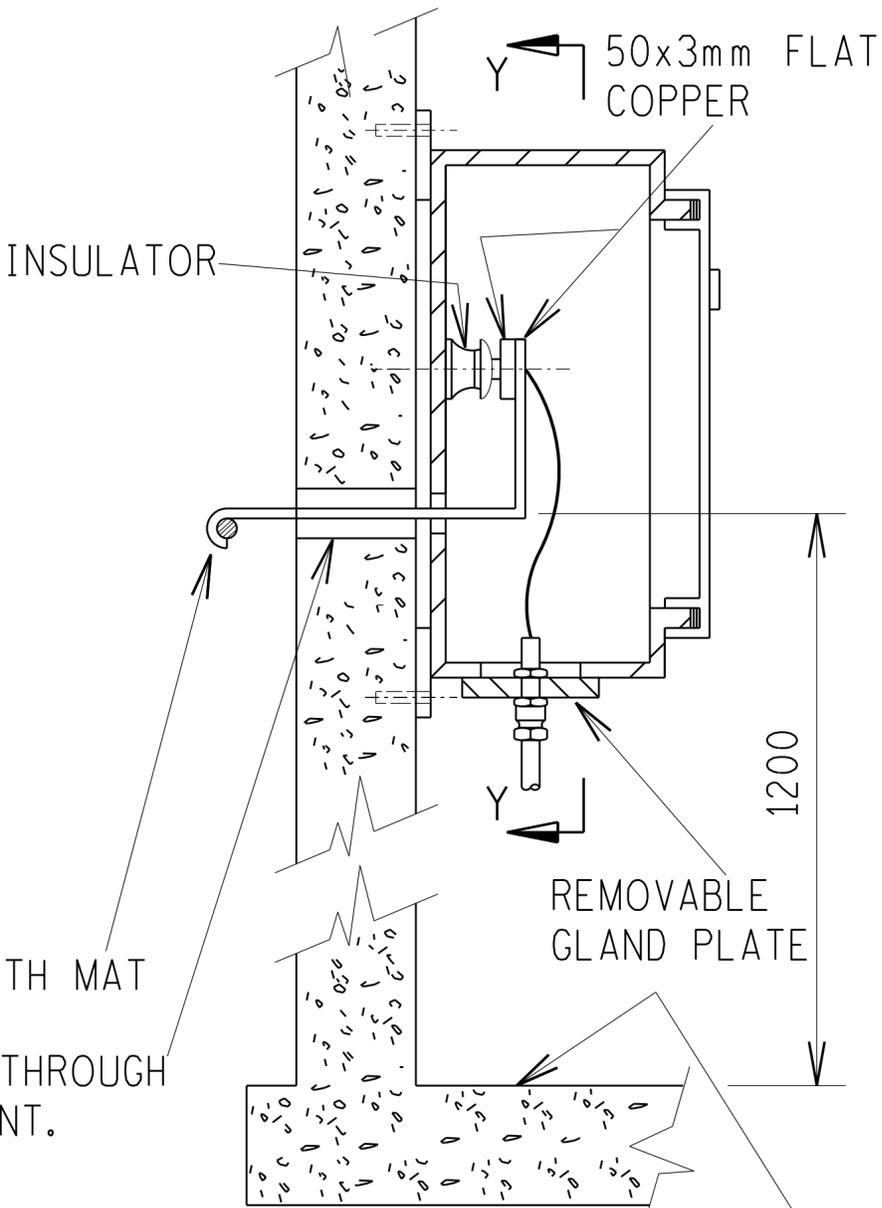
SIZE
GROOTTE A4L

POWER STATION AUXILIARY BAY
SIGNAL EARTH TERMINATION BOX

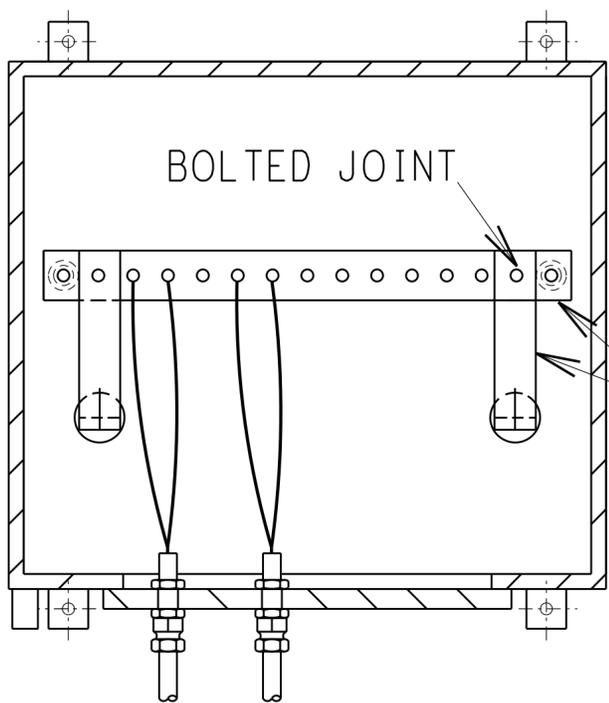


DRAIN PIPE FRONT VIEW
CONNECTION TO MAIN EARTH MAT

50mm DIA PLASTIC PIPE THROUGH
CONCRETE OF SUB BASEMENT.
(TO BE SEALED OFF WITH
WATERTIGHT SEALANT)



SUB BASEMENT FLOOR
SECTIONAL SIDE VIEW X-X



SECTIONAL FRONT VIEW Y-Y



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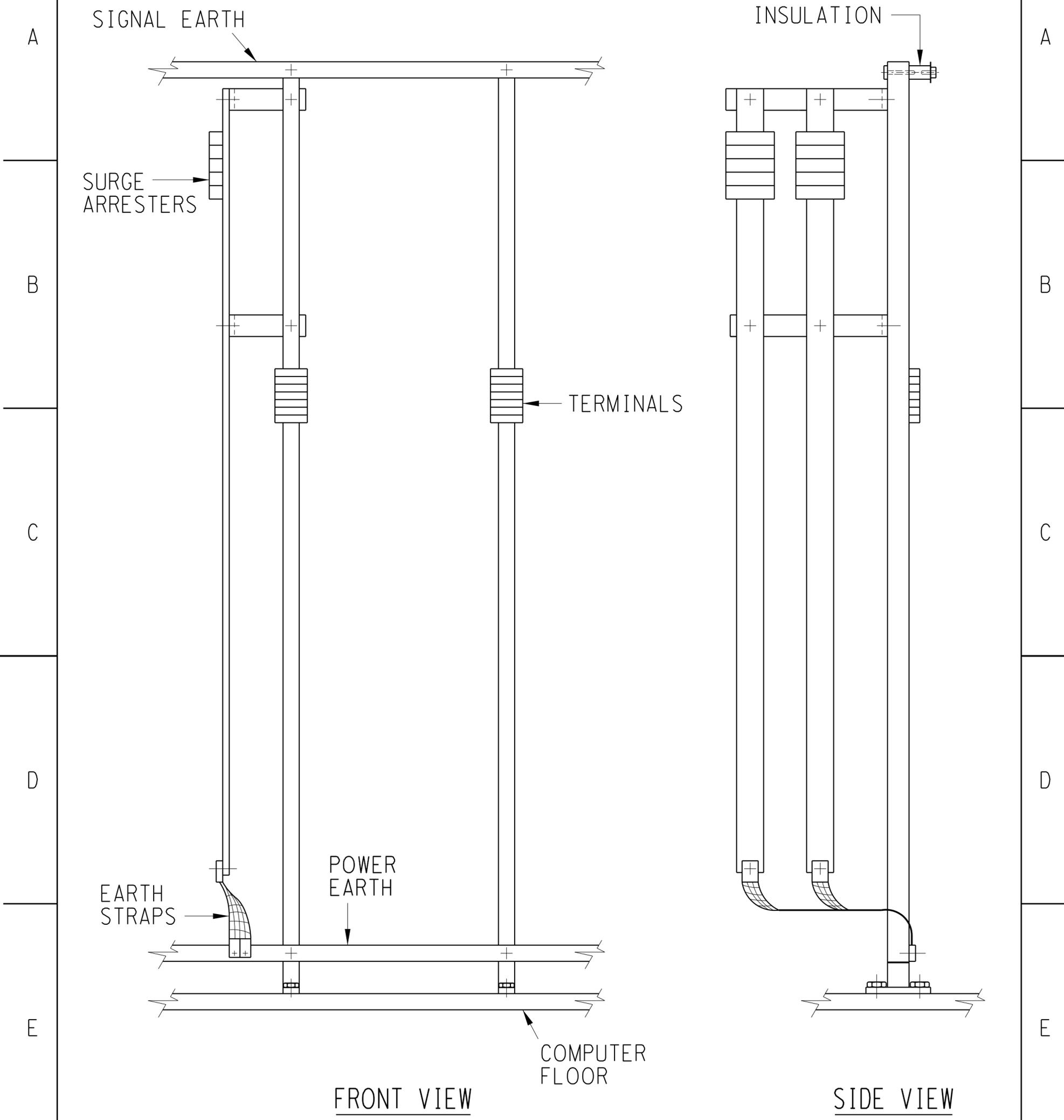
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EARTHING OF SIGNAL DISTRIBUTION FRAMES



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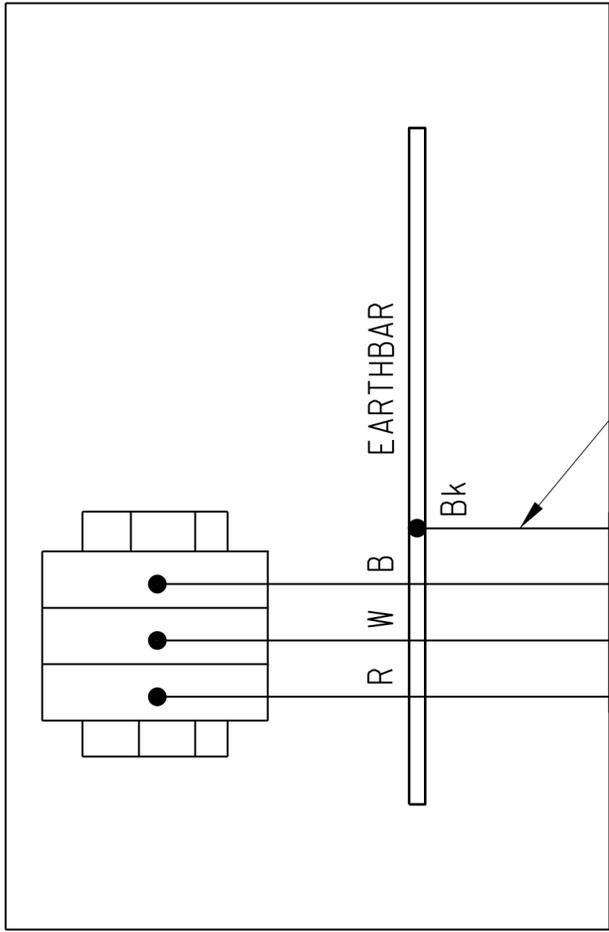
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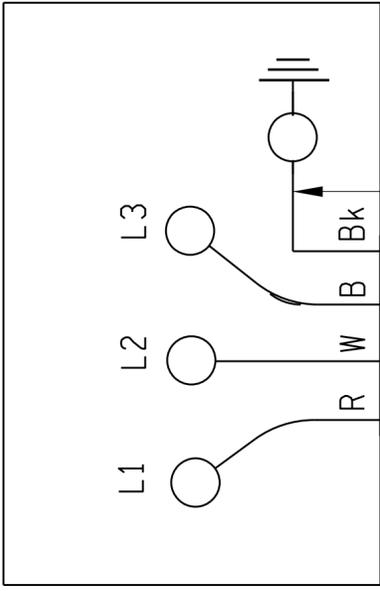
1

EARTHING OF SMALLER 3 PHASE CONSUMERS WITHOUT NEUTRAL WITH 4 CORE UNARMoured CABLE

MOTOR CONTROL CENTRE



e.g. MOTORS, THRUSTORS, ACTUATORS.



4 CORE UP TO 16mm² UNARMoured CABLE (BVV4HCV) BLACK CONDUCTOR TO BE FITTED WITH GREEN/YELLOW SLEEVE AT TERMINATIONS



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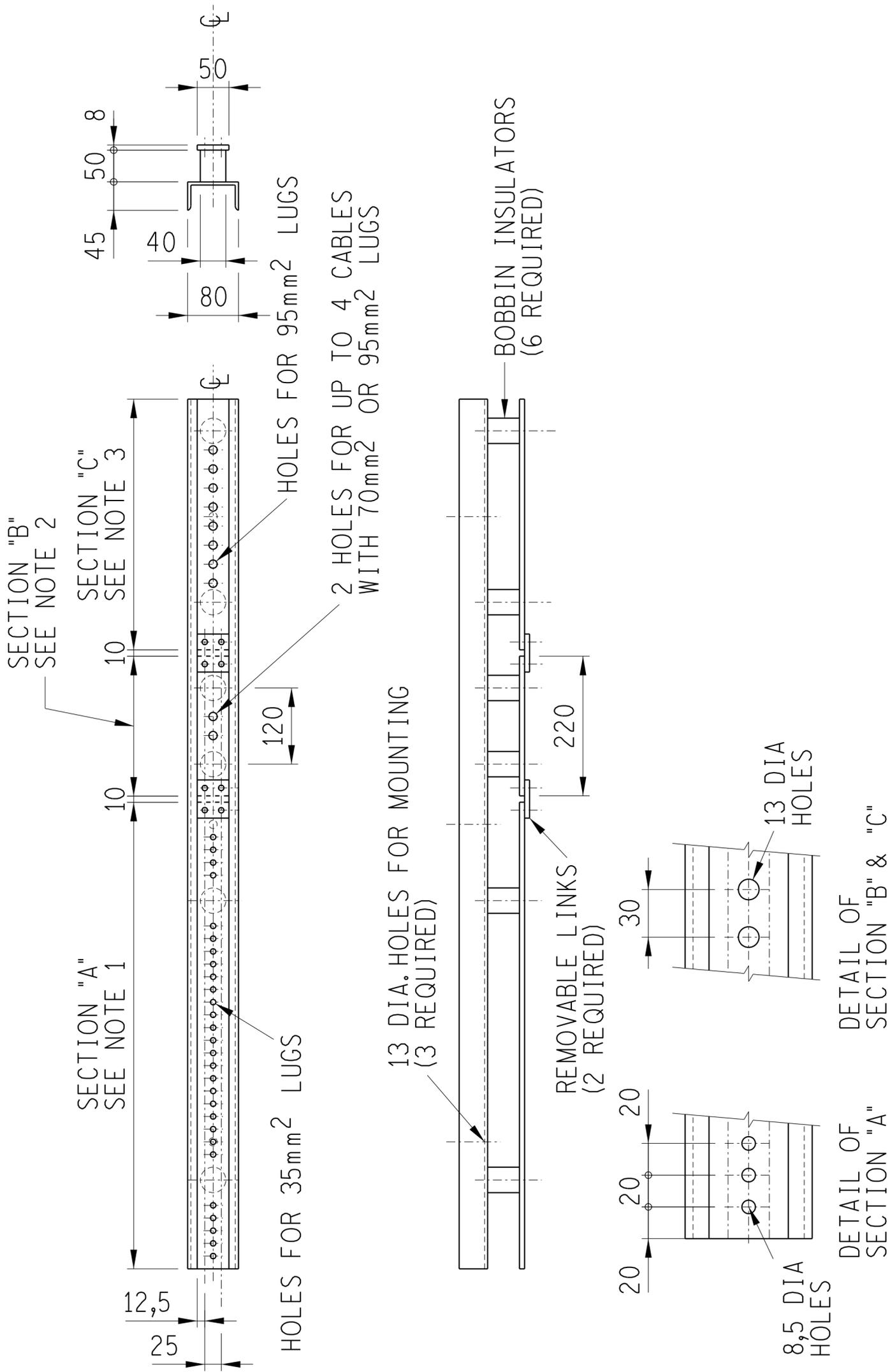
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STANDARDS

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INSULATED MAIN SCREEN EARTH BAR TYPICAL ARRANGEMENT



NOTE:
 SECTION "A" - FOR EARTHING OF ELECTRONIC SYSTEMS LENGTH TO SUIT
 SECTION "B" - FOR CONNECTION TO EARTH MAT
 SECTION "C" - FOR EARTHING OF EQUIPMENT CUBICLES LENGTH TO SUIT



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EARTHING
 STANDARDS

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4

ISOLATOR WITHOUT EARTHING BLADES

A

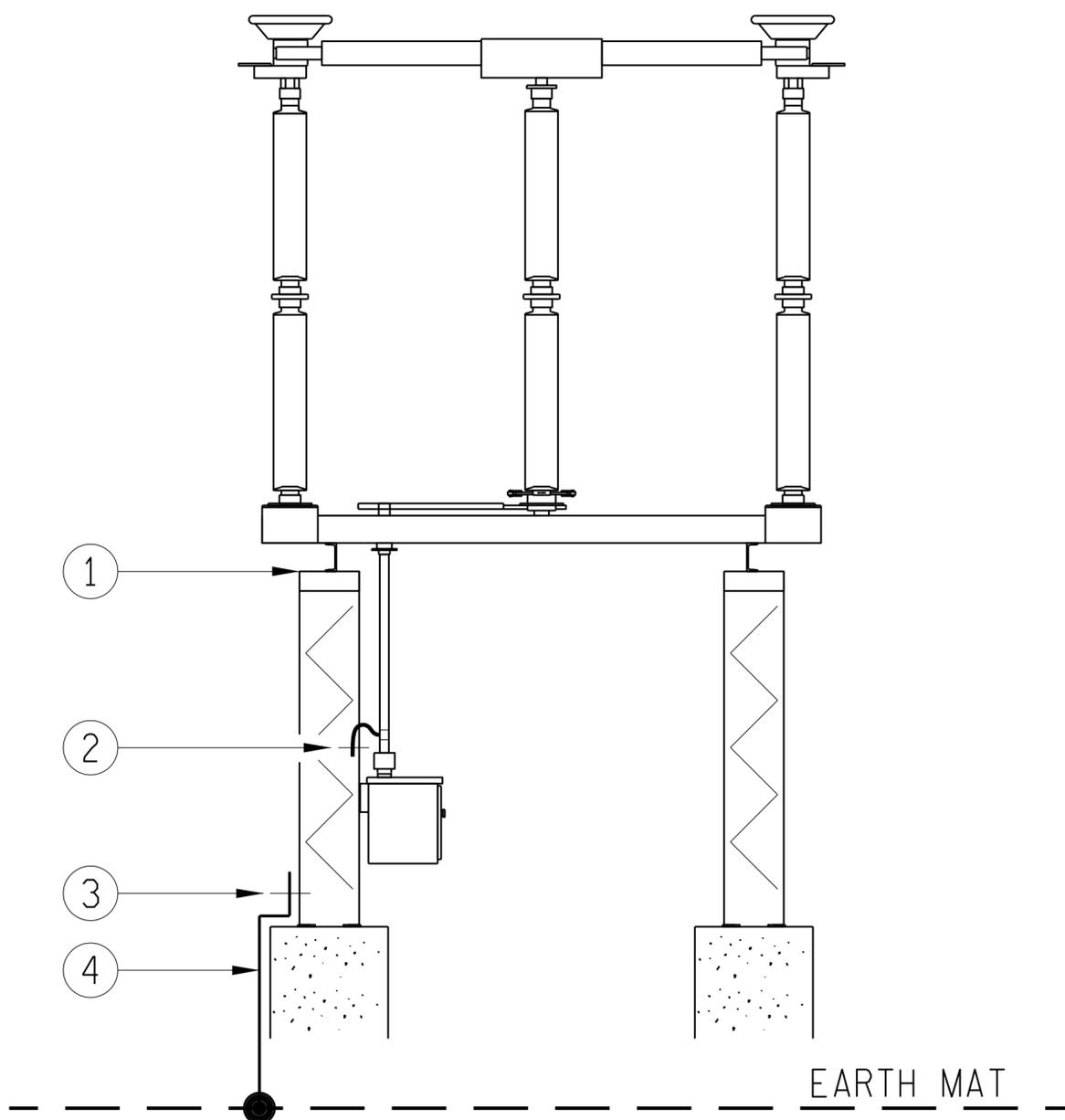
A

B

B

C

C



D

D

- ① EQUIPMENT EARTHED THROUGH H.D. BOLTS.
- ② FOR DRIVE SHAFT EARTH REFER TO SHT C3A NOTE 22.
- ③ FOR CONNECTION, REFER TO SHT C7.
- ④ SUPPORT STEELWORK EARTHTAIL (SEE NOTE).

E

E

NOTE:
SUPPORT STEEL EARTHING.
 NUMBER OF EARTHING CONNECTIONS
 TO EARTH MAT AS PER APPLICABLE SUBSTATION BAY EARTHING SHEETS.

F

F



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		T1		3	

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4 SIZE GROOTTE A4L

1

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4

ISOLATOR WITH ONE EARTHING BLADE

A

A

B

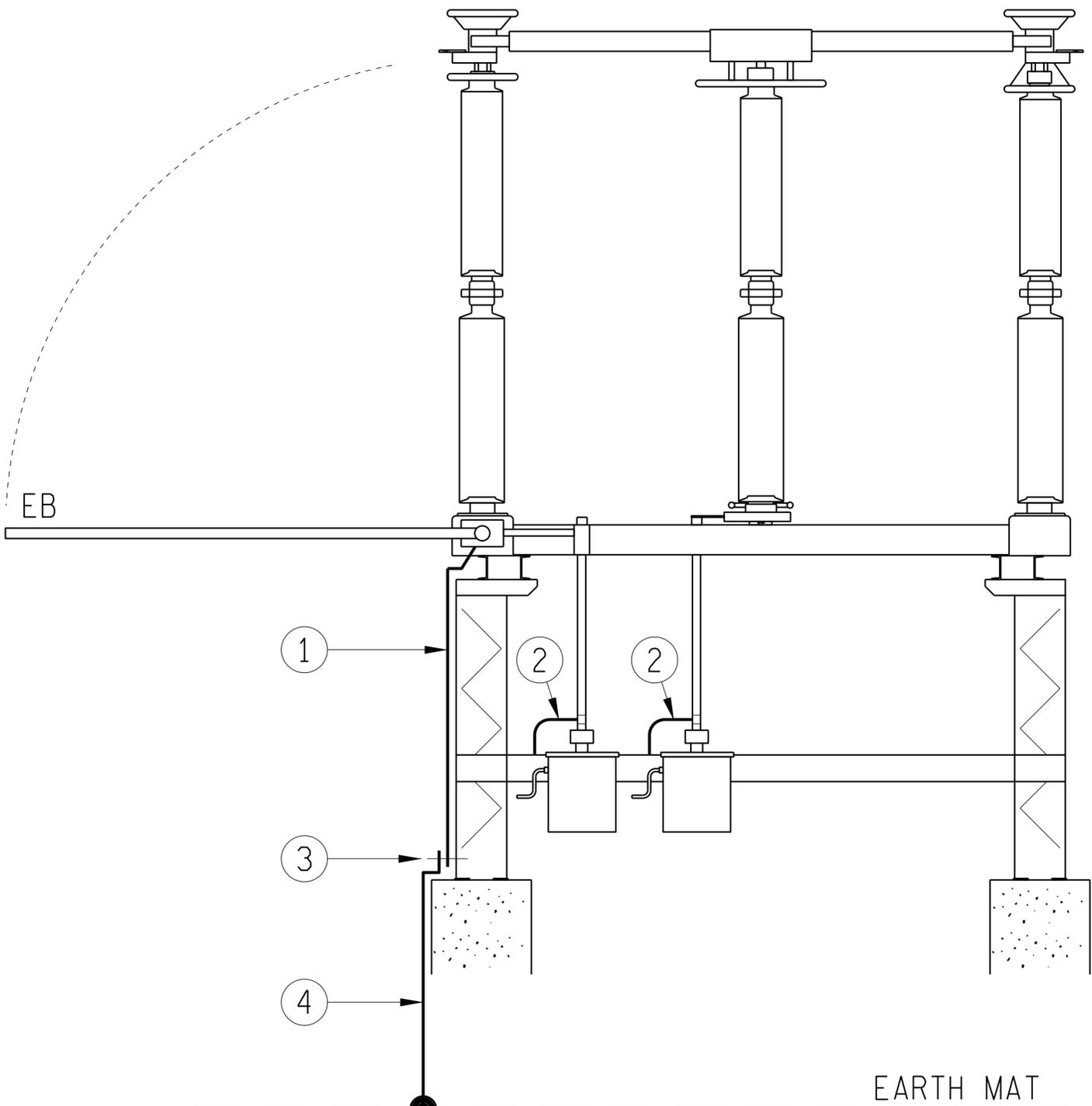
B

C

C

D

D



- ① EQUIPMENT EARTHING STRAP 50x3mm Cu FLAT.
- ② FOR DRIVE SHAFT EARTHS, REFER TO SHT C3A NOTE 22.
- ③ FOR CONNECTION, REFER TO SHT C7.
- ④ SUPPORT STEELWORK EARTHTAIL (SEE NOTE).

NOTE:
SUPPORT STEEL EARTHING.
 NUMBER OF EARTHING CONNECTIONS
 TO EARTH MAT AS PER APPLICABLE SUBSTATION BAY EARTHING SHEETS.

E

E

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4 SIZE GROOTTE A4L

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4

ISOLATOR WITHOUT EARTHING BLADES

A

A

B

B

C

C

D

D

E

E

EQUIPMENT EARTHED THROUGH H.D. BOLTS

SUPPORT STEELWORK EARTHING SUPPLIED BY ESKOM

EARTH MAT



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1

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JMV

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DATE

EARTHING
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SHEET NUMBER

REVISION

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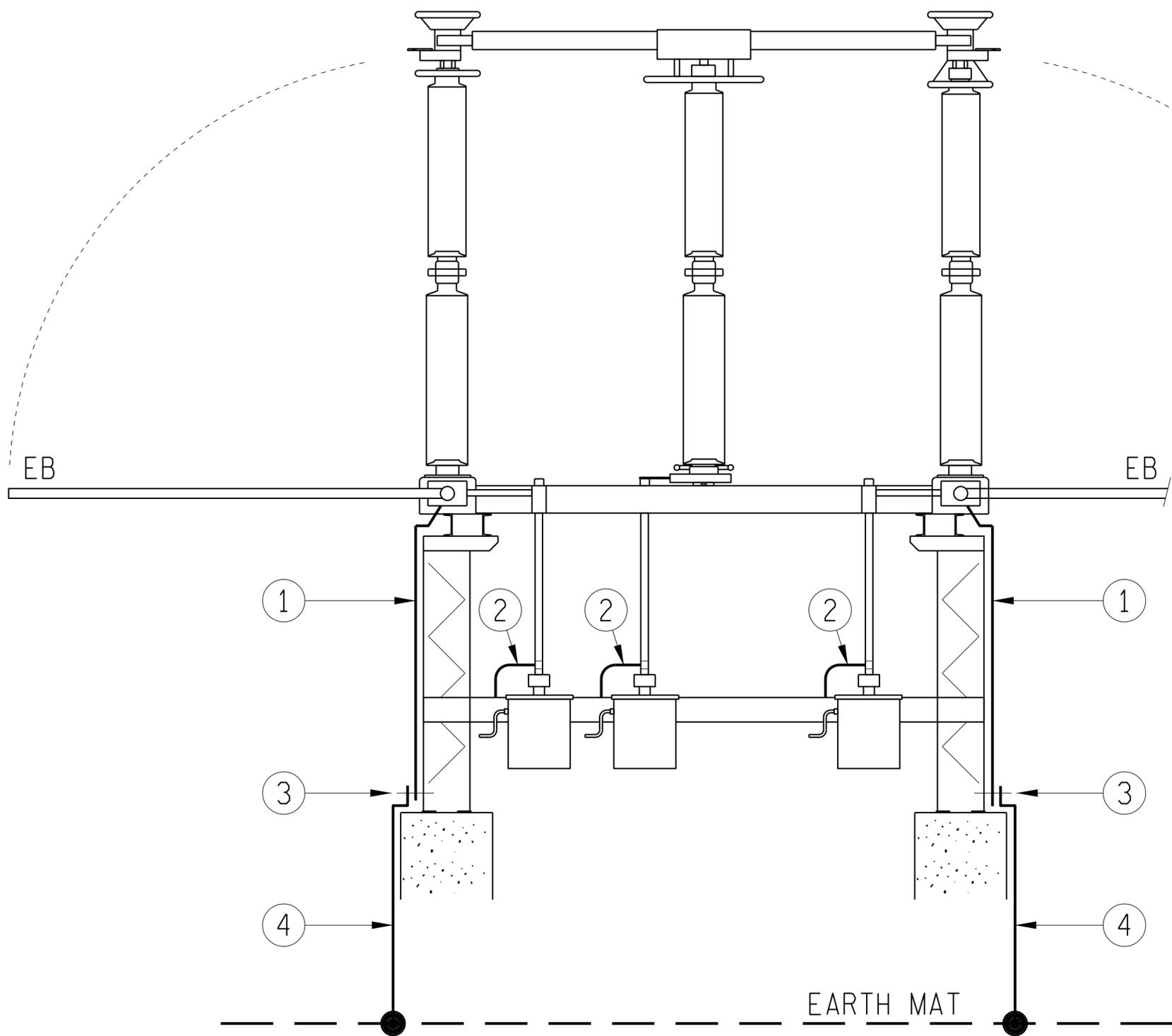
2

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4

SIZE GROOTTE A4L

ISOLATOR WITH TWO EARTHING BLADES



- ① EQUIPMENT EARTHING STRAP 50x3mm Cu FLAT.
- ② FOR DRIVE SHAFT EARTHS, REFER TO SHT C3A NOTE 22.
- ③ FOR CONNECTION, REFER TO SHT C7.
- ④ SUPPORT STEELWORK EARTHTAIL (SEE NOTE).

NOTE:
SUPPORT STEEL EARTHING.
 NUMBER OF EARTHING CONNECTIONS
 TO EARTH MAT AS PER APPLICABLE SUBSTATION BAY EARTHING SHEETS.



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EARTHING
 STANDARDS

0.54/393

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T3

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1

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EARTHING SWITCH

A

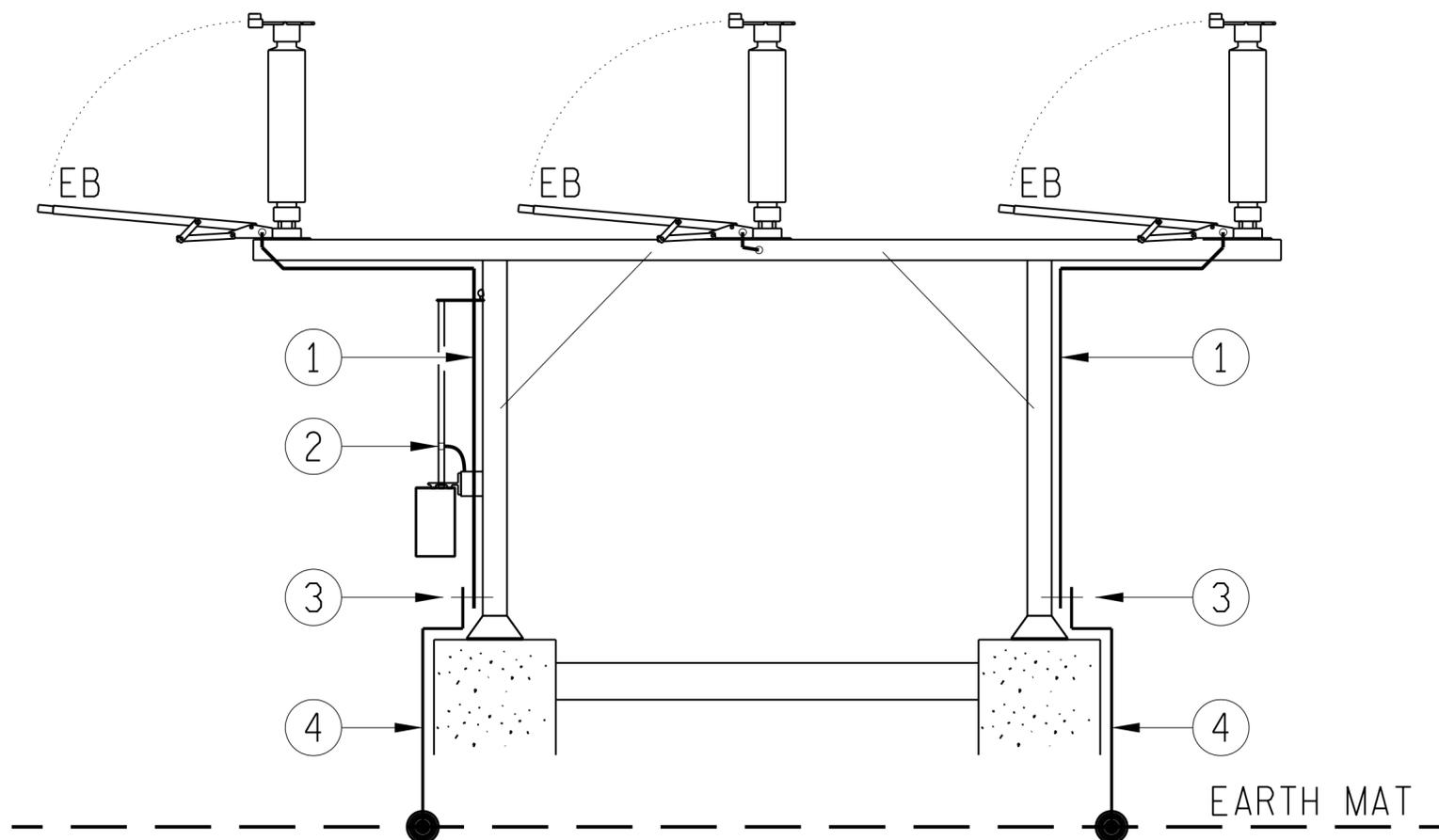
A

B

B

C

C



- ① EQUIPMENT EARTHING STRAP 50x3mm Cu FLAT.
 ② FOR DRIVE SHAFT EARTHS, REFER TO SHT C3 NOTE 22.
 ③ FOR CONNECTION CLAMP, REFER TO C7.
 ④ SUPPORT STEELWORK EARTHTAIL (SEE NOTE).

D

D

E

E

NOTE:
SUPPORT STEEL EARTHING.
 NUMBER OF EARTHING CONNECTIONS
 TO EARTH MAT AS PER APPLICABLE SUBSTATION BAY EARTHING SHEETS.

F

F



Eskom Holdings
 SOC Limited
 REG No. 2002/015527/30

3

DRG SHEET REPLACED. GENERAL REDAWN.

JMV

KN

TM

01/07/2019

REV

REVISION DESCRIPTION

BY

CHKD

AUTH

DATE

EARTHING
 STANDARDS

0.54/393

SHEET NUMBER

REVISION

T4

3

1

2

3

4

SIZE
GROOTTE A4L

1

2

3

4

NEUTRALS OF EQUIPMENT MOUNTED ON EARTHED STEELWORK

A

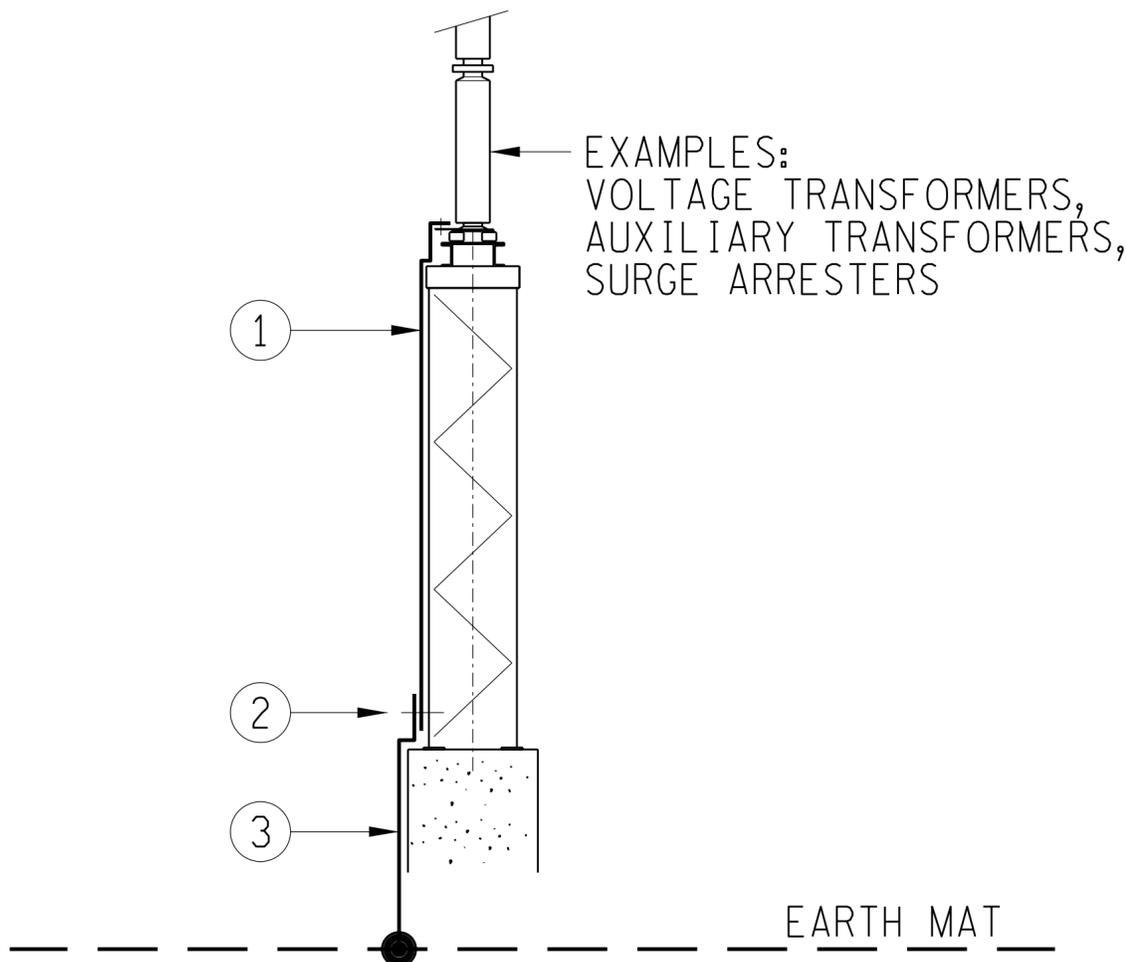
A

B

B

C

C



- ① EARTHING OR NEUTRAL TERMINAL EARTHING STRAP 50x3mm Cu FLAT.
- ② FOR CONNECTION CLAMP, REFER TO SHT C7.
- ③ SUPPORT STEELWORK EARTH TAIL (SEE NOTE).

D

D

NOTE:

SUPPORT STEEL EARTHING.

- 1. NUMBER OF EARTHING CONNECTIONS TO EARTH MAT AS PER APPLICABLE SUBSTATION EARTHING LAYOUT.
- 2. SURGE ARRESTERS EARTH STRAP TO BE RUN AS STRAIGHT AS POSSIBLE.
- 3. FOR SURGE ARRESTERS FITTED WITH DISCHARGE COUNTERS SEE SHEETS T8 & T9.
- 4. SEE SHEET 14, 14A, 14B FOR EARTHING OF SURGE ARRESTERS WITH PROVISION FOR CONDITION MONITORING DEVICE.

E

E

F

F



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

3	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
--------------	----------

T5

3

1

2

3

4 SIZE GROOTTE A4L

1

2

3

4

CVT (GALVANISED & PAINTED TANKS)
MOUNTED ON EARTHED STEELWORK
WITHOUT CARRIER COUPLING EQUIPMENT (LME)

A

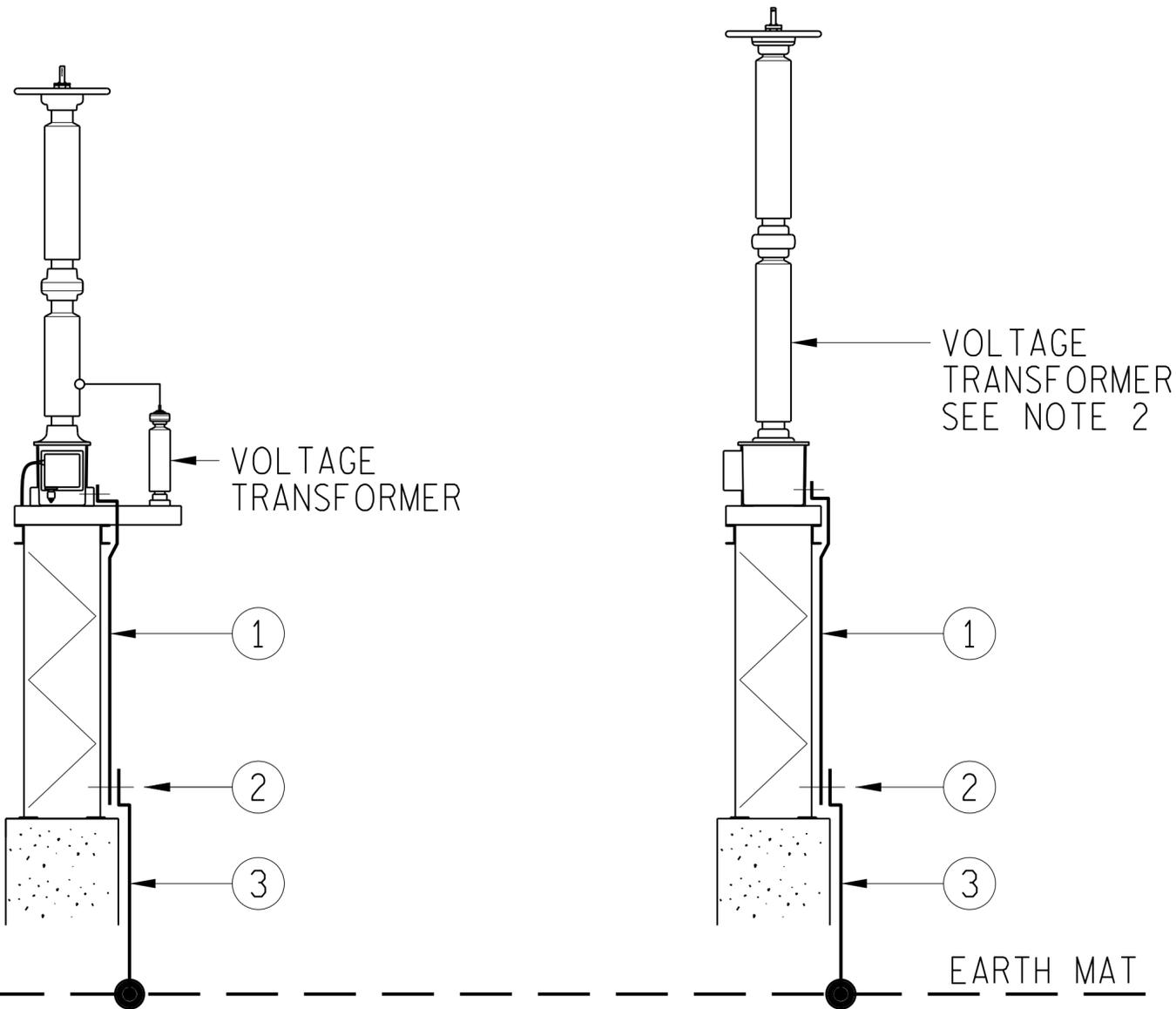
A

B

B

C

C



CC OR CVT WITH SEPERATE VT

CVT

EARTH MAT

D

D

- ① EQUIPMENT EARTHING STRAP 50x3mm Cu FLAT.
- ② FOR CONNECTION CLAMP, REFER TO SHT C7.
- ③ SUPPORT STEELWORK EARTHTAIL (SEE NOTE).

E

E

NOTE:
SUPPORT STEEL EARTHING.

- 1. NUMBER OF EARTHING CONNECTIONS TO EARTH MAT AS PER APPLICABLE SUBSTATION BAY EARTHING LAYOUT.
- 2. LOW VOLTAGE (LME) TERMINAL TO BE EARTHED IN VOLTAGE TRANSFORMER CONNECTION BOX.

F

F



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REG No. 2002/015527/30

2	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
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T6

2

1

2

3

4

SIZE GROOTTE A4L

1

2

3

4

CVT (GALVANISED & PAINTED TANKS)
MOUNTED ON EARTHED STEELWORK
WITH CARRIER COUPLING EQUIPMENT (LME)

A

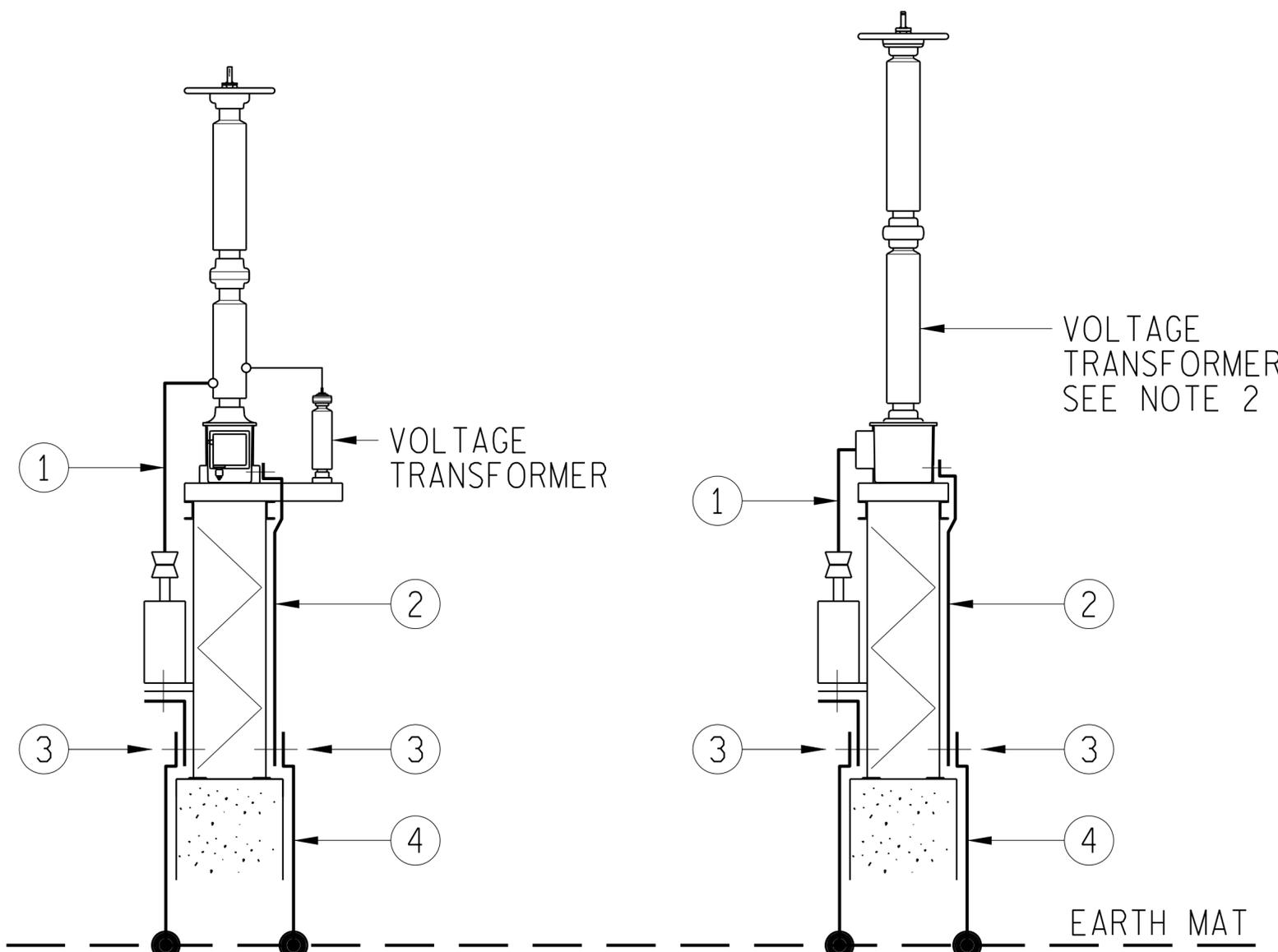
A

B

B

C

C



CC OR CVT WITH SEPERATE VT

CVT

EARTH MAT

D

D

- ① $\phi 10\text{mm}$ Cu ROD.
- ② EQUIPMENT EARTHING STRAP 50x3mm Cu FLAT.
- ③ FOR CONNECTION CLAMP, REFER TO SHT C7.
- ④ SUPPORT STEELWORK EARTHTAIL (SEE NOTE).

E

E

NOTE:
SUPPORT STEEL EARTHING.
 NUMBER OF EARTHING CONNECTIONS TO EARTH MAT
 AS PER APPLICABLE SUBSTATION BAY EARTHING LAYOUT.

F

F



Eskom Holdings
 SOC Limited
 REG No. 2002/015527/30

2	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
 STANDARDS

0.54/393

SHEET NUMBER		REVISION	
T7		2	

1

2

3

4 SIZE GROOTTE A4L

1

2

3

4

EARTHING OF SURGE ARRESTERS FITTED WITH DISCHARGE COUNTERS

(CONTINUED ON SHT T9)

A

A

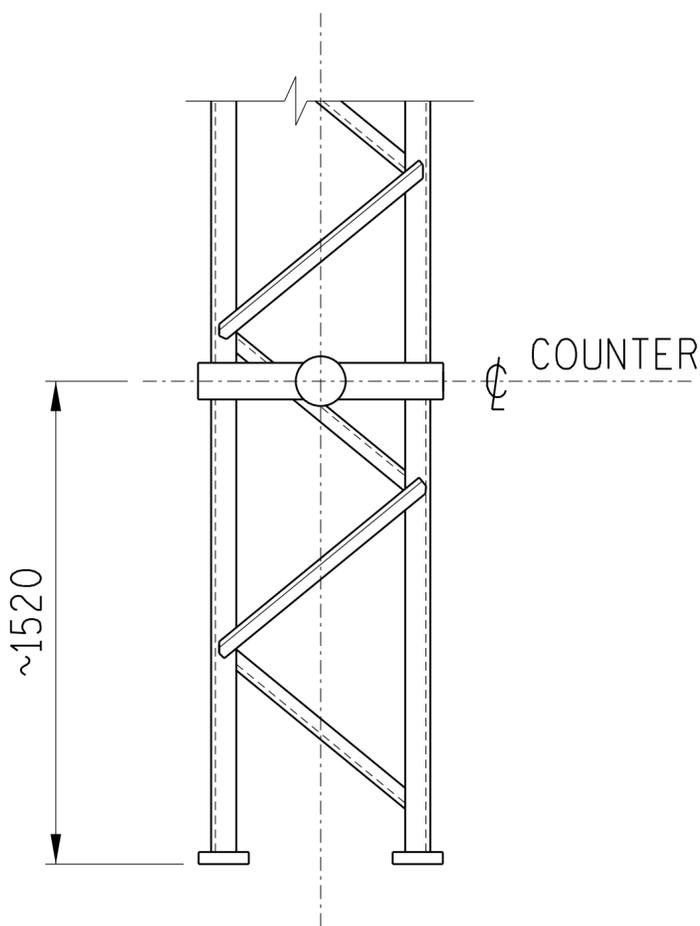
FOR DISCHARGE COUNTER & PI
BRACKET DETAILS SEE
DRG No 0.54/6603

B

B

C

C



D

D

2500 - 7000 HIGH
MEDIUM SUPPORT

E

E

F

F



Eskom Holdings
SOC Limited
REG No. 2002/015527/30

2

DRG SHEET REPLACED. GENERAL REDAWN.

JMV

KN

TM

01/07/2019

REV

REVISION DESCRIPTION

BY

CHKD

AUTH

DATE

EARTHING STANDARDS

0.54/393

SHEET NUMBER

REVISION

T8

2

1

2

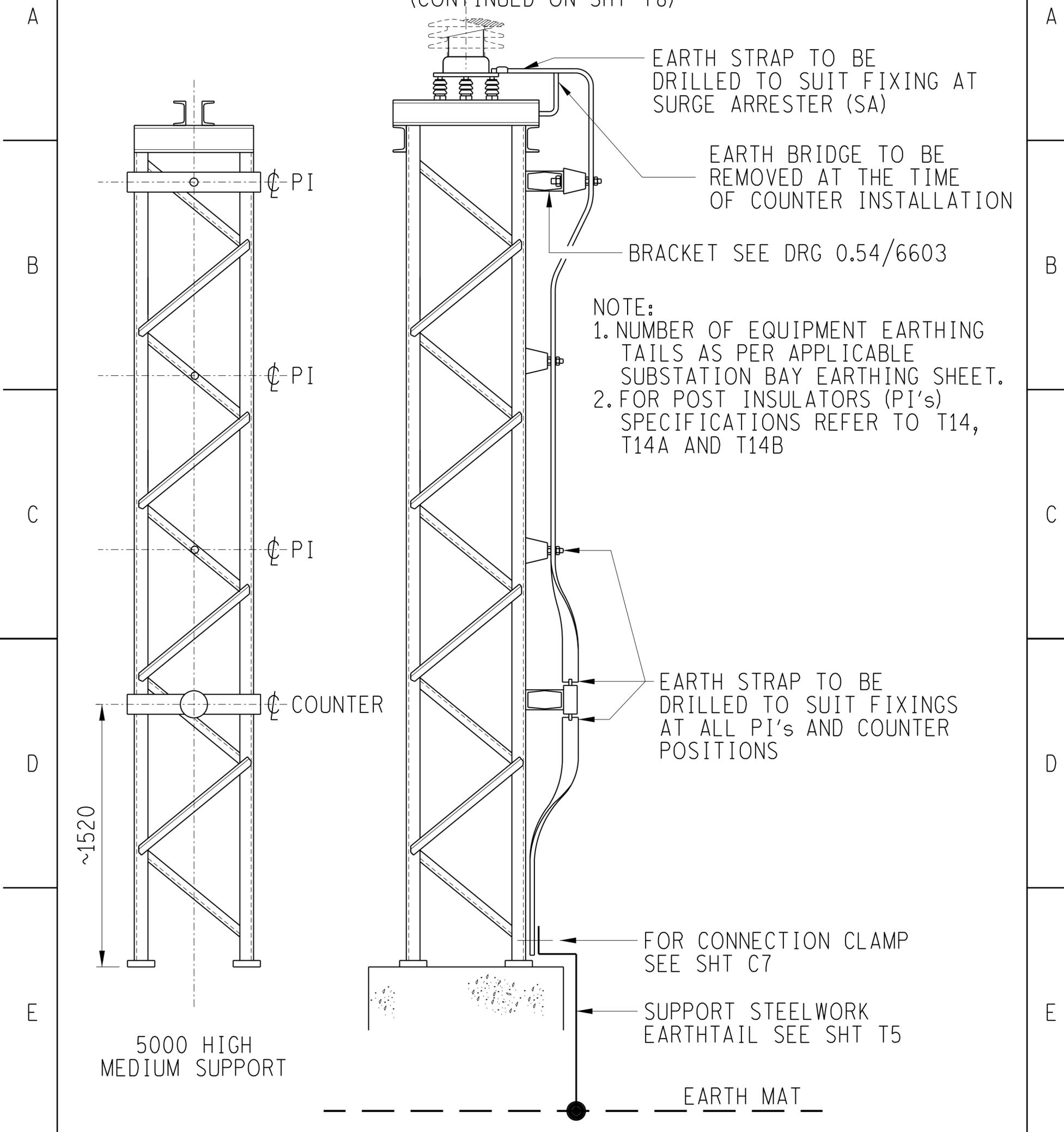
3

4

SIZE GROOTTE A4L

EARTHING OF SURGE ARRESTERS FITTED WITH CONDITION MONITORING DEVICE

(CONTINUED ON SHT T8)



~1520

5000 HIGH MEDIUM SUPPORT



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REG No. 2002/015527/30

3	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	10/07/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		T9		3	

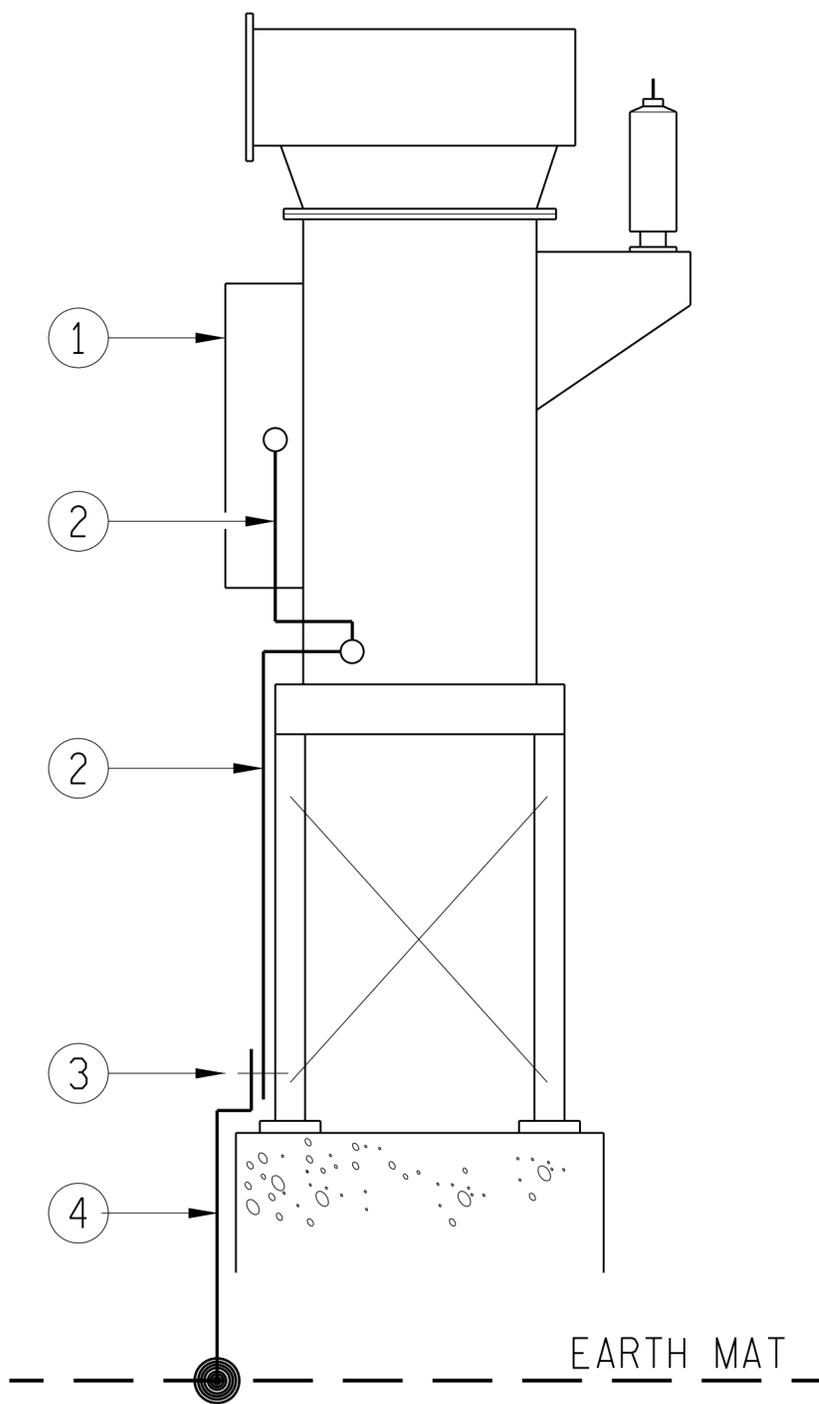
1

2

3

4

HV YARD AUXILIARY TRANSFORMER



- ① LV TERMINAL BOX.
- ② NEUTRAL TERMINAL EARTHING STRAP 50x3 Cu FLAT.
- ③ FOR CONNECTION CLAMP, REFER TO SHT C7.
- ④ SUPPORT STEELWORK EARTHTAIL (SEE NOTE).

NOTE:
SUPPORT STEEL EARTHING.
 NUMBER OF EARTHING CONNECTIONS TO EARTH MAT
 AS PER APPLICABLE SUBSTATION BAY EARTHING LAYOUT.



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 REG No. 2002/015527/30

2	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/07/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
<h1>EARTHING STANDARDS</h1>		0.54/393			
		SHEET NUMBER		REVISION	
		T10		2	

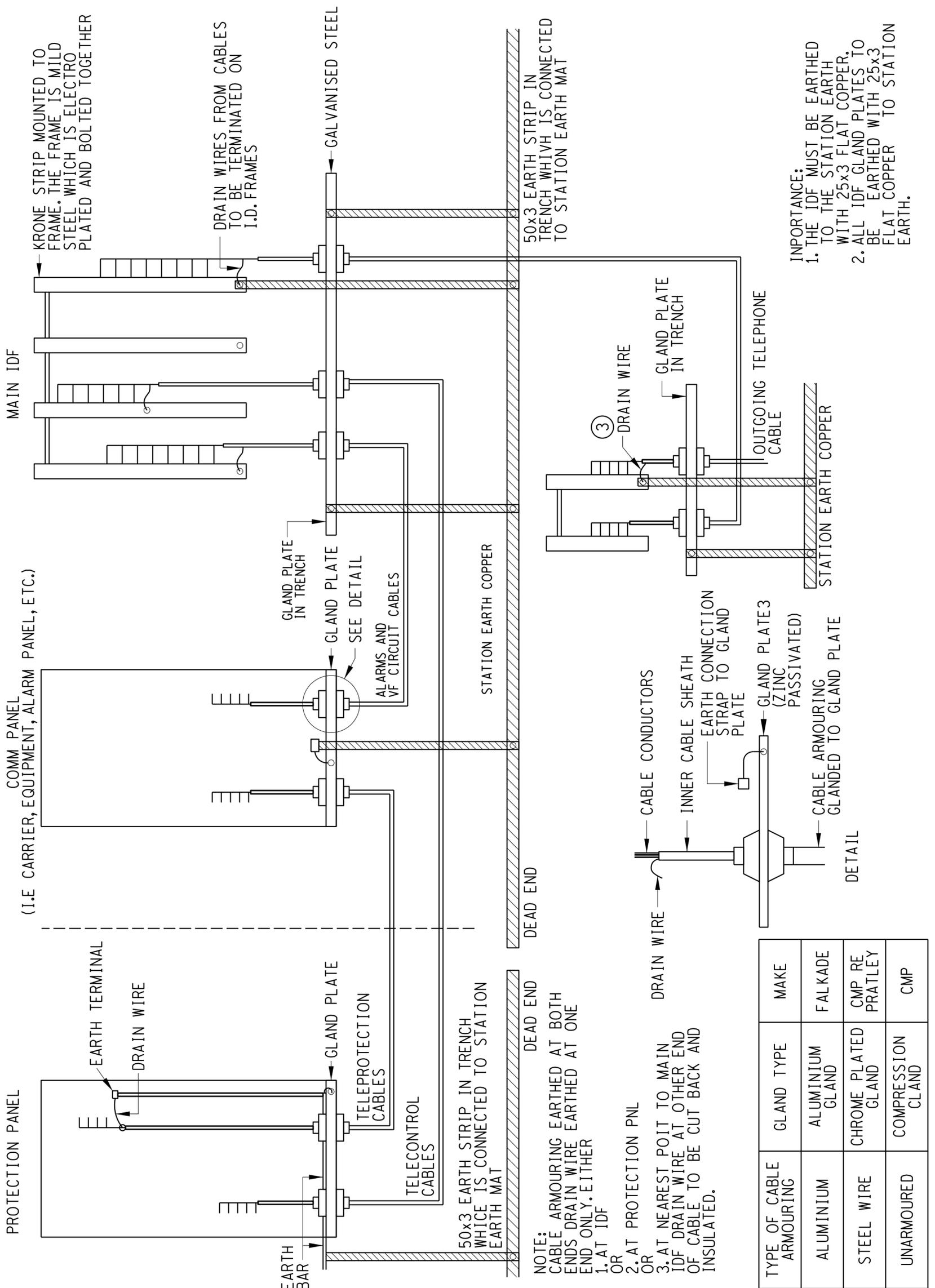
1

2

3

4 SIZE GROOTTE A4L

BASIC EARTHING ARRANGEMENT IN COMMS ROOMS



IMPORTANT:
 1. THE IDF MUST BE EARTHED TO THE STATION EARTH WITH 25x3 FLAT COPPER.
 2. ALL IDF GLAND PLATES TO BE EARTHED WITH 25x3 FLAT COPPER TO STATION EARTH.

NOTE: CABLE ARMOURING EARTHED AT BOTH ENDS DRAIN WIRE EARTHED AT ONE END ONLY. EITHER
 1. AT IDF
 OR
 2. AT PROTECTION PNL
 OR
 3. AT NEAREST POINT TO MAIN IDF DRAIN WIRE AT OTHER END OF CABLE TO BE CUT BACK AND INSULATED.

TYPE OF CABLE ARMOURING	GLAND TYPE	MAKE
ALUMINIUM	ALUMINIUM GLAND	FALKADE
STEEL WIRE	CHROME PLATED GLAND	CMP RE PRATLEY
UNARMoured	COMPRESSION GLAND	CMP



Eskom Holdings
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 REG No. 2002/015527/30

2	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER	REVISION
T11	1

1

2

3

4

A

B

C

D

E

A

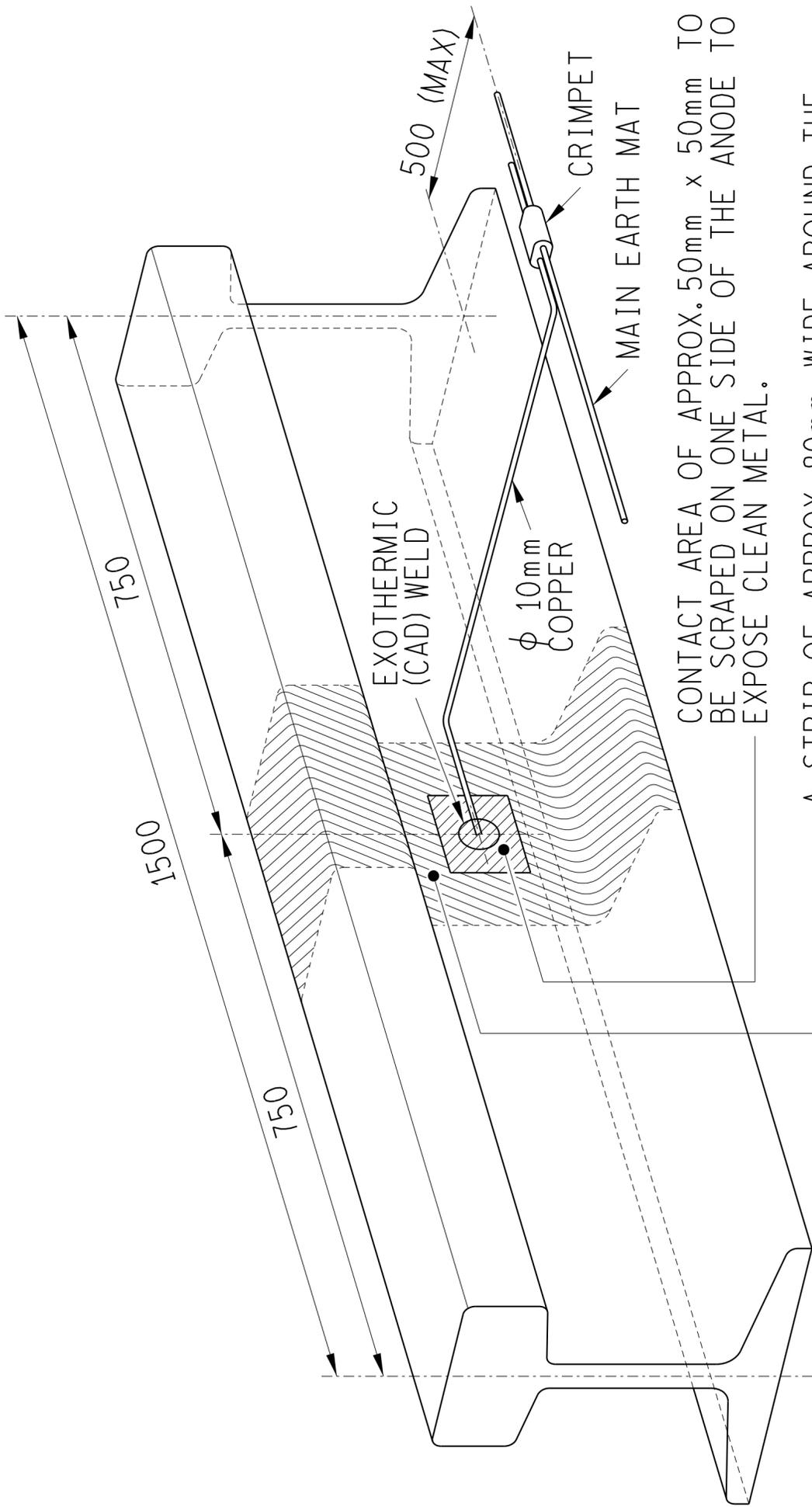
B

C

D

F

SACRIFICIAL EARTH MAT ANODE



CONTACT AREA OF APPROX. 50mm x 50mm TO BE SCRAPPED ON ONE SIDE OF THE ANODE TO EXPOSE CLEAN METAL.

A STRIP OF APPROX. 80mm WIDE AROUND THE CENTRE PORTION OF THE RAIL, WHICH INCLUDES THE WELD AREA, IS TO BE BITUMISED WHILE STILL HOT FROM THE WELD PROCESS.

NOTE:
 1. * THE NUMBER OF THE ANODES IS TO BE DETERMINED BASED ON THE CORROSIVENESS OF THE SOIL AND SURROUNDING CONDITIONS.
 2. THE POSITIONS OF THE ANODES ARE TO BE INDICATED THUS S_{EA} ON THE FOUNDATION, TRENCH & EARTHMAT DRAWING OF THE SUBSTATION.



Eskom Holdings
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 REG No. 2002/015527/30

5	DRG SHEET REPLACED. GENERAL REDRAWN.	JMV	KN	TM	01/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

SHEET NUMBER REVISION

T12

5

1

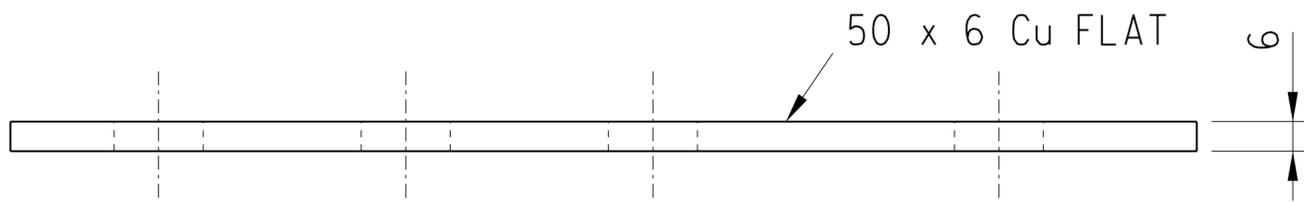
2

3

4 SIZE GROOTTE A4L

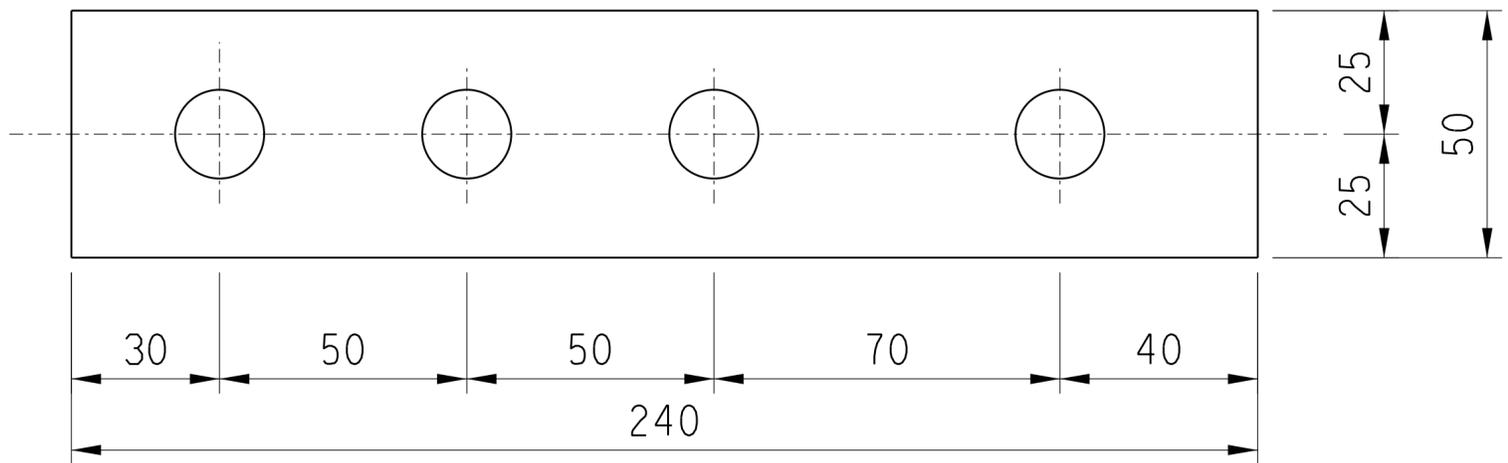
CAPACITOR BANK EARTH STUD ADAPTOR PLATE

A



ELEVATION

B

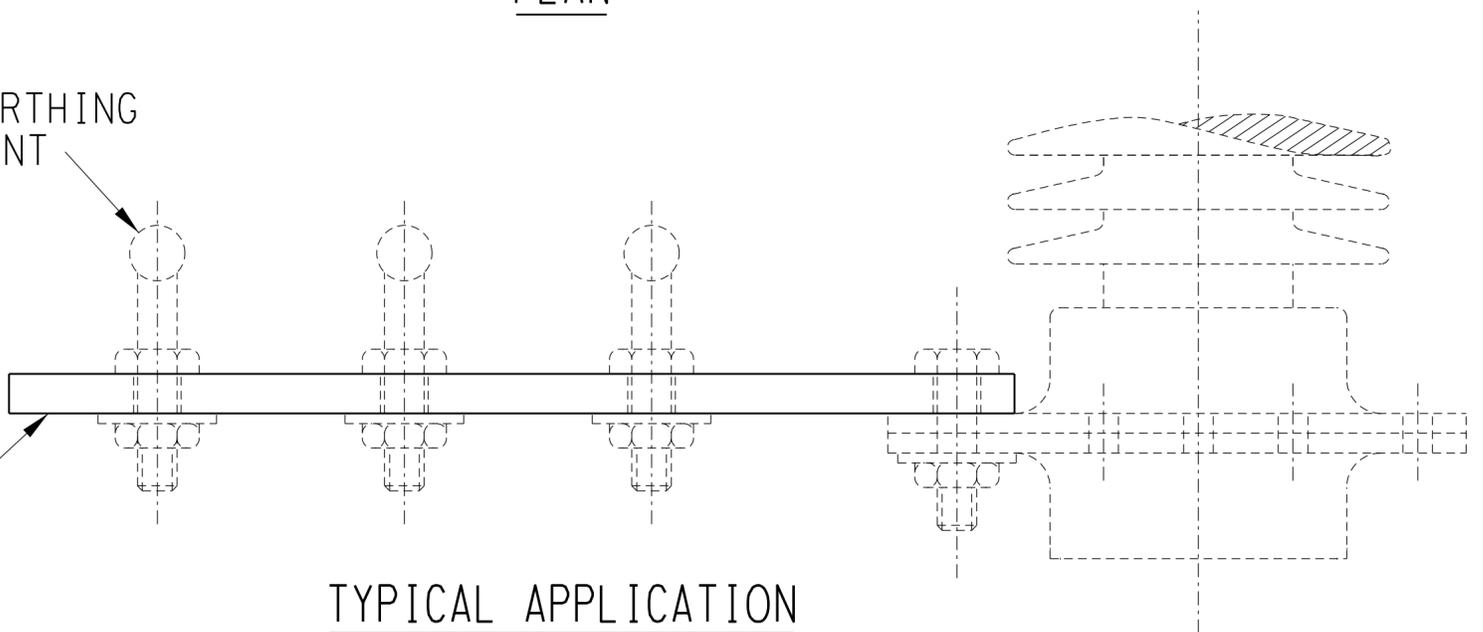


PLAN

C

FIXED EARTHING BALL JOINT

ADAPTOR PLATE



TYPICAL APPLICATION

D

E

NOTE:
1. ALL HOLES TO BE $\phi 18$.



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REG No. 2002/015527/30

1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/17/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		T13		1	

F

1

2

3

4 SIZE GROOTTE A4L

1

2

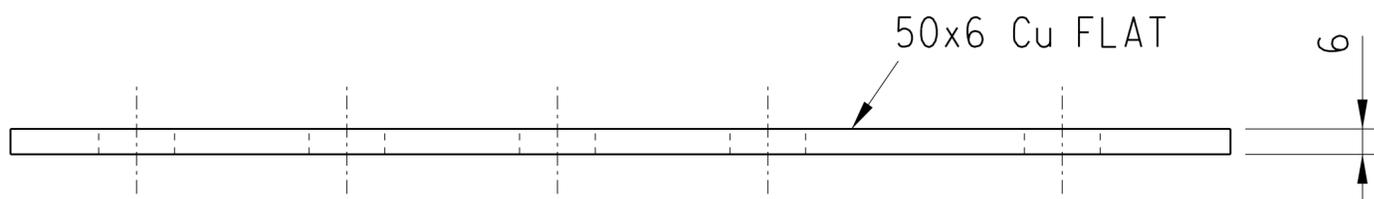
3

4

CAPACITOR BANK EARTH STUD ADAPTOR PLATE

A

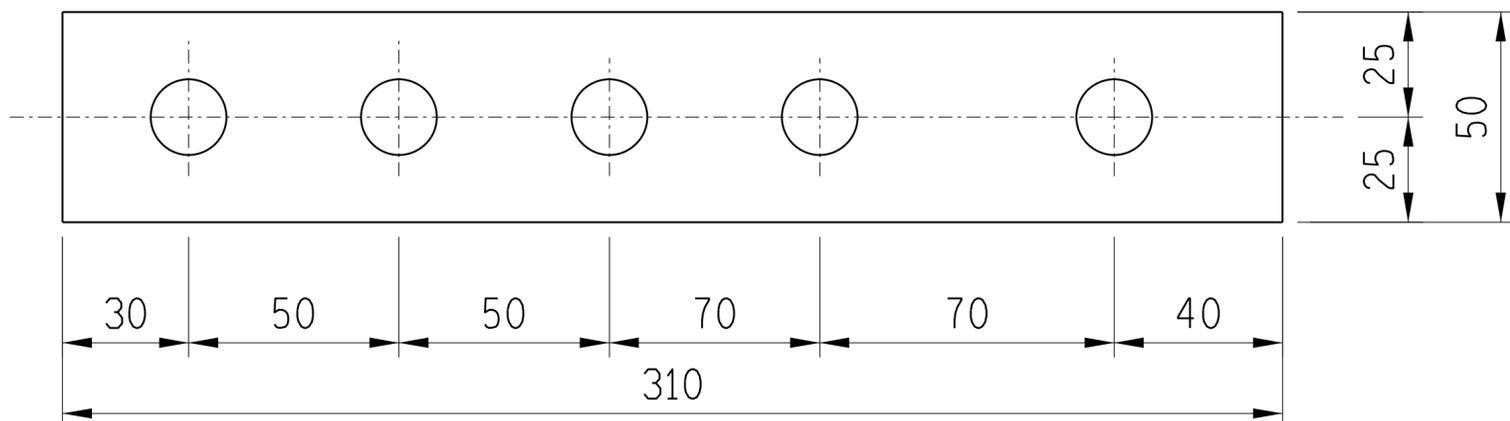
A



ELEVATION

B

B



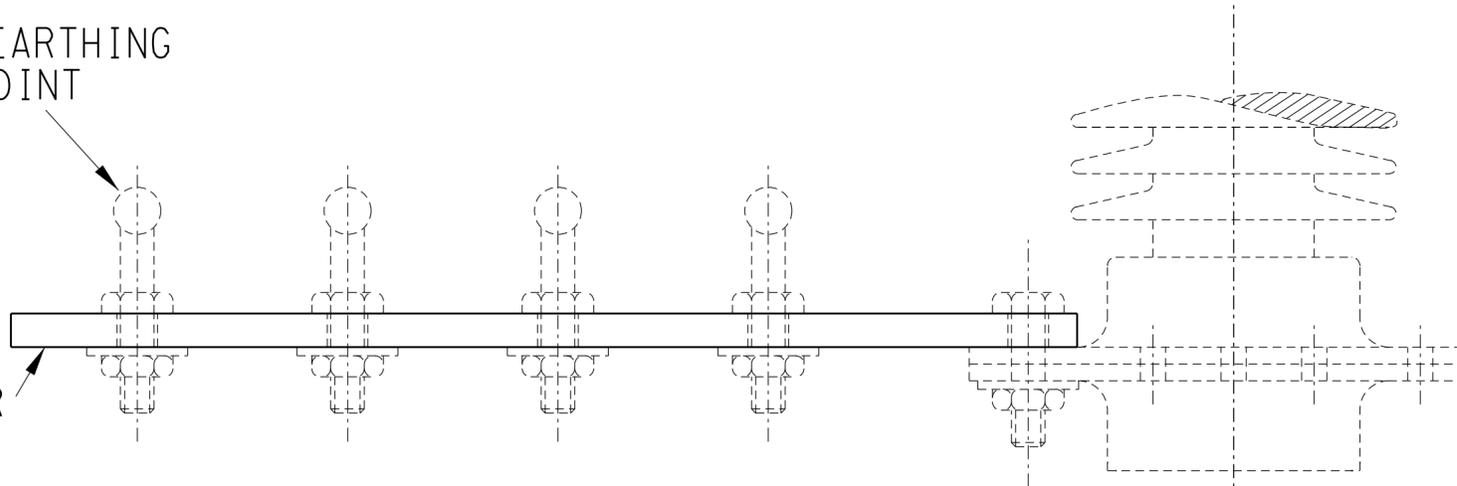
PLAN

C

C

FIXED EARTHING BALL JOINT

ADAPTOR PLATE



TYPICAL APPLICATION

D

D

E

E

- NOTE:
1. MAXIMUM 20kA STUDS TO BE USED IN THIS ARRANGEMENT.
 2. ALL HOLES TO BE $\phi 18$.



Eskom Holdings
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REG No. 2002/015527/30

1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/07/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		T13A		1	

F

F

1

2

3

4 SIZE GROOTTE A4L

1

2

3

4

EARTHING OF SURGE ARRESTER MOUNTED ON INSULATED BASE
WITH PROVISION FOR CONDITION MONITORING DEVICE

(SEE ALSO SHT T14A & T14B)

35 65 35

M16 STUD M12 STUD

TYPICAL INSULATOR MATERIAL EPOXY RESIN.
STUDS TO BE STAINLESS STEEL AND
SUPPLIED WITH 2 STAINLESS STEEL NUTS &
2 WASHERS FOR EACH STUD SIZE.

EARTH BRIDGE TO BE
INSTALLED IF COUNTER
IS NOT INSTALLED.

SURGE ARRESTER
INSULATED BASE

50x3 Cu EARTH STRAP CONNECTED
TO EARTH CLAMP (SUPPLIED WITH
SURGE ARRESTER) AND BOLTED TO
INSULATORS WITH NUTS AND
WASHERS (SUPPLIED WITH
INSULATOR)

BRACKET SEE DRG 0.54/6603

EARTH STRAP TO BE
DRILLED TO SUIT
INSULATOR STUD SIZE

BEND EARTH STRAP & DRILL
EARTH TAIL CLAMP (SHT C7)
(ON RETROFITS THIS EARTHTAIL
MAY BE 50x3 Cu FLAT)

SUPPORT STEELWORK
EARTHTAIL (SEE SHT T5)
NUMBER OF EARTHING
CONNECTIONS TO EARTH MAT
AS PER APPLICABLE SUBSTATION
BAY EARTHING SHEETS.

EARTH MAT

EARTH MAT

TYPICAL ARRANGEMENT

INSULATOR QUANTITY VARIES WITH SUPPORT HEIGHT
5000 HIGH SHOWN SEE SHT T14A & T14B.



Eskom Holdings
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REG No. 2002/015527/30

1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	30/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
STANDARDS

0.54/393

SHEET NUMBER	REVISION
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T14

1

1

2

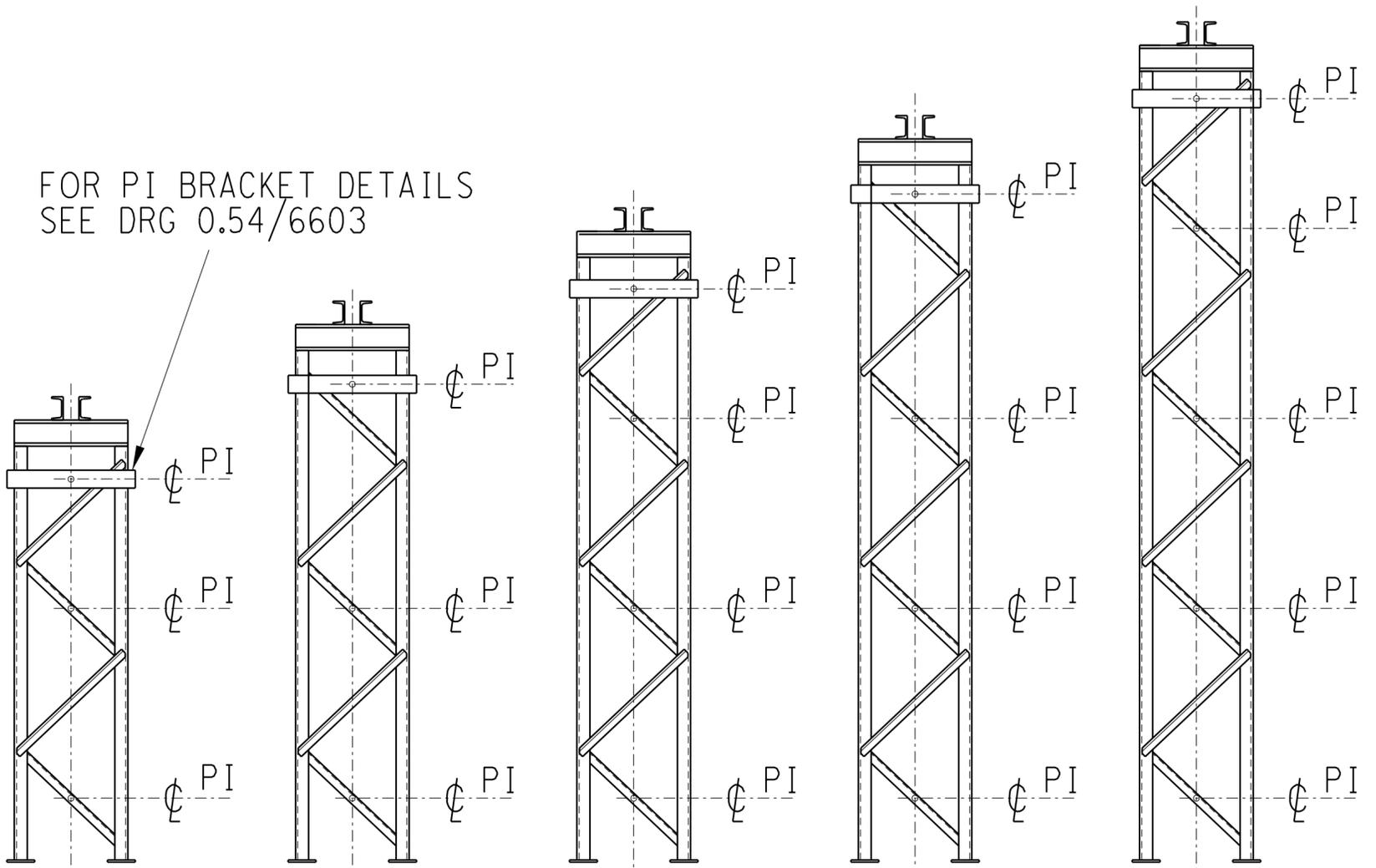
3

4 SIZE GROOTTE A4L

EARTHING OF SURGE ARRESTER MOUNTED ON INSULATED BASE
WITH PROVISION FOR CONDITION MONITORING DEVICE

(SEE ALSO SHT T14 & 14B)

FOR PI BRACKET DETAILS
SEE DRG 0.54/6603



0.54/302
2500 HIGH
MEDIUM SUPPORT
(3 INSULATORS)

0.54/304
3500 HIGH
MEDIUM SUPPORT
(4 INSULATORS)

0.54/4707
4500 HIGH
MEDIUM SUPPORT
(5 INSULATORS)

0.54/303
3000 HIGH
MEDIUM SUPPORT
(3 INSULATORS)

0.54/305
4000 HIGH
MEDIUM SUPPORT
(4 INSULATORS)



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SOC Limited
REG No. 2002/015527/30

1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	01/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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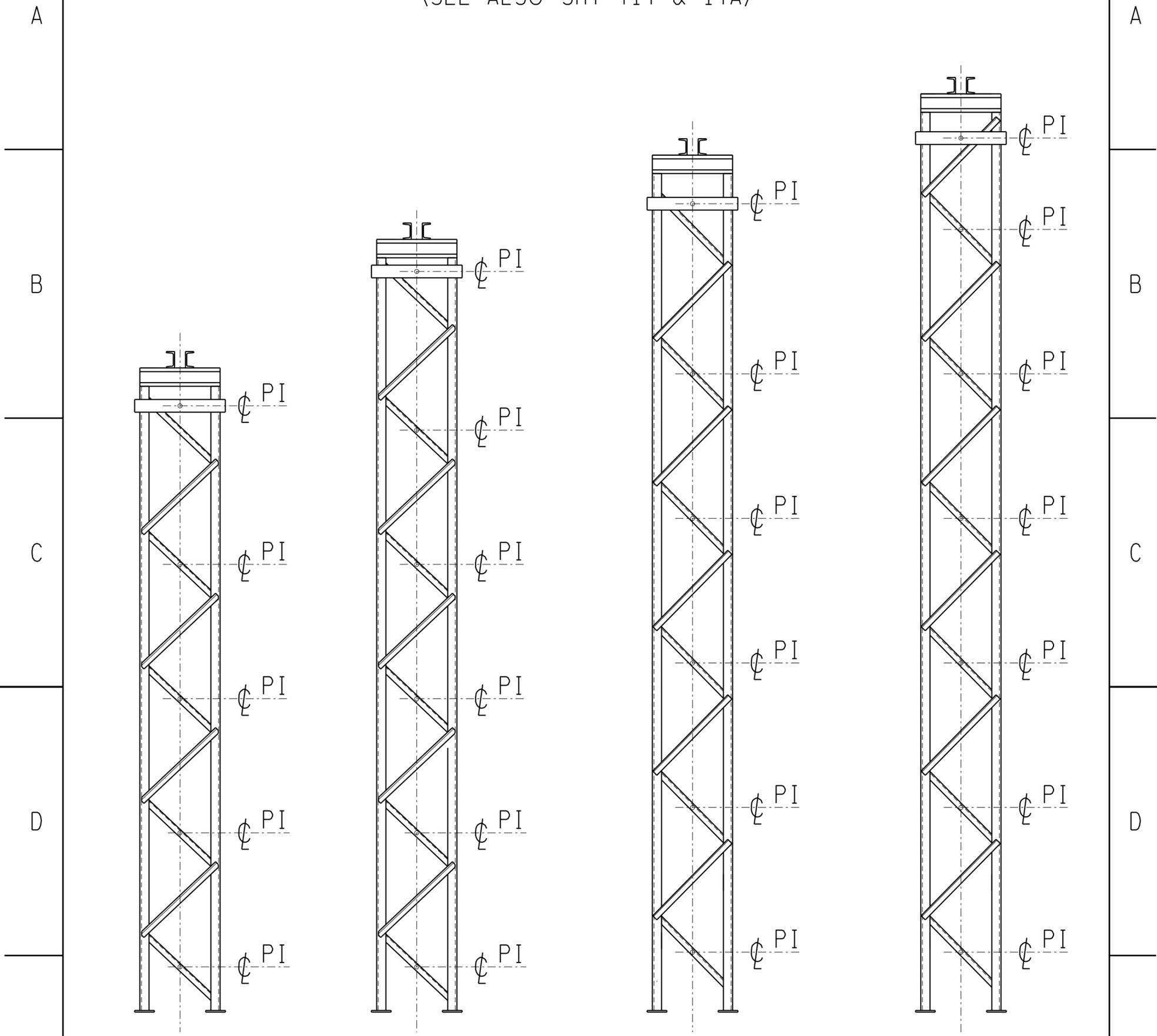
EARTHING
STANDARDS

0.54/393

SHEET NUMBER		REVISION	
T14A		1	

EARTHING OF SURGE ARRESTER MOUNTED ON INSULATED BASE
WITH PROVISION FOR CONDITION MONITORING DEVICE

(SEE ALSO SHT T14 & 14A)



0.54/1596
5000 HIGH
MED. SUPPORT

(5 INSULATORS)

0.54/4160
6000 HIGH SUPPORT
(SA MTD ON FIRE
BARRIER SUPPORT)

(6 INSULATORS)

0.54/4586
6500 HIGH SUPPORT

(6 INSULATORS)

0.54/4318
7000 HIGH SUPPORT

(7 INSULATORS)



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REG No. 2002/015527/30

1	DRG SHEET REPLACED. GENERAL REDAWN.	JMV	KN	TM	09/07/2019
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING
STANDARDS

0.54/393

SHEET NUMBER	REVISION
T14B	1

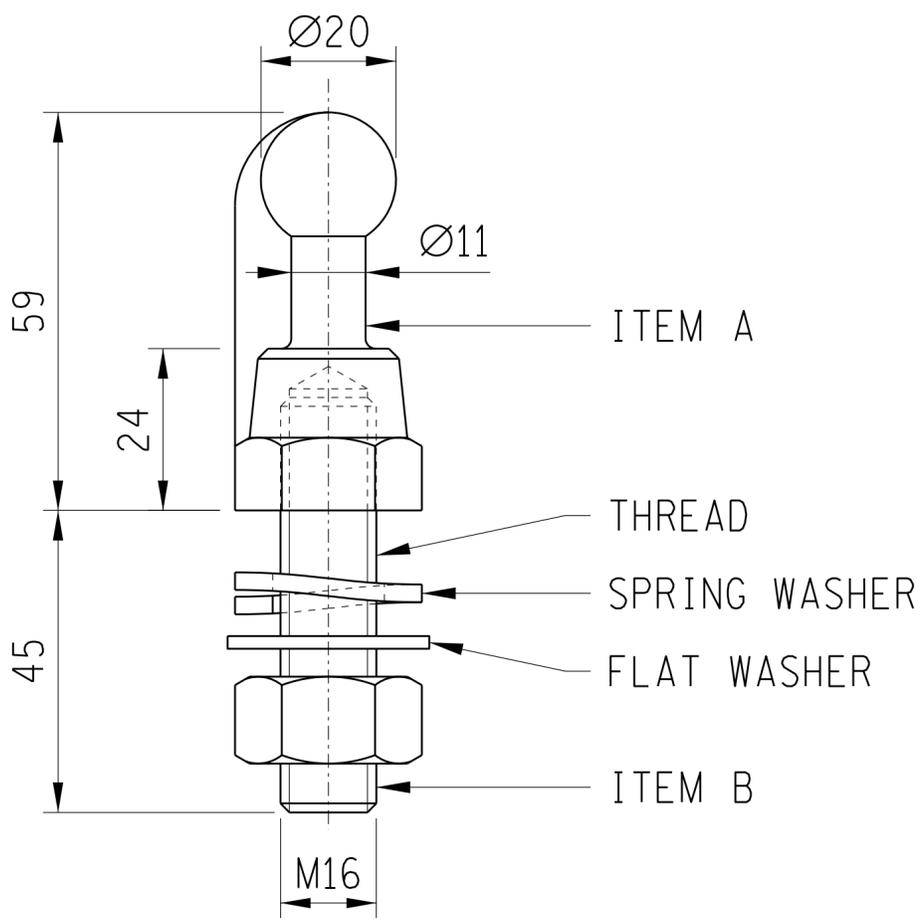
1

2

3

4

EARTH STUD



NOT TO SCALE

NOTE :
DRAWING NOT FOR MANUFACTURING PURPOSE.

SHORT DESCRIPTION: JOINT, BALL PORTABLE EARTH 20kA T/C

TECHNICAL DESCRIPTION:

BALL JOINT (SINGLE) FOR USE ON PORTABLE EARTH ASSEMBLY.
 FAULT LEVEL : 0-20kA; BALL DIAMETER: 20mm.
 ITEM A - MATERIAL: TINNED COPPER.
 ITEM B - THREADED ROD: M16 - MATERIAL: STAINLESS STEEL.
 M16 HEX. NUT - MATERIAL: STAINLESS STEEL.
 ITEM B TO BE TIGHTENED BY SCREWING INTO ITEM A.
 SUPPLIED WITH HEX. NUT, WASHER AND SPRING WASHER.



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 SOC Limited
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1	FIRST ISSUE	JMV	KN	TM	01/07/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
EARTHING STANDARDS		0.54/393			
		SHEET NUMBER		REVISION	
		T15		1	

1

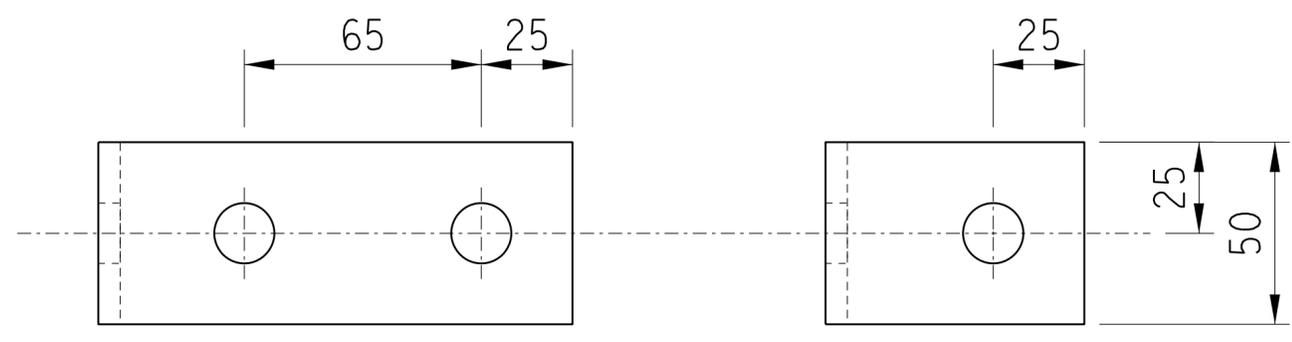
2

3

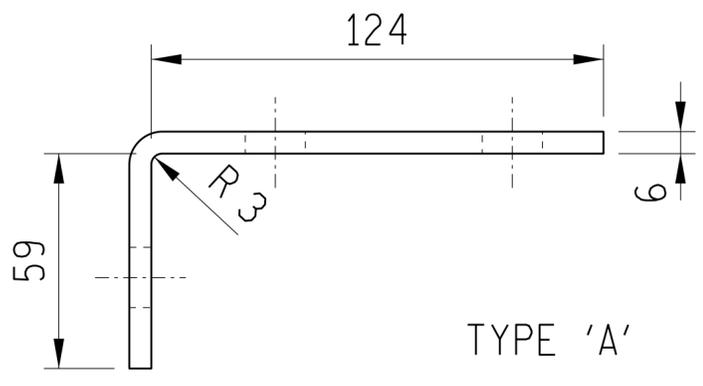
4 SIZE GROOTTE A4L

ADAPTOR PLATE FOR EARTH STUD

A

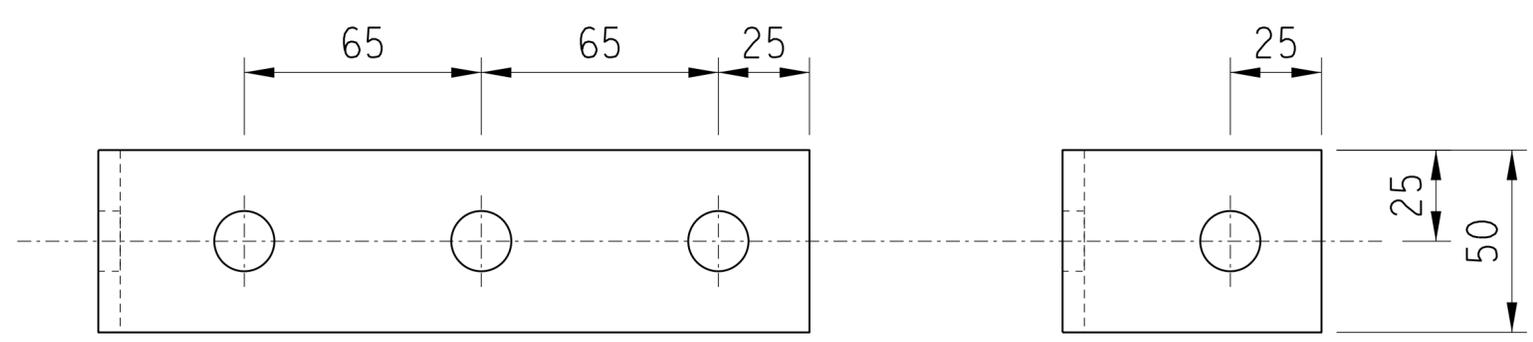


B

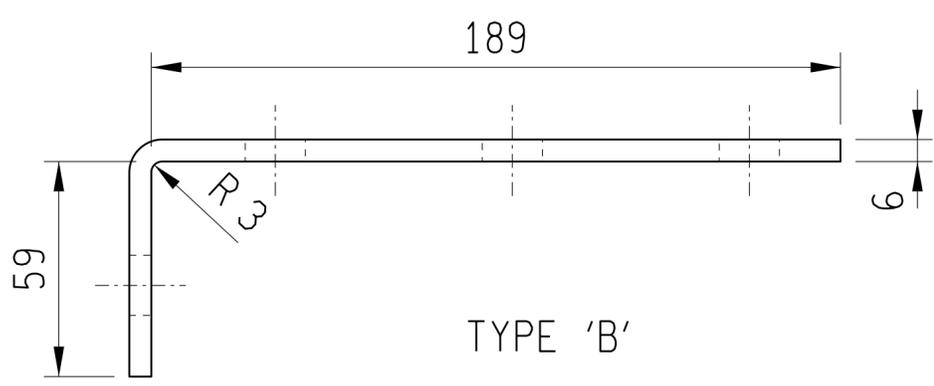


FLAT LENGTH: 198mm
MATERIAL: COPPER
3 HOLES: 17 DIA

C



D



FLAT LENGTH: 263mm
MATERIAL: COPPER
4 HOLES: 17 DIA

E

NOTE:
1.) MATERIAL TO BE 50x6 COPPER.
2.) ALL SHARP EDGES TO BE BLUNT OFF.

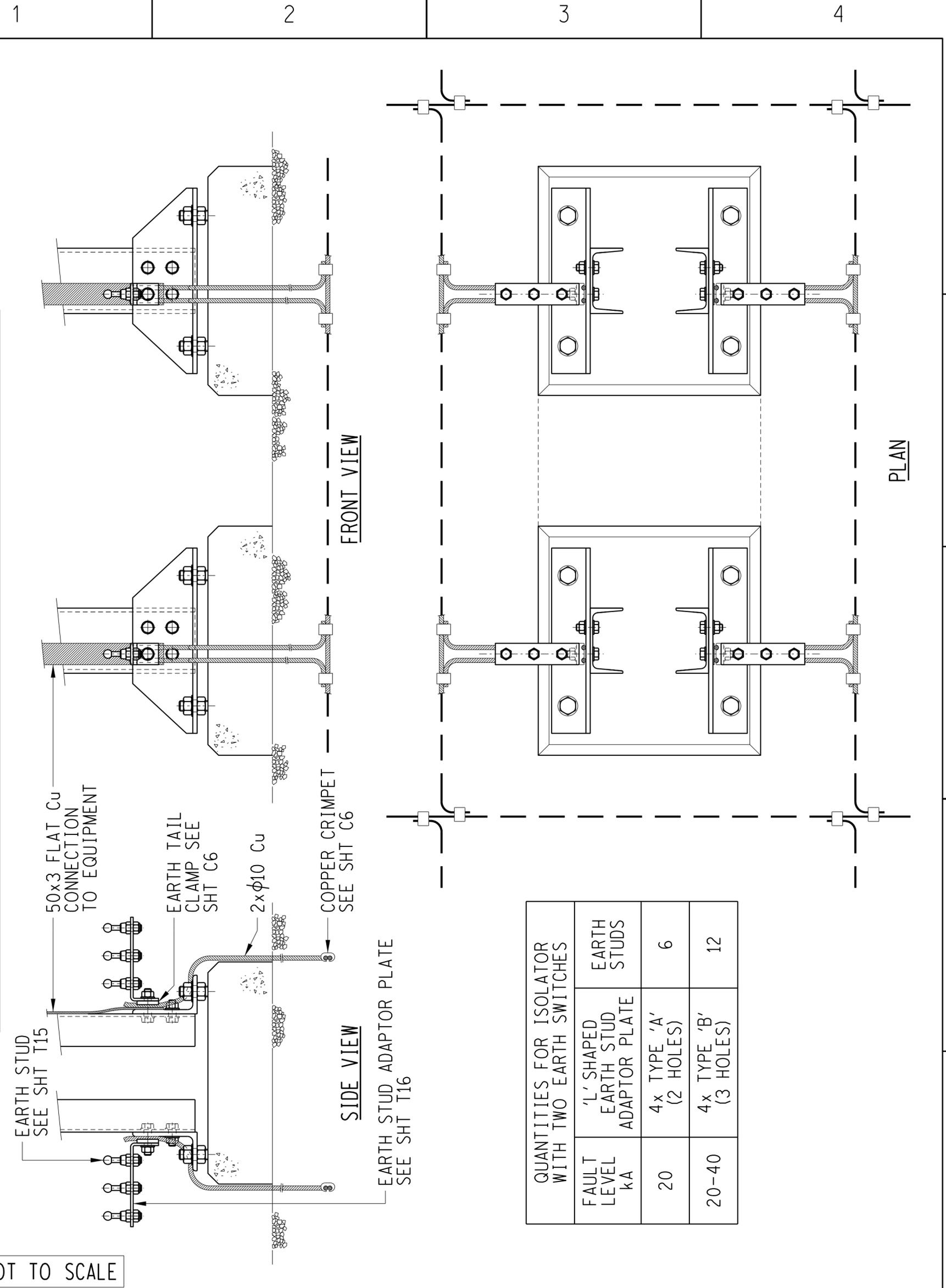
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Eskom Holdings
SOC Limited
REG No. 2002/015527/30

1	FIRST ISSUE	JMV	KN	TM	01/07/2019
REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
<h1>EARTHING STANDARDS</h1>		0.54/393			
		SHEET NUMBER		REVISION	
		T16		1	

TYPICAL LAYOUT OF OPERATING EARTHING SHOWING REQUIRED CONNECTIONS



NOT TO SCALE



Eskom Holdings
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REG No. 2002/015527/30

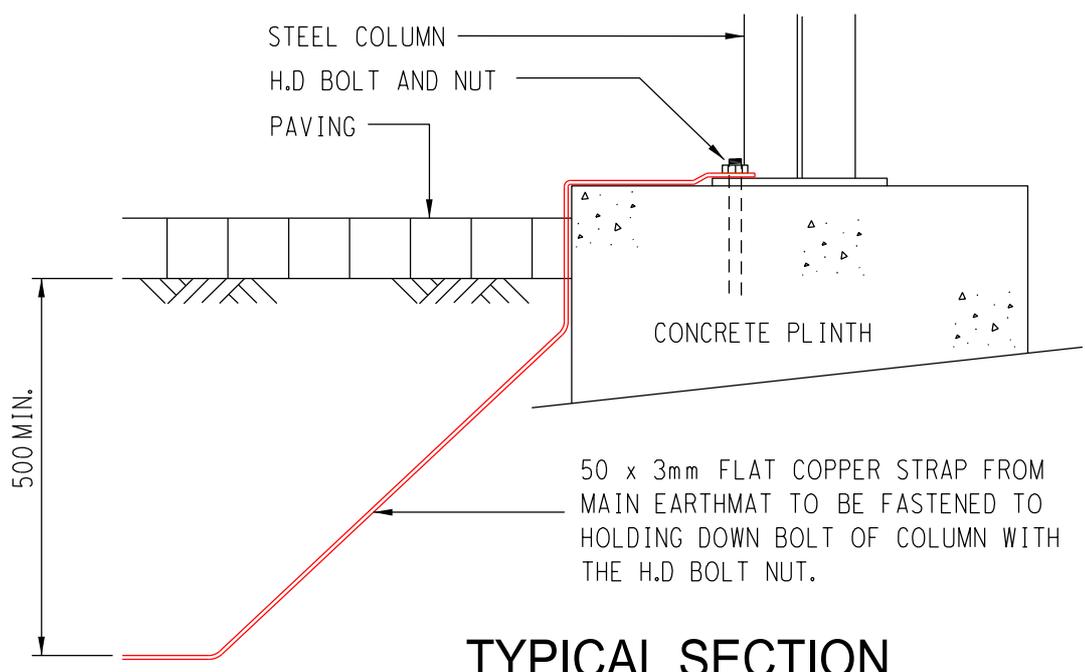
0	FIRST ISSUE	JMV	IH	TM	20/10/2015
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REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE
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EARTHING STANDARDS

0.54/393

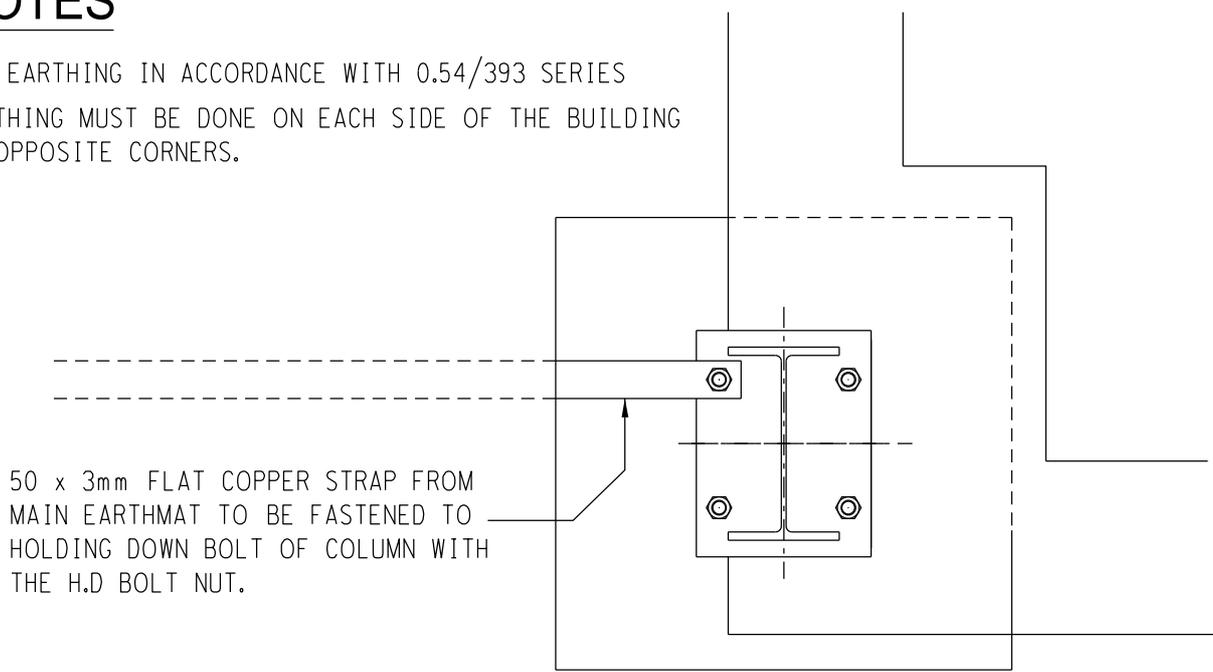
SHEET NUMBER	REVISION
T17	0



TYPICAL SECTION

NOTES

1. ALL EARTHING IN ACCORDANCE WITH 0.54/393 SERIES
2. EARTHING MUST BE DONE ON EACH SIDE OF THE BUILDING AT OPPOSITE CORNERS.



PLAN

EARTHING TO CLADDED STORE BUILDING COLUMN

	DRAWN GETEKEN	DBN	JAN 2020	CHKD NAGES		23/7/20	AUTH MAS		23-7-20	REV	0	DATE DATUM
	H V YARD CIVIL WORK STANDARD DETAILS										0.54/393	
												SHEET T18

DRG. TEK
REGISTR

A4L

CONCRETE ROOF TILES

ALUMINIUM GUTTER
M16 BOLT

MAKE A 60 x 60 OPENING
IN FASCIA TO FIT A
50 x 50 EARTHTAIL CLAMP
SEE DRG. 0.54/393 SHT.C6

φ10mm COPPER ROD FIXED TO CLAMP
SEE DRG. 0.54/393 SHT.C7

φ20mm GALVANISED PIPE
FIXED TO WALL WITH
GALV. SADDLES

φ10mm COPPER ROD FROM MAIN EARTHMAT
TO BE TIED TO EACH INDIVIDUAL GUTTER.

TYPICAL SECTION

NOTES

ALL EARTHING IN ACCORDANCE WITH 0.54/393 SERIES.
THE EARTHTAIL CLAMP MUST BE FIXED TIGHTLY AGAINST THE GUTTER
THE 50 x 50mm AREA OF THE CLAMP AT THE GUTTER MUST BE SANDED TO EXPOSED METAL.

AFTER THE CLAMP IS FITTED THE AREA AROUND IT MUST BE SEALED WITH
SIKA SIKAFLEX F1 TO PREVENT THE INCREASE OF WATER.

IF GUTTERS IS NOT CONTINUOUS AND IS DEVIDED, EACH MUST BE EARTHED SEPERATELY
AND FIXED TO THE MAIN EARTHMAT

EARTHING TO TILED ROOF BUILDINGS

	DRAWN GETEKEN	DBN	JAN 2020	CHKD NAGES		23/7/20	AUTH MAS		23-7-20	REV	0	DATE DATUM
	H V YARD CIVIL WORK STANDARD DETAILS										0.54/393	
												SHEET T19

DRG. TEK
REGISTR

A4L