

- NOTES
1. EARTHING CONDUCTORS HAVE TO BE CONNECTED AS SHORT AS POSSIBLE (WITHOUT LOOP) TO GROUND POINT.
 2. ALL INDOOR SUPPORTS HAVE TO BE EARTHED ACC. TO DETAIL A001 / A0011 AS APPLICABLE.
 3. ALL OUTDOOR SUPPORTS HAVE TO BE EARTHED ACC. TO DETAIL A001A0011 / A0012 / A0022 AS APPLICABLE.
 4. ONE BAY FIXATION SUPPORT CLOSE TO THE LCC AND ONE BAY FIXATION SUPPORT ON EXIT (FEEDER SIDE) MUST BE USED IN A "DIAGONAL" ARRANGEMENT TO CONNECT TO THE RISER ACC. TO DETAIL A001 / A0011 AS APPLICABLE.
 5. FIXATION OF EARTHING MATERIALS ON GIS FLOOR ACC. TO DETAIL A008.
 6. ATTACHMENT OF EARTHING MATERIALS ALONG STEEL SUPPORTS ACC. TO DETAIL A0071.
 7. FLOOR AND WALL SEALINGS TO BE EARTHED ACC. TO DETAIL A008_2B / A008_5A AS APPLICABLE.
 8. ATTACHMENT OF COPPER BAR WITH THE EARTHING RISER ACC. TO DETAIL C003 / C003s AS APPLICABLE.
 9. NUMBER OF SCREW CONNECTIONS BETWEEN EARTHING MATERIALS ACC. TO DETAIL A009.
 10. EXACT LAYING OF EARTHING MATERIAL TO BE DECIDED ON SITE BY ABB SUPERVISOR.
 11. ALL METALLIC CABLE CHANNELS HAVE TO BE CONTINUOUSLY CONNECTED AND EARTHED.
 12. COLOR AT GIS FLANGE TO BE REMOVED. (CONTACT AREA BETWEEN GIS FLANGE AND STEEL SUPPORT FLANGE) CONTACT AREA TO BE CLEANED AND GREASED.
 13. CONTACT AREAS MUST BE CLEANED WITH BRUSH OR FILE. AFTERWARDS TO BE GREASED WITH CONTACT GREASE ACC. TO INSTRUCTIONS HASWARTIS.
 14. FOR GIS EARTHING DETAILS PLEASE REFER TO PAGE 002 / 003.
 15. THE RISER LOCATION INDICATED IN EARTHING LAYOUT ARE TENTATIVE AND MAY VARY AS PER ACTUAL CONSTRUCTION, HOWEVER SAME SHOULD LIE IN VICINITY OF SUPPORT STRUCTURE AND SHOULD NOT FOUL WITH BASE PLATE OF SUPPORT STRUCTURE.
 16. RCC - RETURN CURRENT CONNECTION.
 17. PLEASE READ MAIN CONTRACTOR AS "M/s. BHEL LTD."

LEGEND

	EARTHING POINT INDOOR
	EARTHING POINT OUTDOOR
	STRUCTURE FOOTINGS

AC	10.06.2020	DHRUVI S	OUTDOOR SUPPORT STRUCTURE EARTHING WITH GI
AB	18.05.2020	DHRUVI S	MODIFICATIONS IN TEXT AND EARTHING BOQ ADDED
AA	14.04.2020	DHRUVI S	FIRST ISSUE
REV	DATE	NAME	MODIFICATION

CLIENT:	M/S BHARAT HEAVY ELECTRICAL LIMITED
END CUSTOMER:	UTTARAKHAND JAL VIDHYUT NIGAM LIMITED (UJVNL)
PROJECT:	220 kV GIS for 2 x 60 MW VYASI HEP AT VYASI, DIST DEHRADHUN, UK
NOA No:	136/E & M DESIGN-IVy-EPC(6) (FOR SUPPLY) dt 15.04.2014 & 137/E & M DESIGN-IVy-EPC(6) (FOR SERVICES) dt 15.04.2014
BHEL Doc No:	TB-3-398-316-111

Draft:	10.06.2020	DHRUVI S	Derived from:	-	Separate BOM:	-	Scale:	1:85	Doc type:	DW1	Format:	A0
Approved:	10.06.2020	DEBASISH M	Replaces:	-	SF6 SWITCHGEAR ELK-14-245C 220 kV GIS for 2 x 60 MW VYASI HEP.							
Released:	10.06.2020	DHRUVI S	Responsible department:	PGHV- GIS PASS	TOPVIEW GIS EARTHING LAYOUT							
Order number:	3100094055		Revision:	AC	Document number:							
					ABB India Ltd under license of ABB Technology Ltd							
				1HYG900036-17							Sheet no:	001

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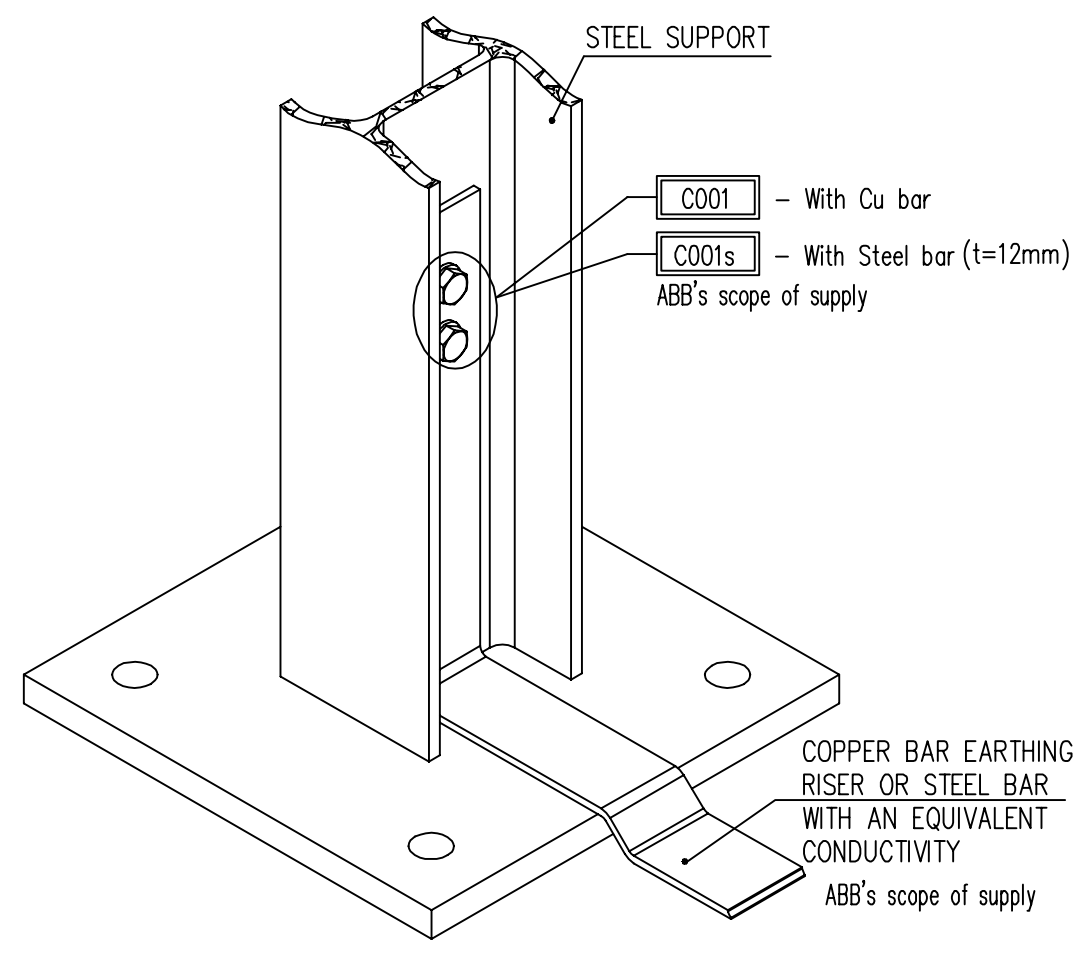
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A001

CONNECTION OF COPPER BAR EARTHING RISER WITH STEEL SUPPORT

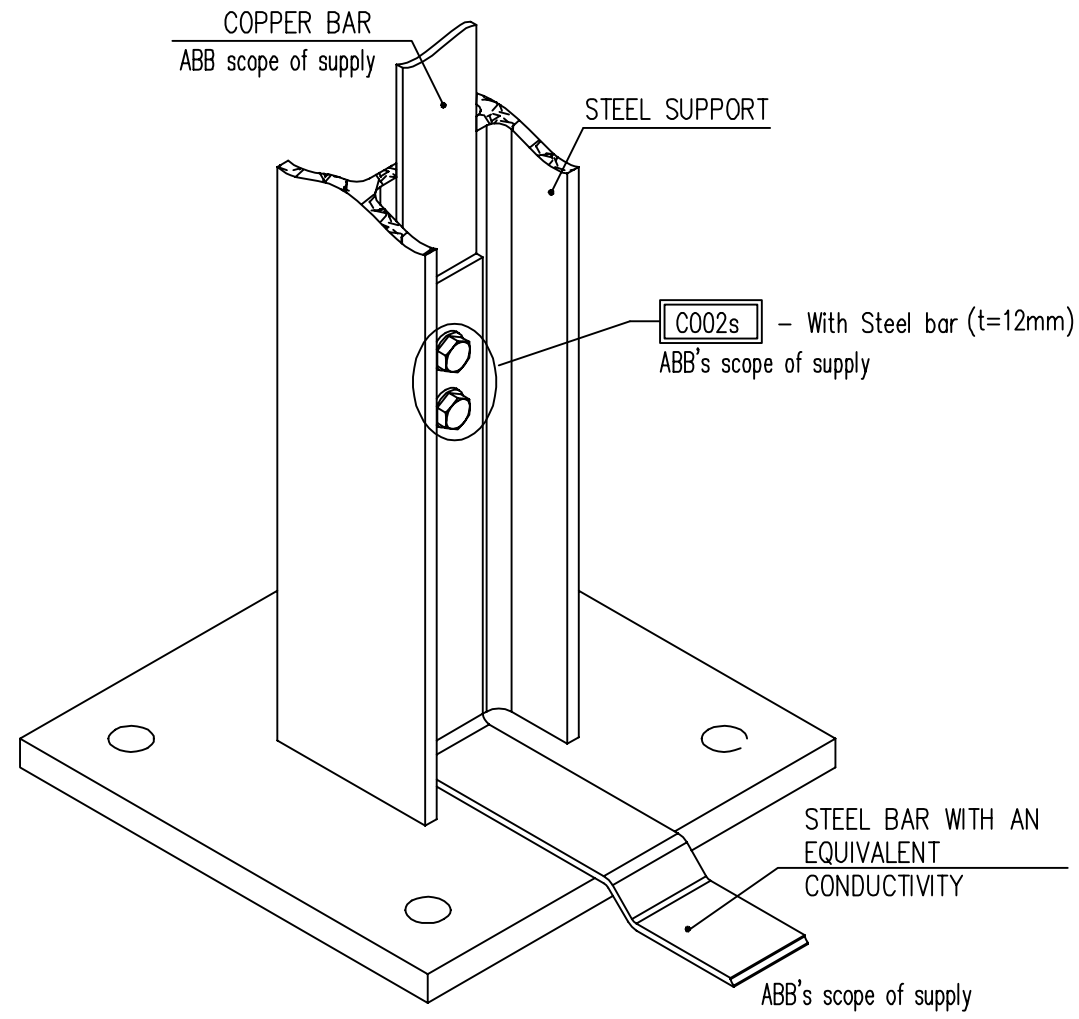


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	COPPER CONNECTION	COPPER PLATE 40x5

Crosssection of earthing riser according to Civil work requirement drawing

A002

CONNECTION OF COPPER BAR EARTHING RISER WITH STEEL SUPPORT AND COPPER BAR

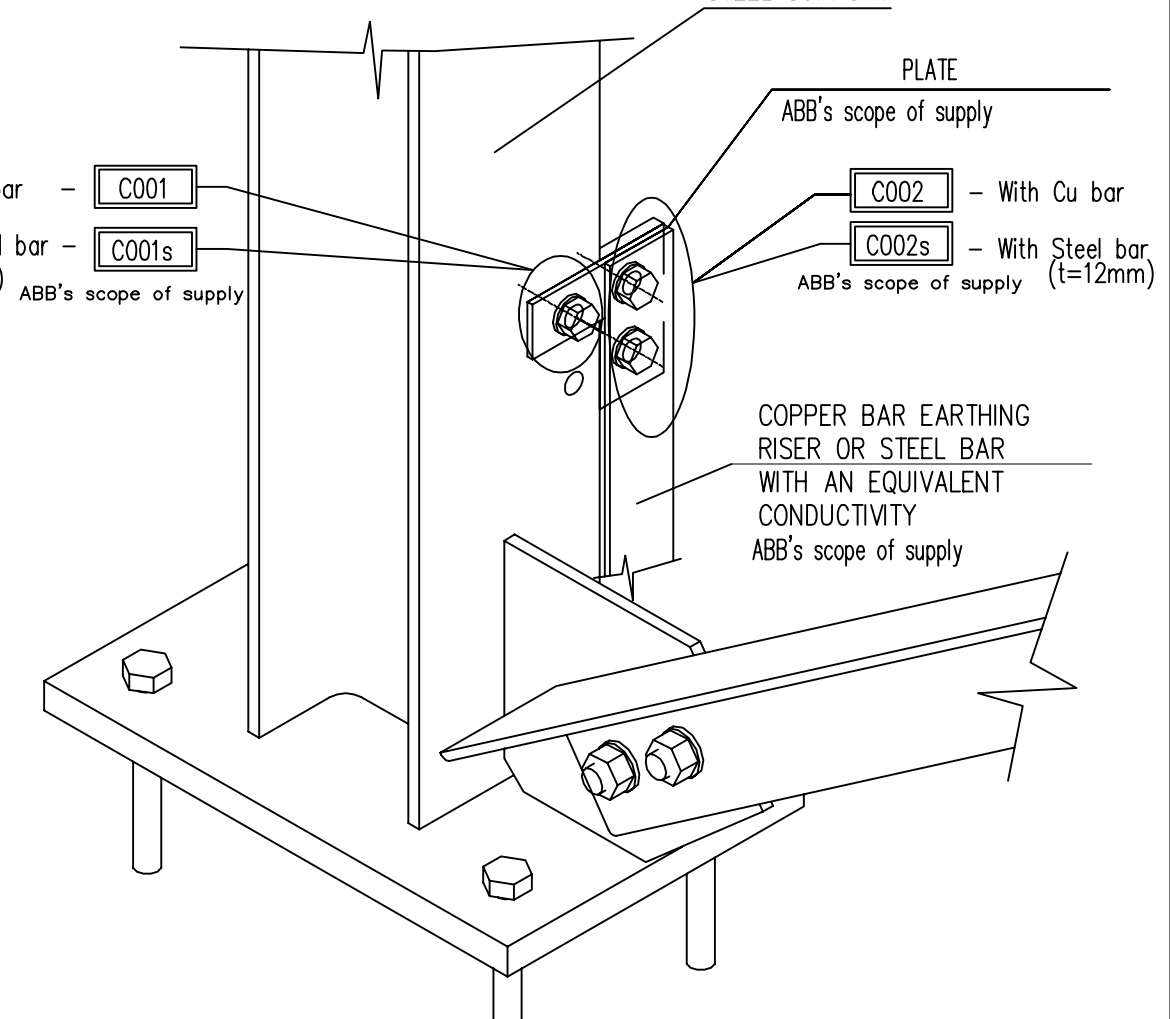


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	COPPER CONNECTION	COPPER PLATE 40x5

Crosssection of earthing riser according to Civil work requirement drawing

A0011

CONNECTION OF COPPER BAR EARTHING RISER WITH STEEL SUPPORT – earthing from plate to the ground/earthing net

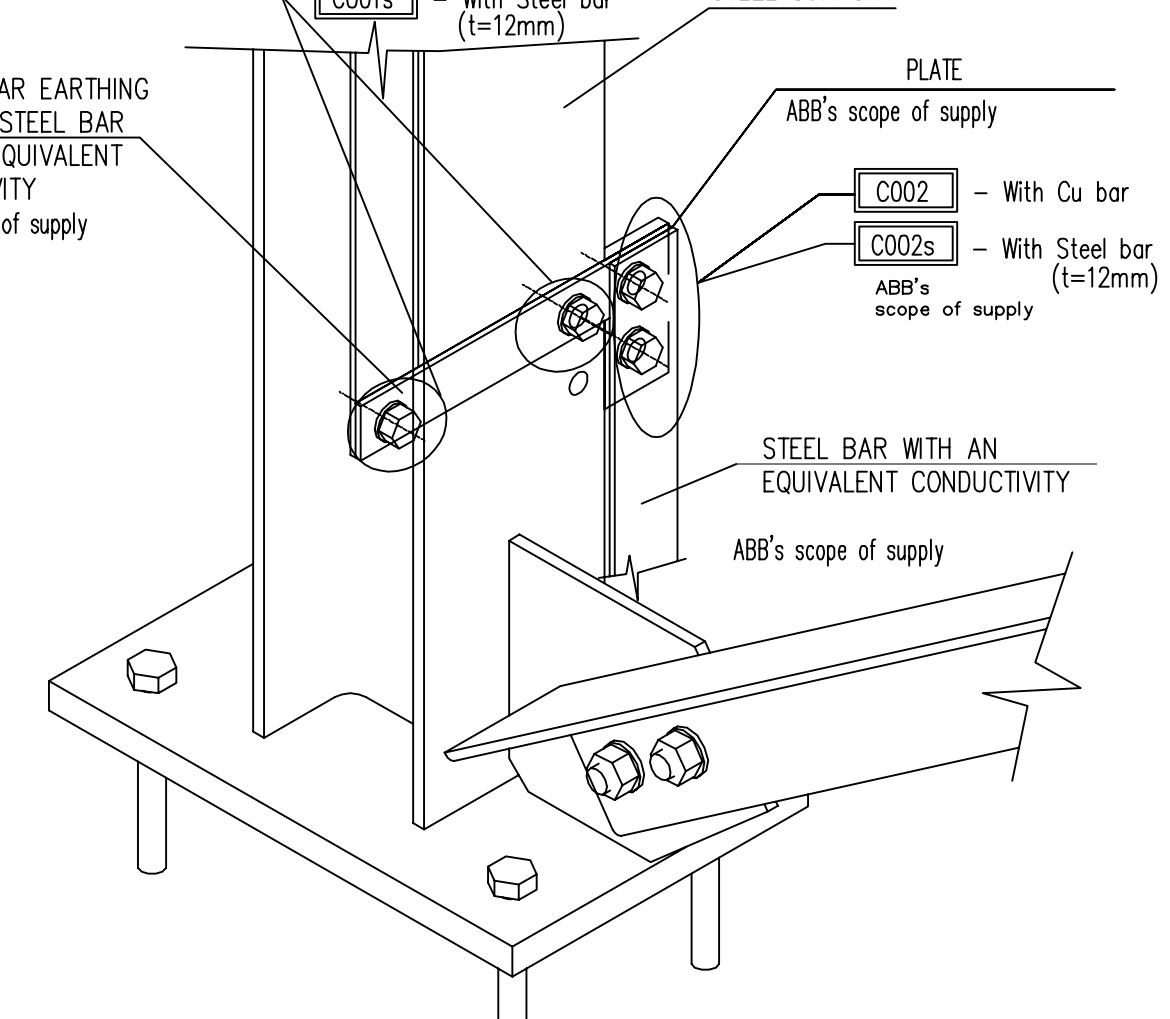


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	COPPER CONNECTION	COPPER PLATE 40x5

Crosssection of earthing riser according to Civil work requirement drawing

A0021

CONNECTION OF COPPER BAR EARTHING RISER WITH STEEL SUPPORT AND COPPER BAR – earthing from plate to the ground/earthing net

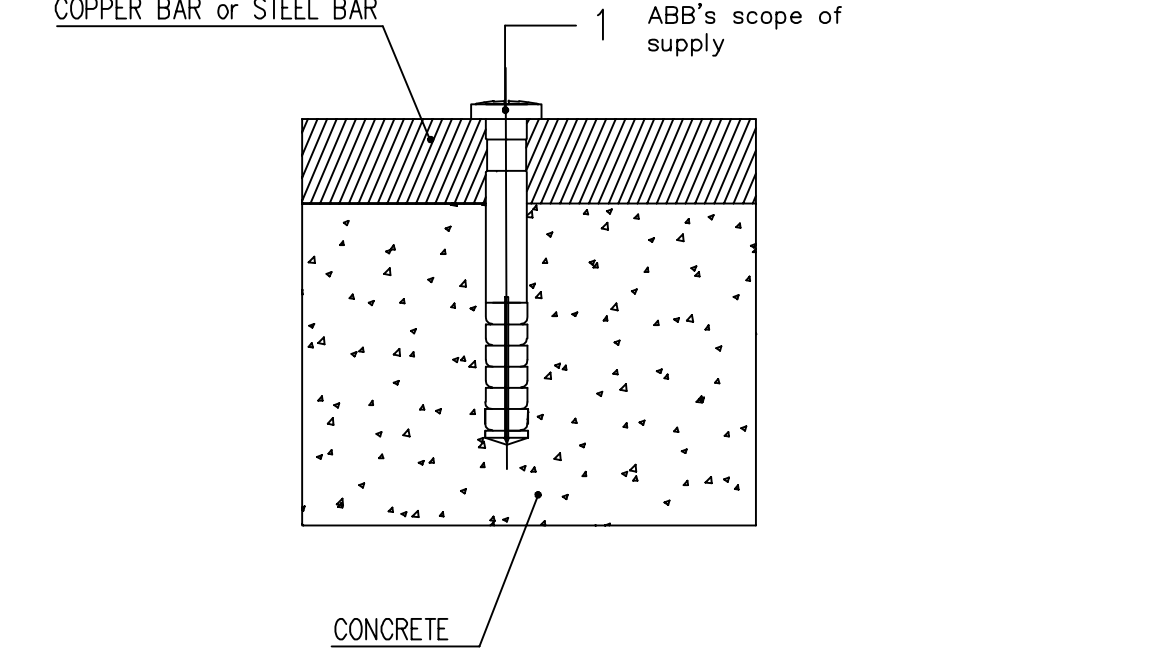


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	COPPER CONNECTION	COPPER PLATE 40x5

Crosssection of earthing riser according to Civil work requirement drawing

A008

ATTACHMENT OF COPPER BAR OR STEEL BAR ON QS FLOOR OR WALL (EVERY 800-1500mm)



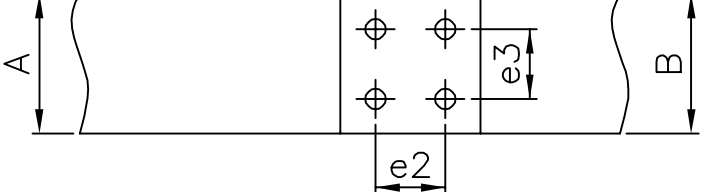
NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

A009

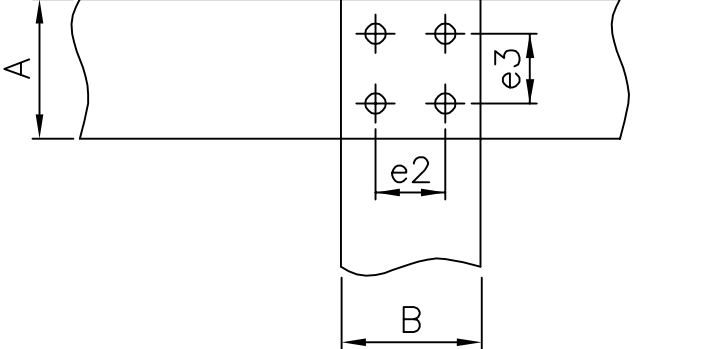
NUMBER OF HOLES/SCREWS FOR CONNECTION OF EARTHING BARS

TYPE 1: LONGITUDINAL CONNECTIONS



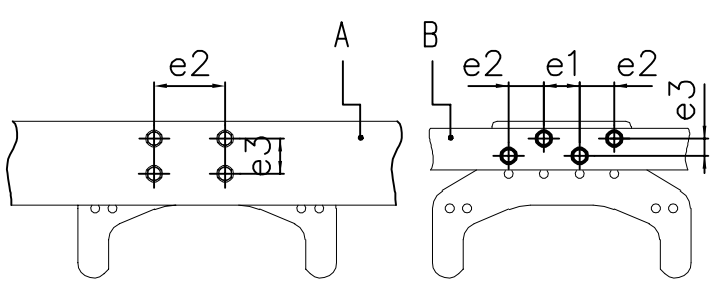
A	B	HOLES	e2	e3
40	40	1	0	0
50	50	2	40	-
60	60	2	30	25
80	80	2	36	36
100	100	4	40	50
120	120	4	40	60

TYPE 2: ANGLE CONNECTIONS



A	B	HOLES	e2	e3
40	40	1	0	0
50	50	1	0	0
60	60	2	25	25
80	80	2	36	36
100	100	4	30	36
120	120	4	30	36
140	140	4	30	36
160	160	4	30	36
180	180	4	30	36
200	200	4	30	36
220	220	4	30	36
240	240	4	30	36
260	260	4	30	36
280	280	4	30	36
300	300	4	30	36
320	320	4	30	36
340	340	4	30	36
360	360	4	30	36
380	380	4	30	36
400	400	4	30	36
420	420	4	30	36
440	440	4	30	36
460	460	4	30	36
480	480	4	30	36
500	500	4	30	36
520	520	4	30	36
540	540	4	30	36
560	560	4	30	36
580	580	4	30	36
600	600	4	30	36
620	620	4	30	36
640	640	4	30	36
660	660	4	30	36
680	680	4	30	36
700	700	4	30	36
720	720	4	30	36
740	740	4	30	36
760	760	4	30	36
780	780	4	30	36
800	800	4	30	36
820	820	4	30	36
840	840	4	30	36
860	860	4	30	36
880	880	4	30	36
900	900	4	30	36
920	920	4	30	36
940	940	4	30	36
960	960	4	30	36
980	980	4	30	36
1000	1000	4	30	36

TYPE 3: RETURN CURRENT CONNECTIONS



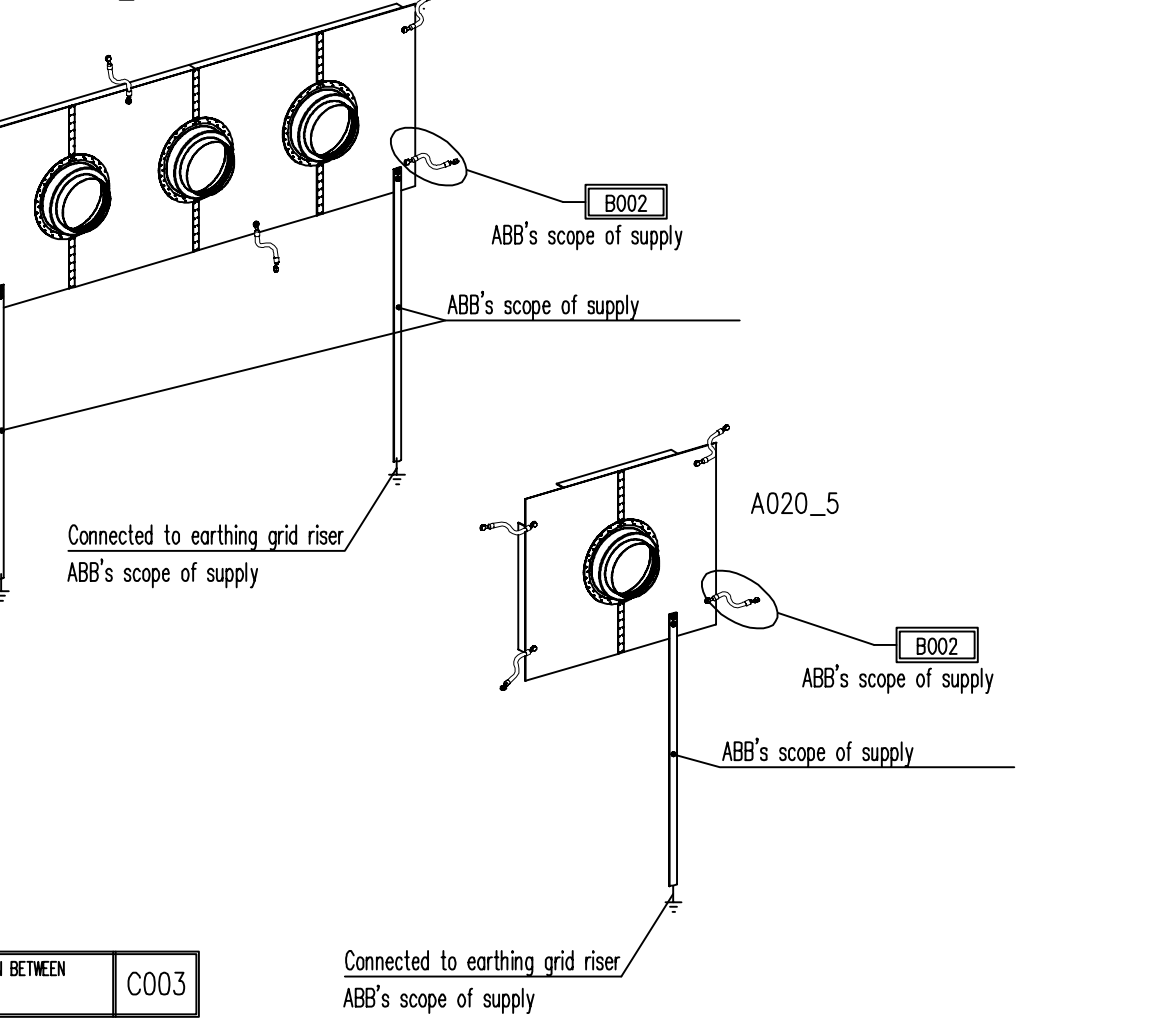
BAR	HOLES	e2	e3	e4
A	4	-	101	50
B	4	51	50	25

NO.	QTY	IDENTIFICATION	DESCRIPTION
A009_1	1	CONCRETE POINT	WALL PLATE 100x100
A009_2	1	CONCRETE POINT	WALL PLATE 100x100
A009_3	1	CONCRETE POINT	WALL PLATE 100x100
A009_4	1	CONCRETE POINT	WALL PLATE 100x100
A009_5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

A020

EARTHING OF FLOOR/WALL SEALINGS

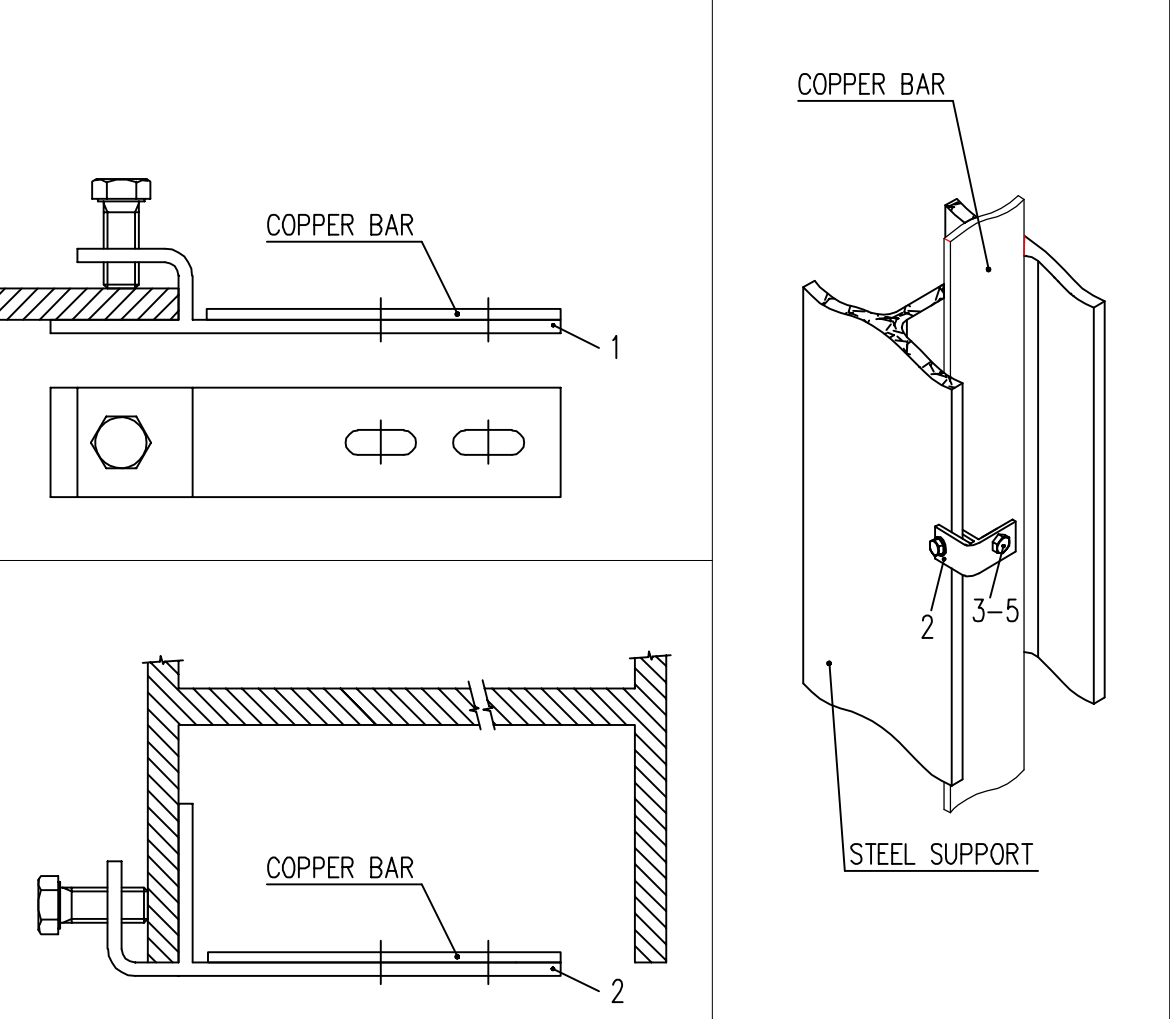


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	COPPER CONNECTION	COPPER PLATE 40x5

Crosssection of earthing riser according to Civil work requirement drawing

A0071

ATTACHMENT OF COPPER BAR ALONG STEEL SUPPORT (EVERY 800-1500 mm)

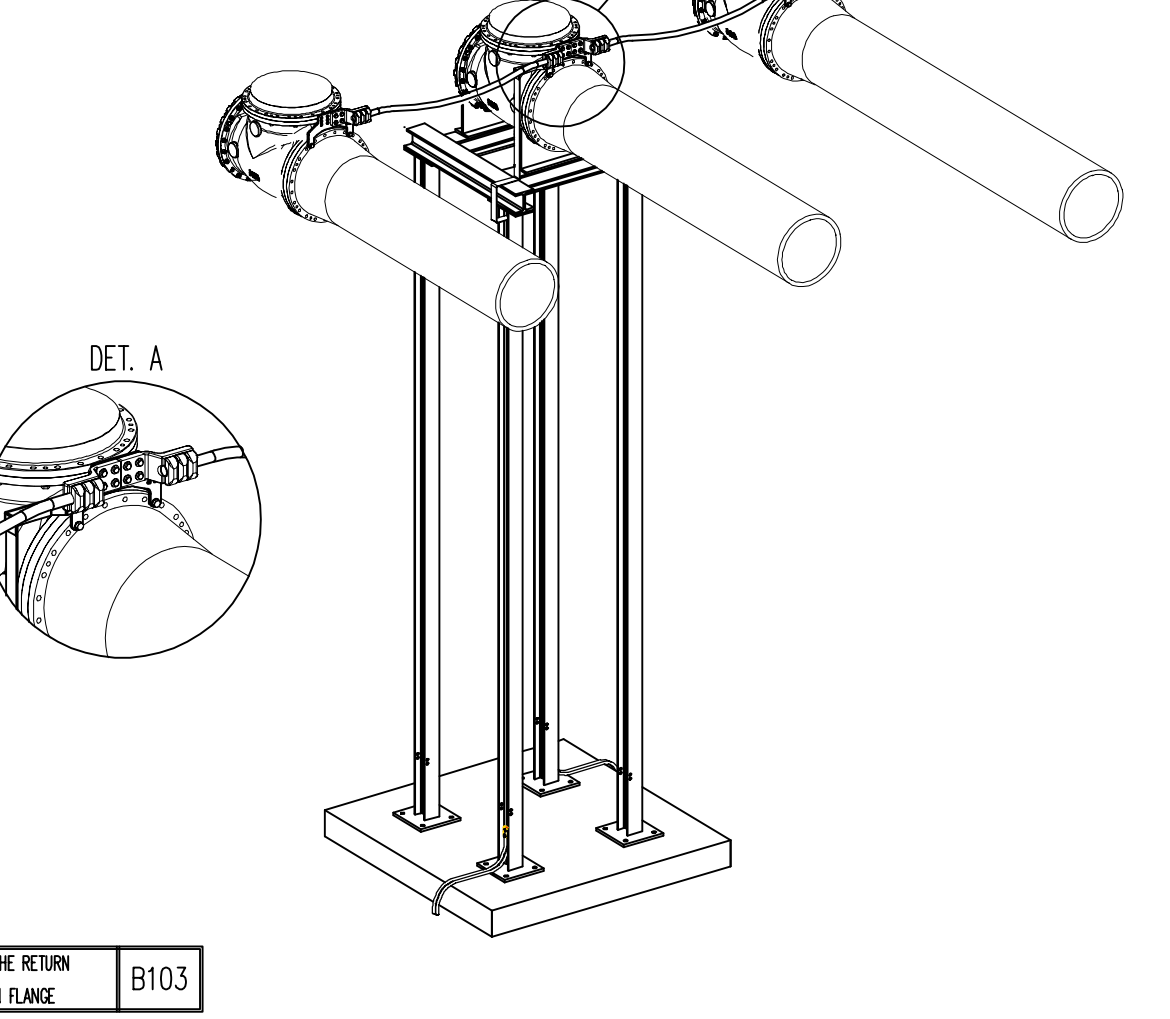


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100
2	1	CONCRETE POINT	WALL PLATE 100x100
3	1	CONCRETE POINT	WALL PLATE 100x100
4	1	CONCRETE POINT	WALL PLATE 100x100
5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

A114

RETURN CURRENT CONNECTION OF SLIDING SUPPORTS FOR THREE PHASES

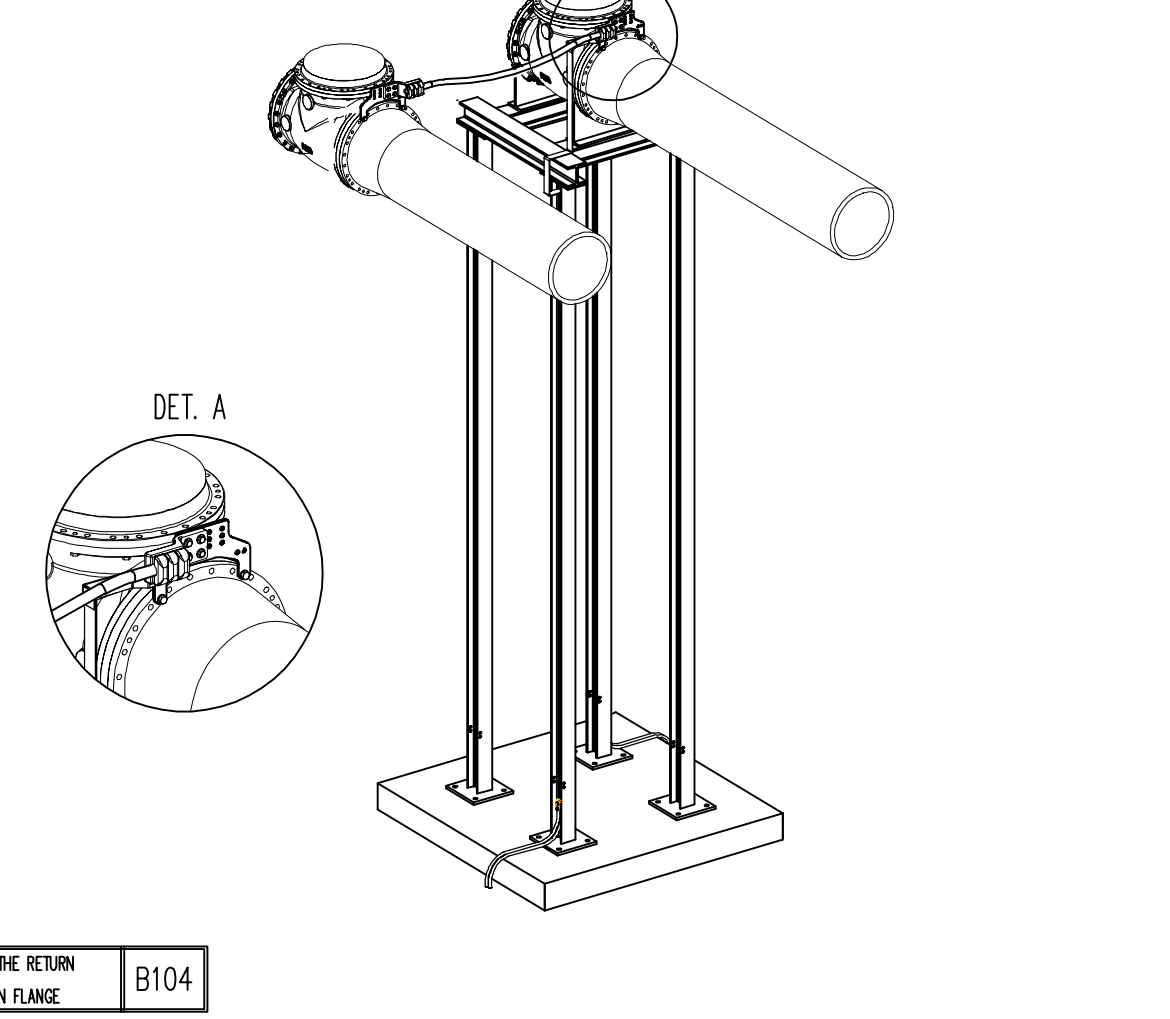


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100
2	1	CONCRETE POINT	WALL PLATE 100x100
3	1	CONCRETE POINT	WALL PLATE 100x100
4	1	CONCRETE POINT	WALL PLATE 100x100
5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

A115

RETURN CURRENT CONNECTION OF SLIDING SUPPORTS FOR TWO PHASES

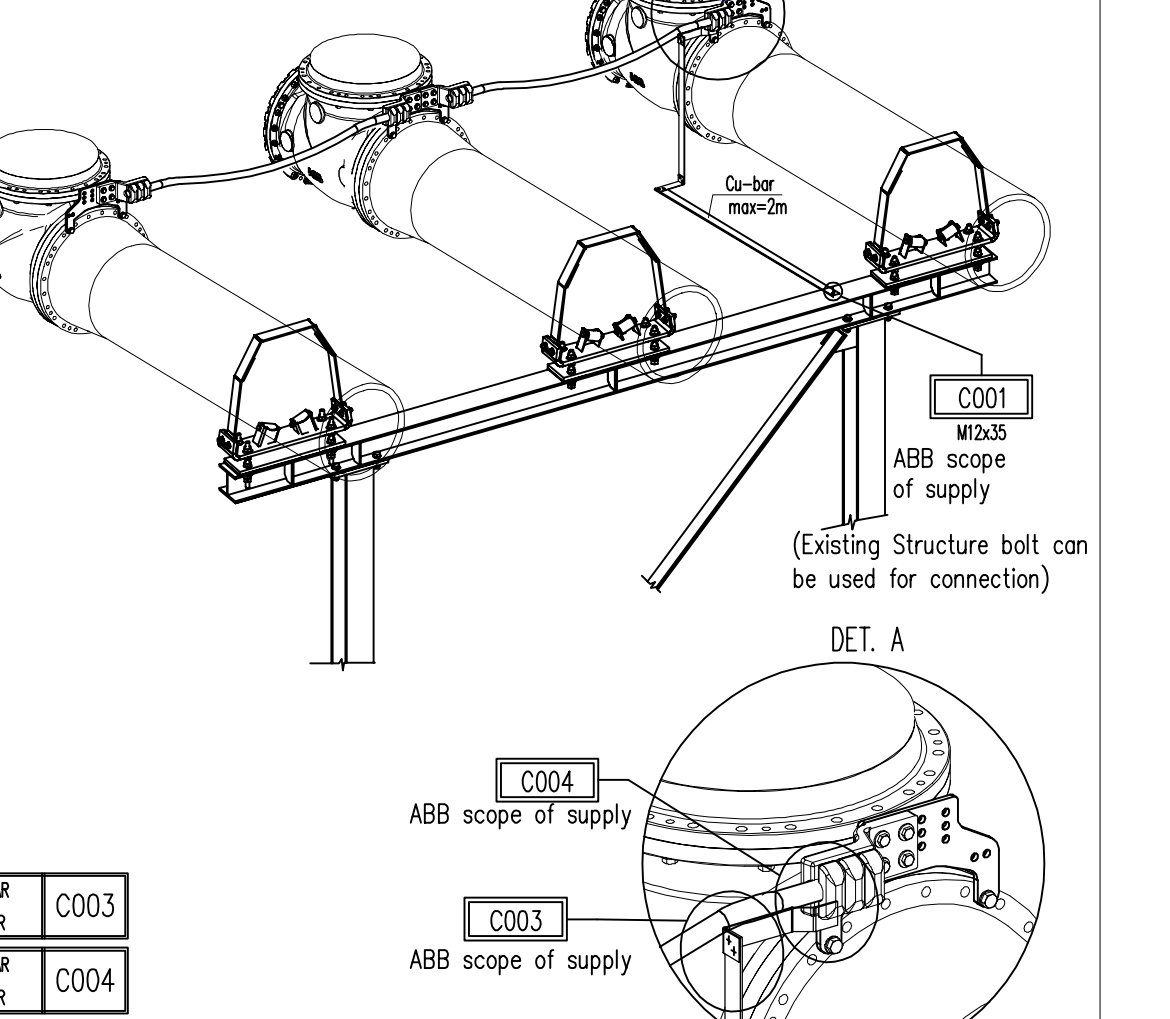


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100
2	1	CONCRETE POINT	WALL PLATE 100x100
3	1	CONCRETE POINT	WALL PLATE 100x100
4	1	CONCRETE POINT	WALL PLATE 100x100
5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

A118

RETURN CURRENT CONNECTION OF SLIDING SUPPORTS FOR THREE PHASES

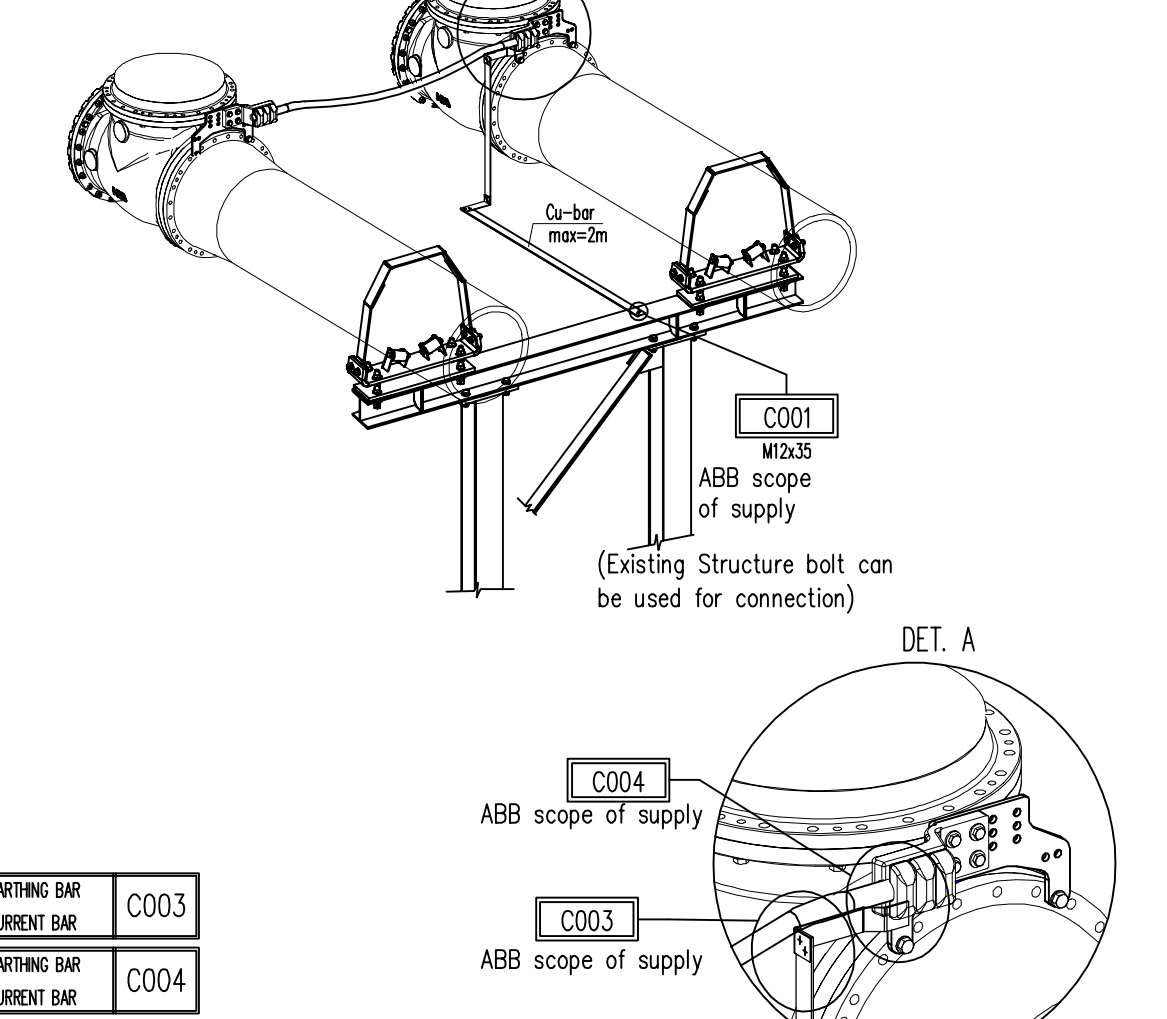


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100
2	1	CONCRETE POINT	WALL PLATE 100x100
3	1	CONCRETE POINT	WALL PLATE 100x100
4	1	CONCRETE POINT	WALL PLATE 100x100
5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

A119

RETURN CURRENT CONNECTION OF SLIDING SUPPORTS FOR TWO PHASES

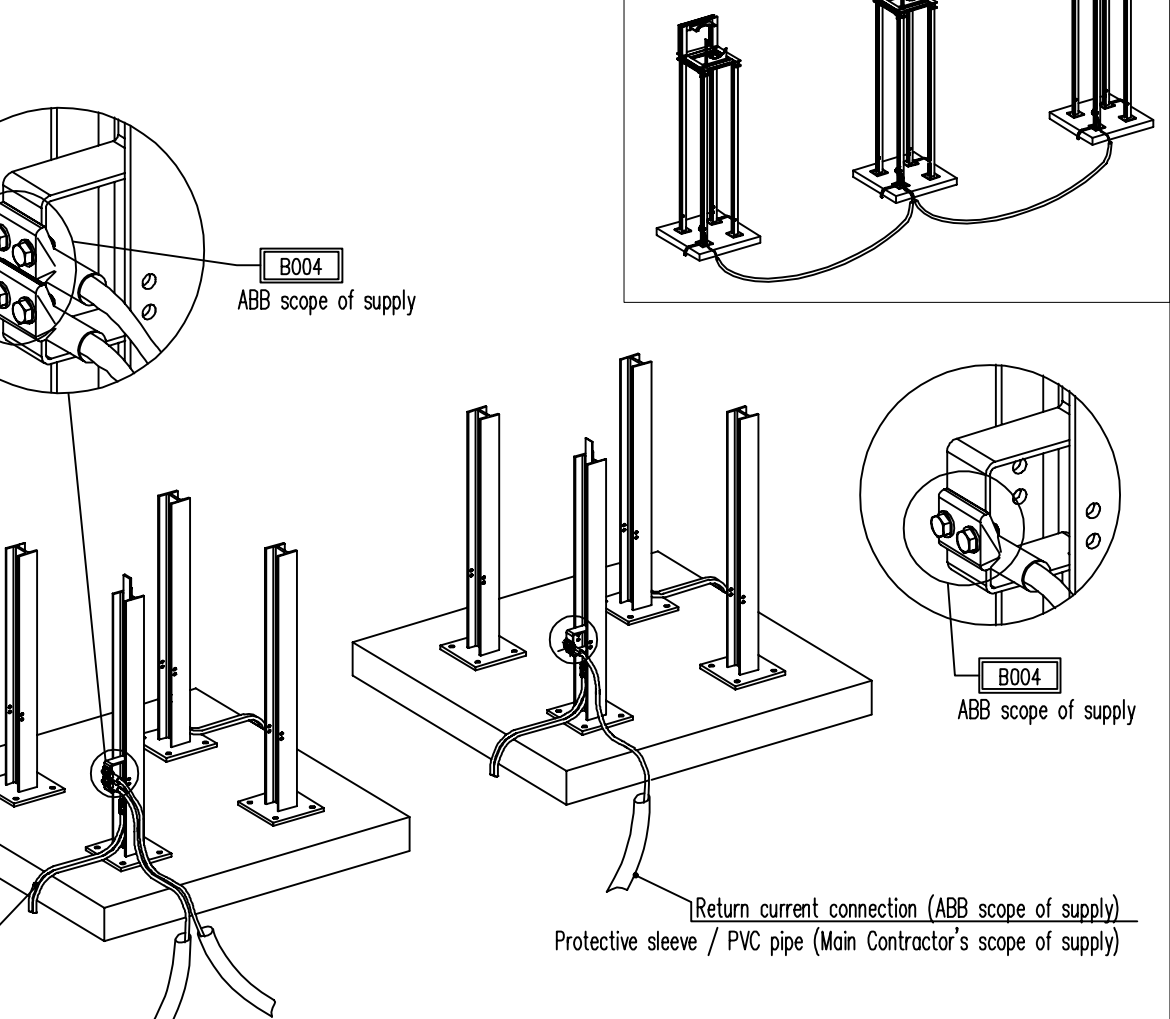


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100
2	1	CONCRETE POINT	WALL PLATE 100x100
3	1	CONCRETE POINT	WALL PLATE 100x100
4	1	CONCRETE POINT	WALL PLATE 100x100
5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

A0161

BUSHING RETURN CURRENT CONNECTION EARTHING BAR AND 2 COPPER ROPE

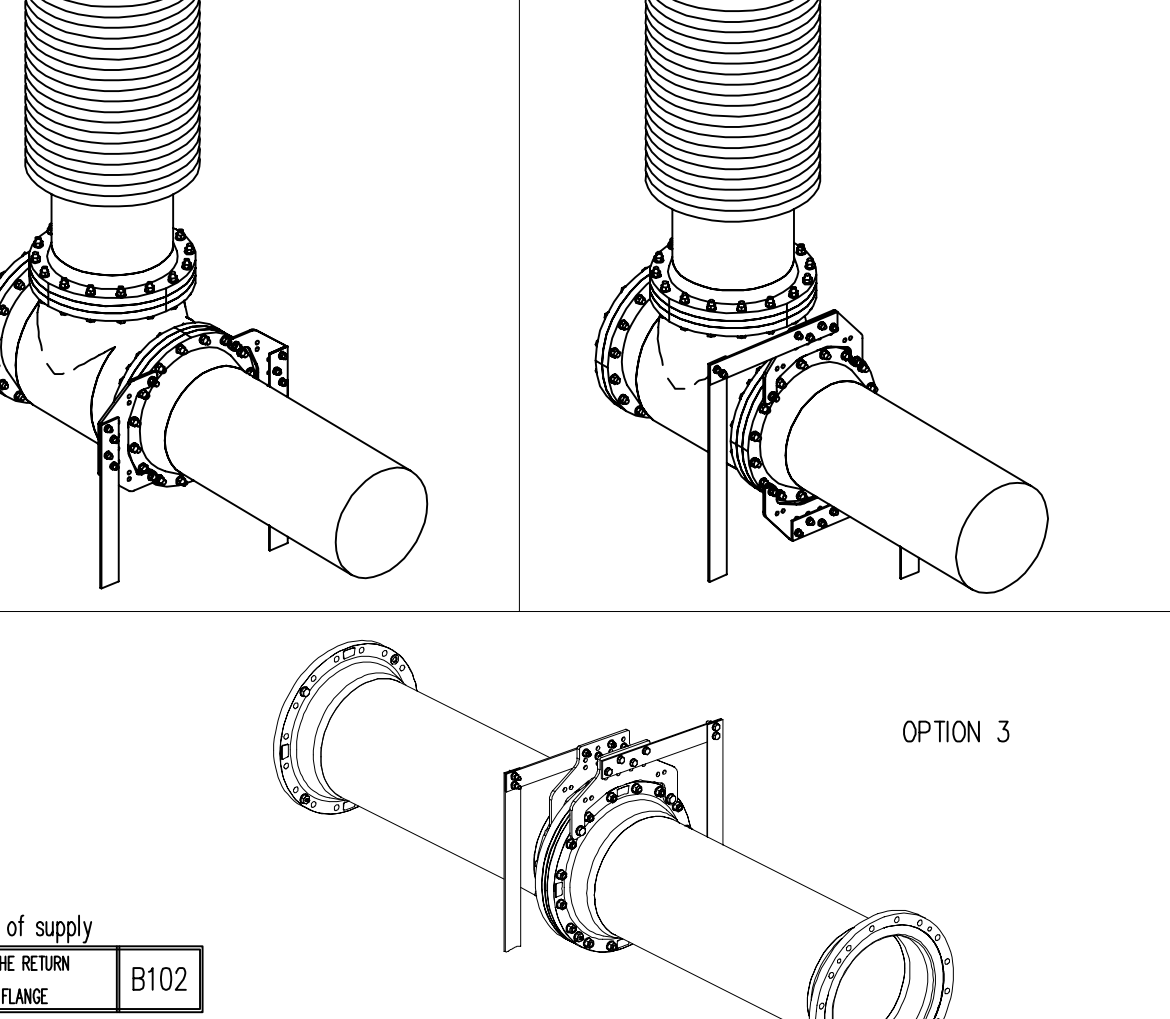


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100
2	1	CONCRETE POINT	WALL PLATE 100x100
3	1	CONCRETE POINT	WALL PLATE 100x100
4	1	CONCRETE POINT	WALL PLATE 100x100
5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

A211

RETURN CURRENT CONNECTION (DOUBLE) WITH EARTHING BAR

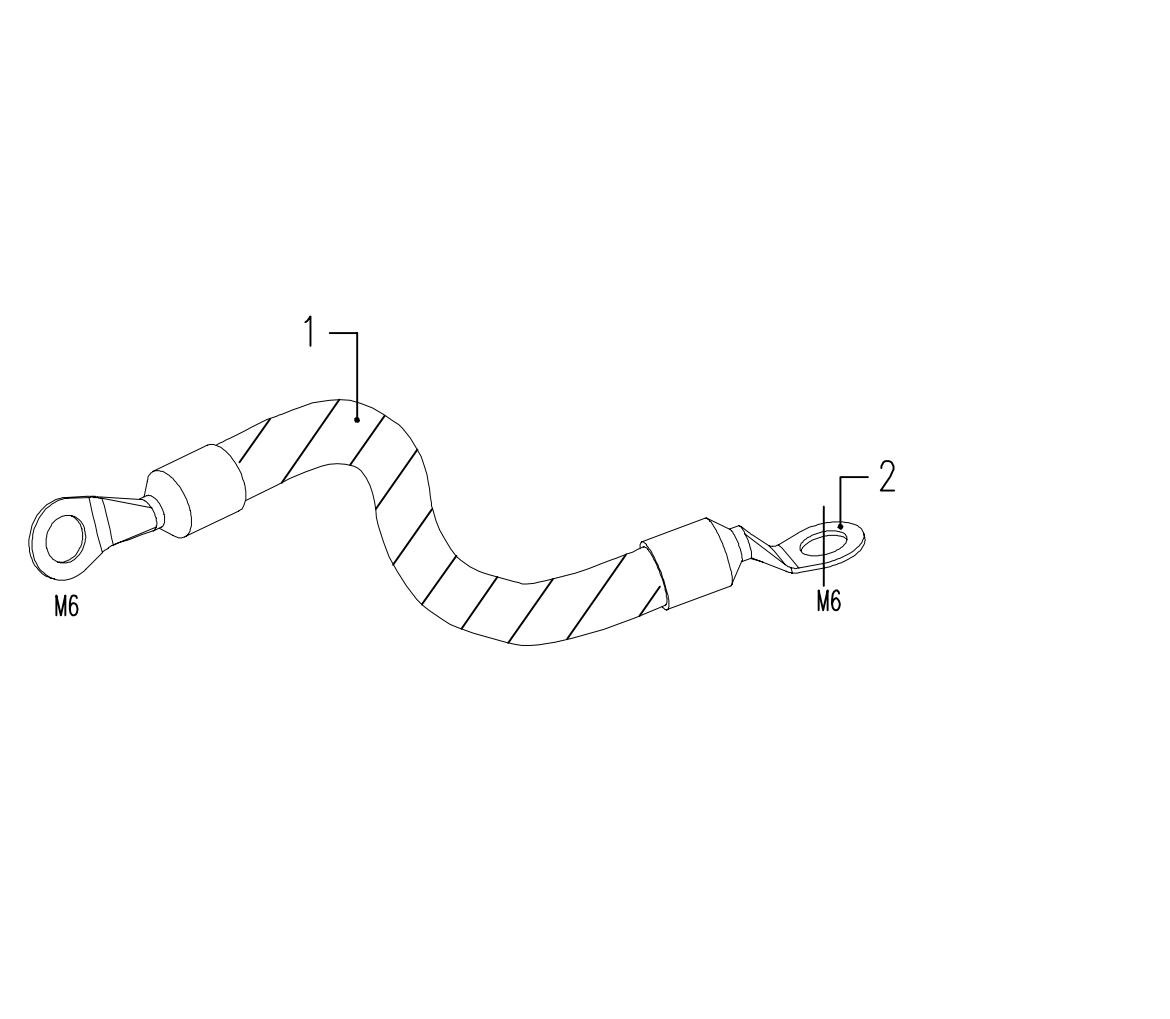


NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100
2	1	CONCRETE POINT	WALL PLATE 100x100
3	1	CONCRETE POINT	WALL PLATE 100x100
4	1	CONCRETE POINT	WALL PLATE 100x100
5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

B002

CU STRAND



NO.	QTY	IDENTIFICATION	DESCRIPTION
1	1	CONCRETE POINT	WALL PLATE 100x100
2	1	CONCRETE POINT	WALL PLATE 100x100
3	1	CONCRETE POINT	WALL PLATE 100x100
4	1	CONCRETE POINT	WALL PLATE 100x100
5	1	CONCRETE POINT	WALL PLATE 100x100

Crosssection of earthing riser according to Civil work requirement drawing

LEGEND			
▲	EARTHING POINT INDOOR		
■	EARTHING POINT OUTDOOR		
□	STRUCTURE FOOTINGS		

AC	10.06.2020	DHRUVI S	OUTDOOR SUPPORT STRUCTURE EARTHING WITH GI
AB	18.05.2020	DHRUVI S	MODIFICATIONS IN TEXT AND EARTHING BOQ ADDED
AA	14.04.2020	DHRUVI S	FIRST ISSUE
REV	DATE	NAME	MODIFICATION

CLIENT:	M/S BHARAT HEAVY ELECTRICAL LIMITED
END CUSTOMER:	UTTARAKHAND JAL VIDHYUT NIGAM LIMITED (UJVN)
PROJECT:	220 kV GIS for 2 x 60 MW VYASI HEP AT VYASI, DIST DEHRADHUN, UK
NOA No:	136/E & M DESIGN-IVy-EPC(6) (FOR SUPPLY) dt 15.04.2014 & 137/E & M DESIGN-IVy-EPC(6) (FOR SERVICES) dt 15.04.2014
BHEL Doc No:	TB-3-398-316-111

Draft:	10.06.2020	DHRUVI S	Derived from:	Separate BOM:	1:85	Doc type:	Format:
Approved:	10.06.2020	DEBASISH M	Replaces:	SF6 SWITCHGEAR ELK-14-245C			
Released:	10.06.2020	DHRUVI S	Responsible department:	220 kV GIS for 2 x 60 MW VYASI HEP.			
Order number:	3100094055		Revision:	DETAILS			
				GIS EARTHING LAYOUT			
				1HYG900036-17			

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B004

EARTHING CLAMP

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160807300 P000	120mm ² CABLE LUG
2	1	160807300 P000	240mm ² CABLE LUG

B102

ATTACHMENT OF RETURN CURRENT BAR (CU) ON GIS FLANGE

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160807300 P000	EARTHING CONNECTING PLATE

B103

ATTACHMENT OF RETURN CURRENT ALU-ROPE ON GIS FLANGE

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	4	160806220 P000	ALU TERMINAL CLAMP
2	2	160806220 P000	EARTHING CONNECTING PLATE

B104

ATTACHMENT OF RETURN CURRENT ALU-ROPE ON GIS FLANGE

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	2	160806220 P000	ALU TERMINAL CLAMP
2	2	160806220 P000	EARTHING CONNECTING PLATE

C001

SCREW CONNECTION BETWEEN COPPER BAR AND STEEL SUPPORT

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160350 P054	HEX. NUT 6.8x M12
3	2	160467 P025	SPRING WASHER 13.5/28

C001s

SCREW CONNECTION BETWEEN STEEL BAR AND STEEL SUPPORT

AC

steel

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160350 P054	HEX. NUT 6.8x M12
3	2	160467 P025	SPRING WASHER 13.5/28

C002

SCREW CONNECTION BETWEEN COPPER BARS AND STEEL SUPPORT

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160350 P054	HEX. NUT 6.8x M12
3	2	160467 P025	SPRING WASHER 13.5/28

C002s

SCREW CONNECTION BETWEEN STEEL BAR & COPPER BAR AND STEEL SUPPORT

AC

steel

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160350 P054	HEX. NUT 6.8x M12
3	2	160467 P025	SPRING WASHER 13.5/28

C003

SCREW CONNECTION BETWEEN COPPER BARS

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160350 P054	HEX. NUT 6.8x M12
3	2	160467 P025	SPRING WASHER 13.5/28

C003s

SCREW CONNECTION BETWEEN COPPER BAR & STEEL BAR

steel

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160350 P054	HEX. NUT 6.8x M12
3	2	160467 P025	SPRING WASHER 13.5/28

C004

SCREW CONNECTION BETWEEN COPPER AND ALUMINIUM BAR

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160350 P054	HEX. NUT 6.8x M12
3	2	160467 P025	SPRING WASHER 13.5/28
4	1	160467 P025	CONTACT WASHER 6.4/12

C008

SCREW CONNECTION BETWEEN AL EARTH CONNECTOR AND ALU TERMINAL CLAMP

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160350 P054	HEX. NUT 6.8x M12
3	2	160467 P025	SPRING WASHER 13.5/28

C009

SCREW CONNECTION BETWEEN CONNECTING PLATE AND GIS FLANGE

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P043	HEX. H. SCREW M12X35
2	1	160467 P025	SPRING WASHER 13.5/28

C012


SCREW CONNECTION OF CU-STRAND ON WALL/CABLE TRAY/LCC

POS.	QTY.	IDENTIFICATION	DESCRIPTION
1	1	160350 P020	HEX. H. SCREW M8X20
2	1	160350 P021	HEX. NUT 6.8x M8
3	2	160350 P027	SPRING WASHER 6.4/12

LEGEND			
	⚡	EARTHING POINT INDOOR	
	⚡	EARTHING POINT OUTDOOR	
	⚡	STRUCTURE FOOTINGS	

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Released:	10.06.2020	DHRUVI S	Responsible department:	PGHV- GIS PASS						
Order number:	3100094055		Revision:	AC						
 ABB India Ltd under license of ABB Technology Ltd					Document number:	1HYG900036-17				

ANNEXURE-1

Earthing Material BOQ for Vyasi

Sr.No.	Material Code	Description	Qty.	UoM
1	1HC6001583R0009	FLAT COPPER-ETP H K 50X6	130	M
2	1HYG490154-001	FLAT GI 75mmX12mm	20	M
3	1HC0062250P0002	AL-ROPE_MSXD SAL39.2mm/910mm ²	17	M
4	1HC0062250P0001	AL-TERMINALCLAMP	32	PC
5	NB 312352P0260	HEX-HD-SCR M6X20-A4-70	250	PC
6	NB 332600P2511	HEX NUT 0,8D M6 A4-70	200	PC
7	NB 335050P0607	WASHER:WOB 6,4/12X1,6-A2	300	PC
8	NB 312352P0413	HEX-HD-SCR M12X35-A4-70	300	PC
9	NB 312352P0414	HEX-HD-SCR M12X40-A4-70	250	PC
10	NB 312352P0416	HEX-HD-SCR M12X50-A4-70	300	PC
11	NB 332600P2514	HEX NUT 0,8D M12 A4-70	750	PC
12	NB 336407P0215	74007 TENSION WASHER	1450	PC
13	HAGS402067P0001	CONTACT WASHER AL/CU M12	50	PC
14	1HC6015433P0001	IMPACT ANCHOR TILCA N6x40 Z	80	PC
15	1HC0061926P0300	EARTHING CONNECTION PLATE ELK-14 / 300	29	PC
16	1HC6021703P0001	CRIMPING LUG 35MM ² A7-M6	110	PC
17	1HC6021704P0001	FLEX. G-ROPE 35MM ² , EPR, YELLOW-GREEN	60	M
18	1HC6018545P0001	CU-ROPE 240MM ² BLANK	30	M
19	1HC0027392P0002	240 mm ² CABLE LUG	10	PC
20	1HC6015482P0001	CLAMPING PIECE BFK 187/33	35	PC
21	1HC6015482P0002	CLAMPING PIECE BFK 166/58	15	PC