

# K.C. LTD.



<b>DRAWING TITLE</b>	<b>APPROVAL DRAWING</b>
<b>ITEM</b>	<b>IMPRESSED CURRENT CATHODIC PROTECTION (I.C.C.P) SYSTEM &amp; SHAFT EARTHING DEVICE</b>
<b>SHIPYARD</b>	<b>TAIZHOU MAPLE LEAF SHIPBUILDING CO.,LTD.</b>
<b>HULL No.</b>	<b>MLBC31800-039/040</b>
<b>VESSEL TYPE</b>	<b>31,800 DWT BULK CARRIER</b>
<b>K.C. LTD. REF. No.</b>	<b>5799</b>
<b>K.C. LTD. MODEL. No.</b>	<b>KC1T 730A</b>

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0	ORIGINALLY PREPARED	H.J.S.		NOV.18,10
REV	DESCRIPTION	DWN.	APP.	DATE

## K.C. LTD.

1589-6, Songjung-dong, Kangsu-ku,  
Busan 618-818, Korea

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FOR  
(1)ITS REPRODUCTION BY ANY MEANS,  
(2)ITS DISCLOSURE TO A THIRD PARTY,  
(3)ITS USE FOR ANY PURPOSE OTHER THAN

THOSE FOR WHICH IT IS SUPPLIED

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# K.C. LTD.

SPECIFICATION & SCOPE OF SUPPLY	
SHIPYARD	TAIZHOU MAPLE LEAF SHIPBUILDING CO., LTD.
PROJECT No	MLBC31800-039/040

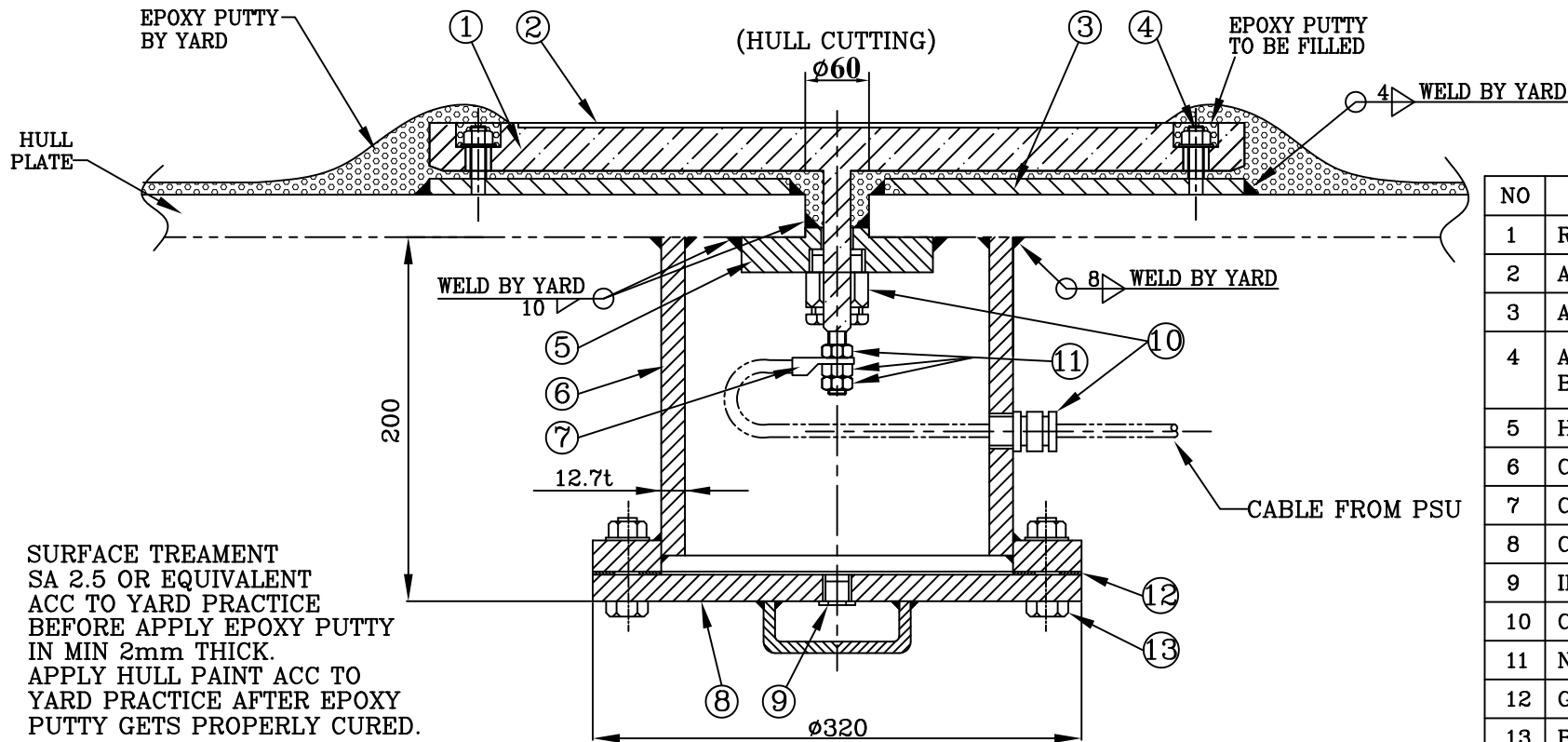
DESIGN BASE	1. TOTAL WETTED SURFACE AREA : - HULL : 7,462 m <sup>2</sup>
	2. TOTAL SYSTEM REQUIRED : - HULL : $7,462 \text{ m}^2 \times 35 \text{ mA/m}^2$ (mean current density) = 261.17 Amp TOTAL 261.17 Amp
	TOTAL SYSTEM PROVIDED BY K.C. LTD. : 300Amp

QUANTITY	DESCRIPTION FOR SYSTEM :
ONE(1)	300 AMPERE KC1T 730A POWER SUPPLY CONTROL UNIT : INPUT : 440V/60HZ/1PH OUTPUT : 300A/24V DC PAINTED : RAL 7032 SUPPLIED COMPLETE WITH EARTHING CABLE
TWO (2)	150 AMPERE MMO/Ti CIRCULAR ANODE ASSEMBLY EACH COMPLETE WITH : EPOXY PUTTY FOR DI-ELECTRIC SHIELD ANODE FIXING PLATE HULL BOSS COFFERDAM CABLE GLANDS
TWO (2)	PURITY ZINC REFERENCE ELECTRODE CELL ASSEMBLY EACH COMPLETE WITH : COFFERDAM CABLE GLAND

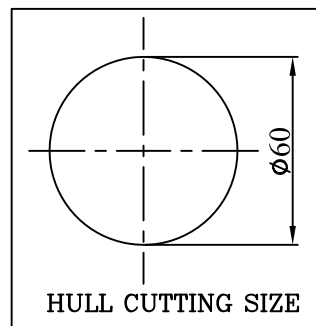
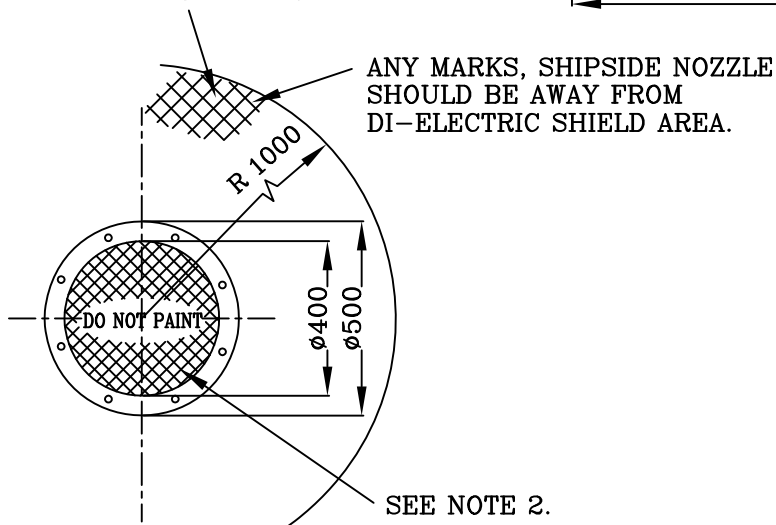
# K.C. LTD.

SPECIFICATION & SCOPE OF SUPPLY	
SHIPYARD	TAIZHOU MAPLE LEAF SHIPBUILDING CO., LTD.
PROJECT No	MLBC31800-039/040

QUANTITY	DESCRIPTION FOR ASSOCIATED EQUIPMENT
ONE (1)	EPOXY PUTTY FOR MOUNTING ANODES AND FILLING IN COFFERDAM OF REF ELECTRODE CELL
ONE (1)	SHAFT GROUNDING DEVICE CONSISTING OF SLIP RING, BRUSH(SILVER GRAPHITE), mV METER(0~150mV) WITH GLAND, BRUSH HOLDER, GROUNDING CABLE AND BAND
ONE (1)	RUDDER STOCK BONDING CABLE
ONE (1)	SYSTEM SPARES WITH BOX
ONE (1)	SYSTEM LOG SHEET
SIX (6)	OPERATION / INSTRUCTION MANUALS IN ENGLISH



SURFACE TREATMENT  
SA 2.5 OR EQUIVALENT  
ACC TO YARD PRACTICE  
BEFORE APPLY EPOXY PUTTY  
IN MIN 2mm THICK.  
APPLY HULL PAINT ACC TO  
YARD PRACTICE AFTER EPOXY  
PUTTY GETS PROPERLY CURED.



NO	DESCRIPTION
1	RESIN BLOCK
2	ANODE FACE (KEEP CLEAN)
3	ANODE FIXING PLATE - SEE NOTE 1
4	ANODE FIXING BOLT/NUT/WASHER (M10)
5	HULL BOSS
6	COFFERDAM
7	CABLE TERMINAL
8	COFFERDAM COVER
9	INSPECTION PLUG (PF 1/2")
10	CABLE GLAND
11	NUT (M12)
12	GASKET
13	BOLT/NUT/WASHER (M20 X 8)
WEIGHT OF COFFERDAM : 31 Kg	
WEIGHT OF ANODE : 12.6 Kg	

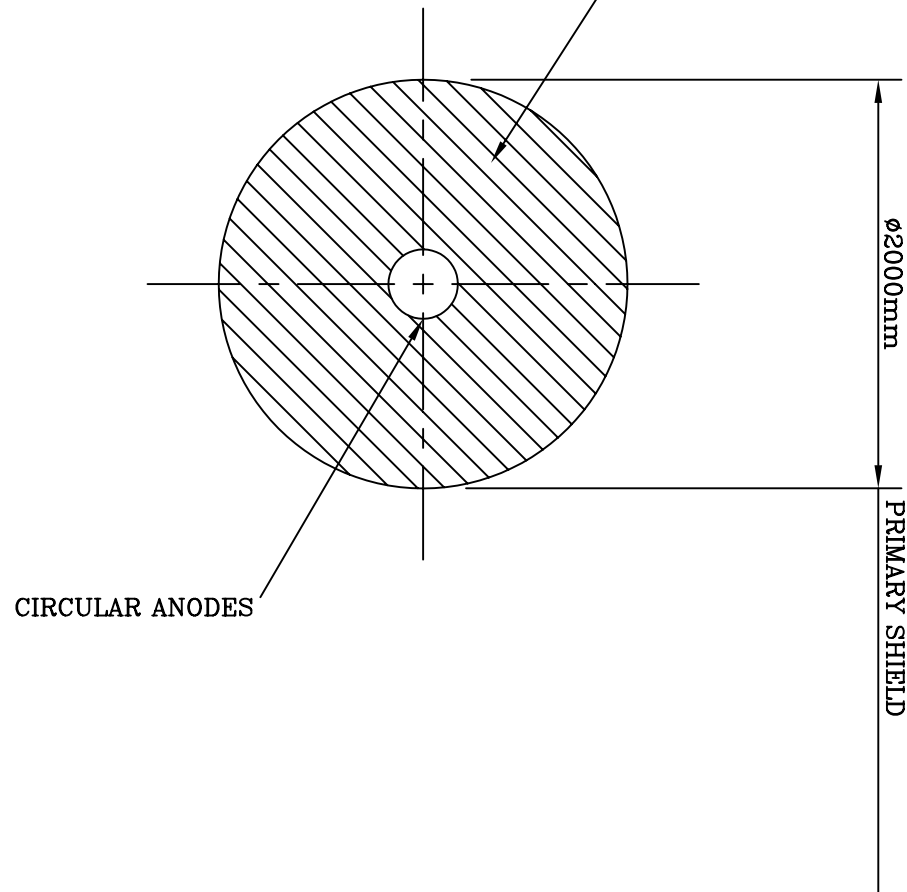
**NOTE :**

1. WELD ANODE FIXING PLATE USING FILLER PLATES OR WELD BUILD-UP IF NECESSARY AT ANY UNEVEN POINTS/PLACES.
2. ANODE FACE TO BE KEPT FREE FROM PAINT OR GREASE.

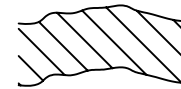
<b>K.C. LTD.</b>			
1589-6, SONGJUNG-DONG, KANGSU-KU, BUSAN 618-270, KOREA			
TEL: +82 51 831 7720 FAX: +82 51 831 7726			
TITLE			
GENERAL ARRANGEMENT OF CIRCULAR ANODE ASSEMBLY			
REF.	DATE	SCALE	
	AUG.10.04	N.S	
DWN.	SYH	CHD.	SCO
	APP.	SHJ	DRG NO
			IACR14

0	AUG.10.04	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		

NOTE : GRITBLAST ENTIRE AREA TO  
S.A. 2.5 BEFORE APPLICATION  
OF EPOXY PUTTY



KEY TO EPOXY PUTTY AREAS:

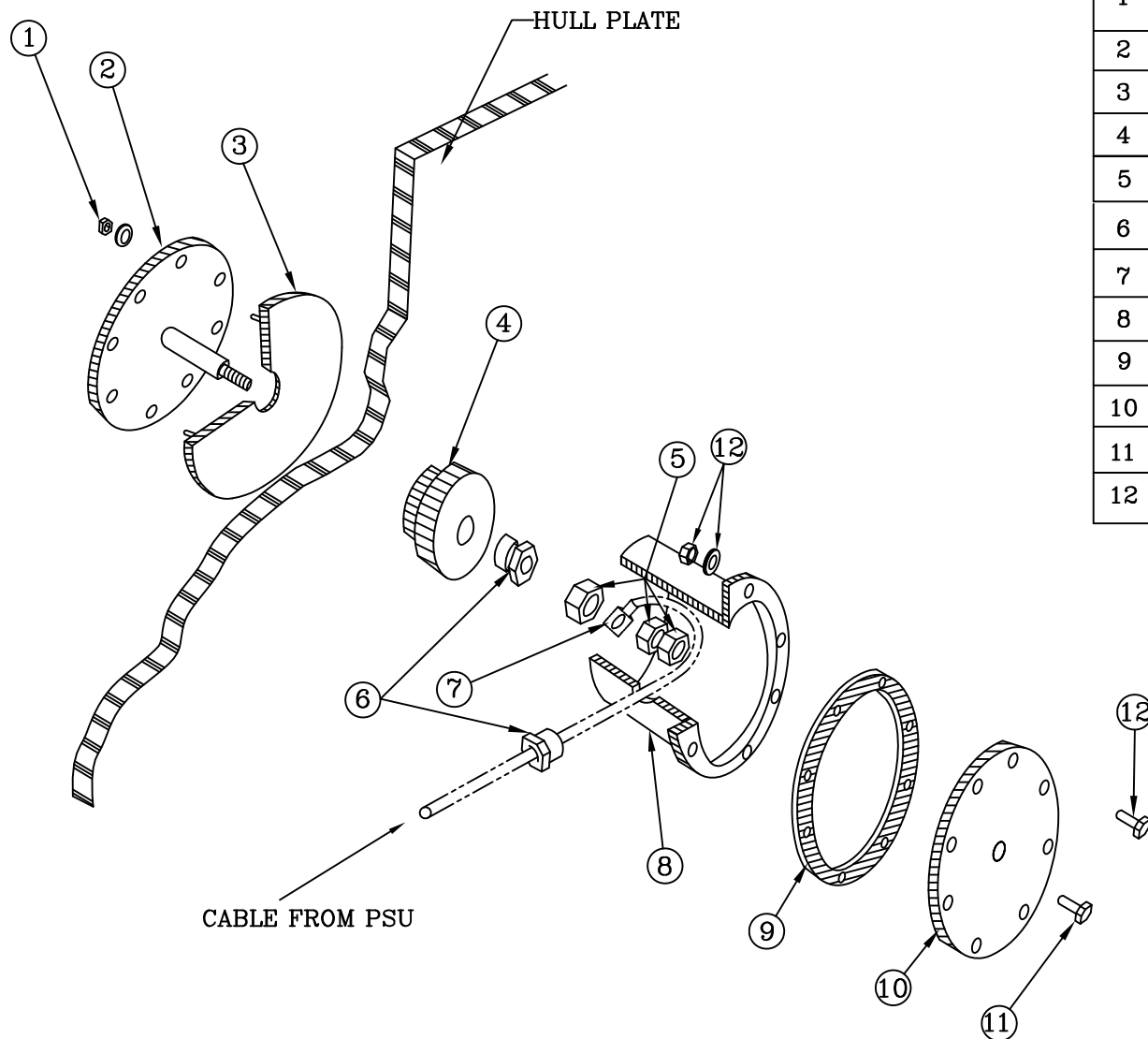


AREAS OF  
DI-ELECTRIC SHIELD EPOXY PUTTY.  
COATING TO RUN 2.0mm THICK  
IN AREA SHOWN.

\* REMARK : AFTER FULL DRY OF EPOXY PUTTY  
(DI-ELECTRIC SHIELD) YARD TO  
PAINT WHOLE DI-ELECTRIC SHIELD  
ACC TO YARD'S STANDARD A/F  
PAINTING BUT KEEP ANODE  
UNPAINTED.

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<b>TITLE</b> DI-ELECTRIC SHIELD AREAS FOR CIRCULAR ANODES			
REF.	DATE	SCALE	
	FEB.24,98	N.S	
DWN.	CHD.	APP.	DRG NO
HCK	SCO	SHJ	C1196-2

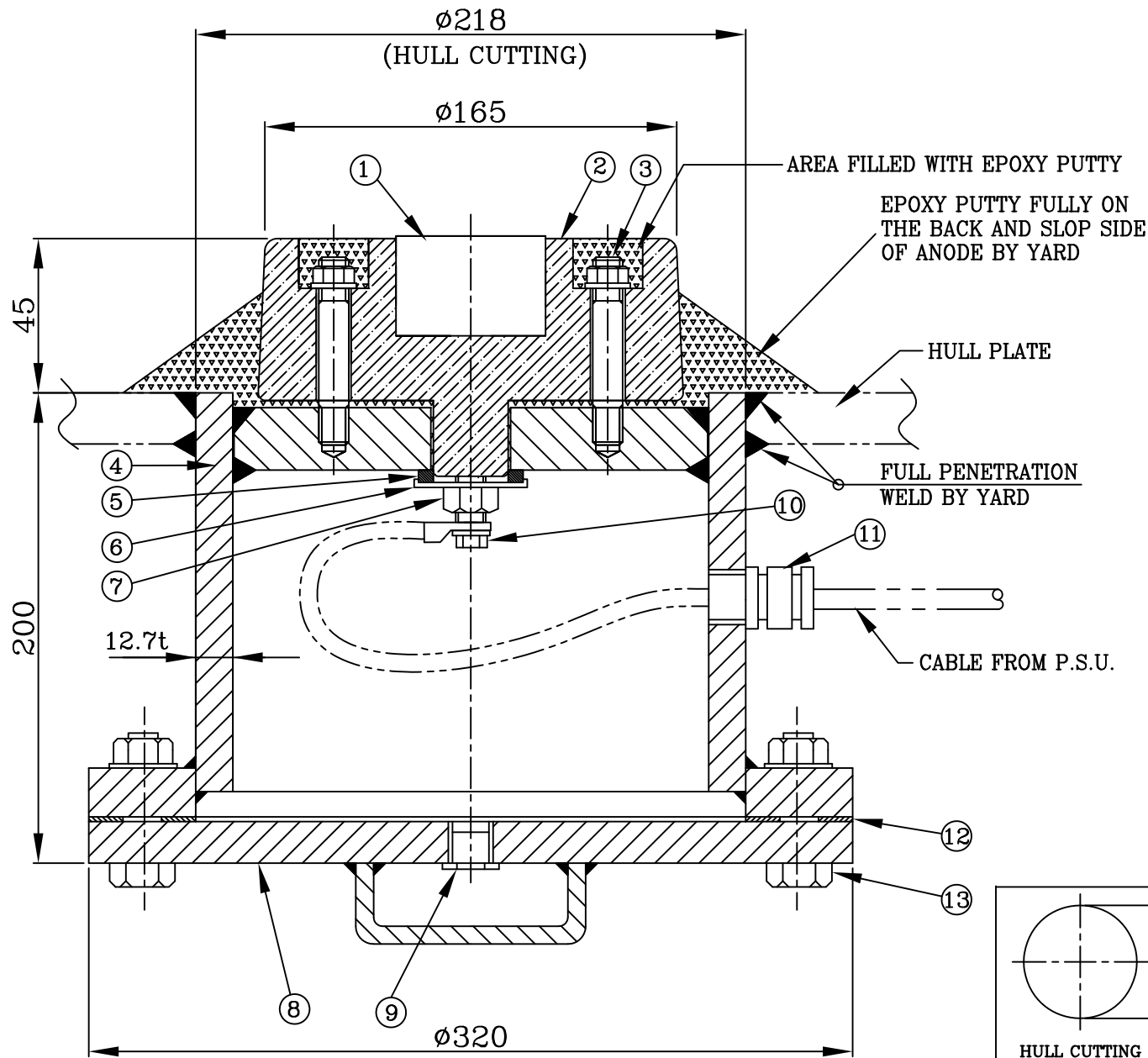
0	FEB.24,98	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		



No	DESCRIPTION	MATERIAL	Q'TY
1	M10 NUT & WASHER FOR ANODE TO ANODE FIXING PLATE ASSEMBLY	STAINLESS STEEL	8
2	ANODE ASSEMBLY	MMO/Ti & RESIN	1
3	ANODE FIXING PLATE	STEEL	1
4	HULL BOSS	STEEL	1
5	NUT (M12)	STAINLESS STEEL	3
6	CABLE GLAND	BRASS	2
7	CABLE TERMINAL	STEEL	1
8	COFFERDAM (200A)	STEEL	1
9	GASKET	RUBBER	1
10	COFFERDAM COVER	STEEL	1
11	INSPECTION PLUG (PF 1/2")	GAL.SS	1
12	BOLT, NUT & WASHER (M20)	HOT DIP GAL.SS	8

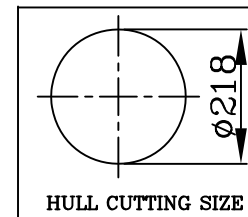
<b>K.C. LTD.</b> 1589-6, SONGJUNG-DONG, KANGSU-KU, BUSAN 618-270, KOREA TEL: +82 51 831 7720 FAX: +82 51 831 7726			
TITLE EXPLODED DIAGRAM OF CIRCULAR ANODE INSTALLATION			
REF.	DATE	SCALE	
	AUG.10,04	N.S	
DWN.	CHD.	APP.	DRG NO
SYH	SCO	SHJ	IACRD14

0	AUG.10,04	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		



NO	DESCRIPTION
1	ZINC REFERENCE CELL BLOCK
2	RESIN BLOCK
3	REF.CELL FIXING BOLT, NUT & WASHER
4	COFFERDAM
5	GASKET
6	WASHER
7	NUT (M12)
8	COFFERDAM COVER
9	INSPECTION PLUG (PF 1/2")
10	CABLE FIXING BOLT, WASHER
11	CABLE GLAND
12	COFFERDAM GASKET
13	BOLT/NUT/WASHER (M20×8)
ASSEMBLY WEIGHT : 42Kg	

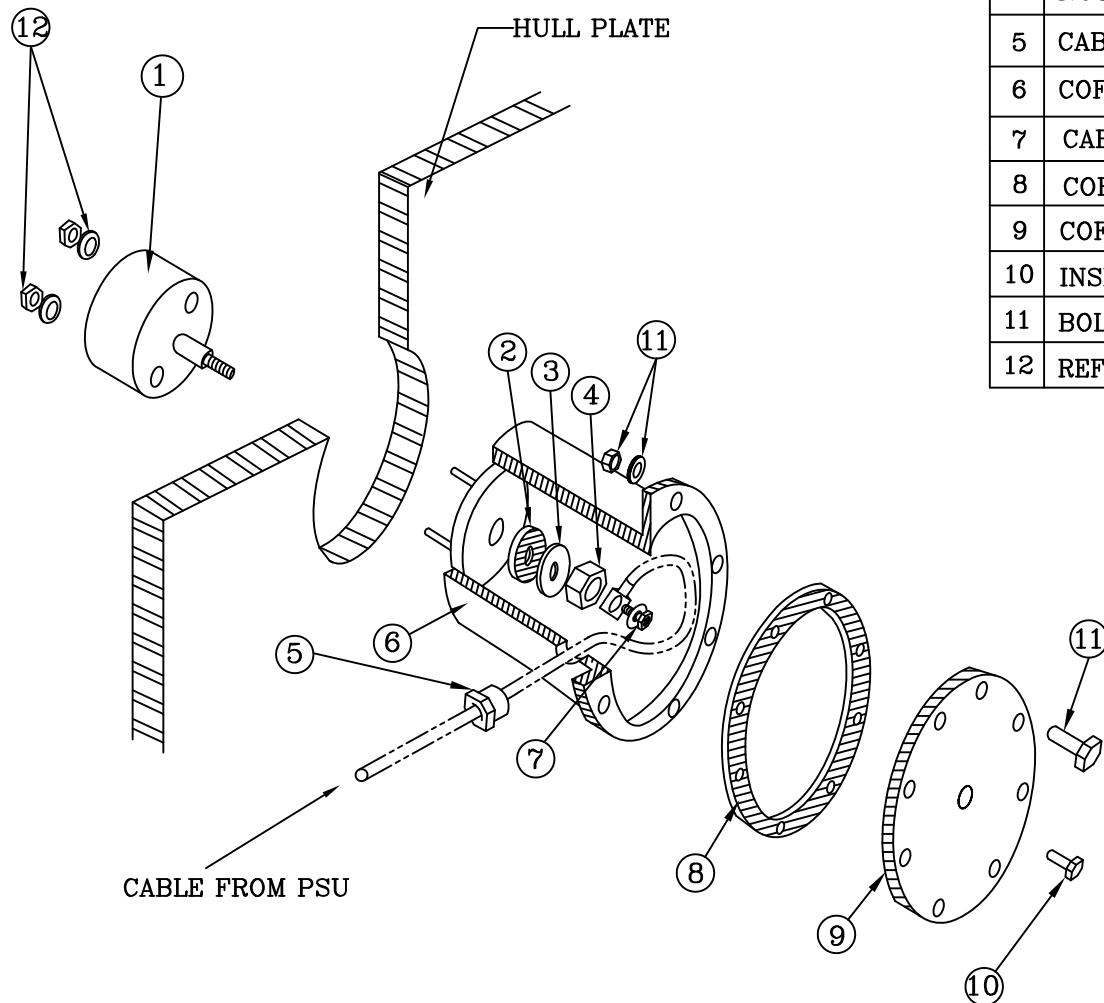
**NOTE:** REFERENCE ELECTROD CELL  
BLOCK FACE TO BE KEPT FREE  
FROM PAINT OR GREASE



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TITLE GENERAL ARRANGEMENT OF REF ELECTRODE CELL ASSEMBLY			
REF.	DATE	JAN.05,09	SCALE N.S
DWN. SYH	CHD.	SCO	APP. SCO
DRG NO IREA21-2			

0	JAN.05,09	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		

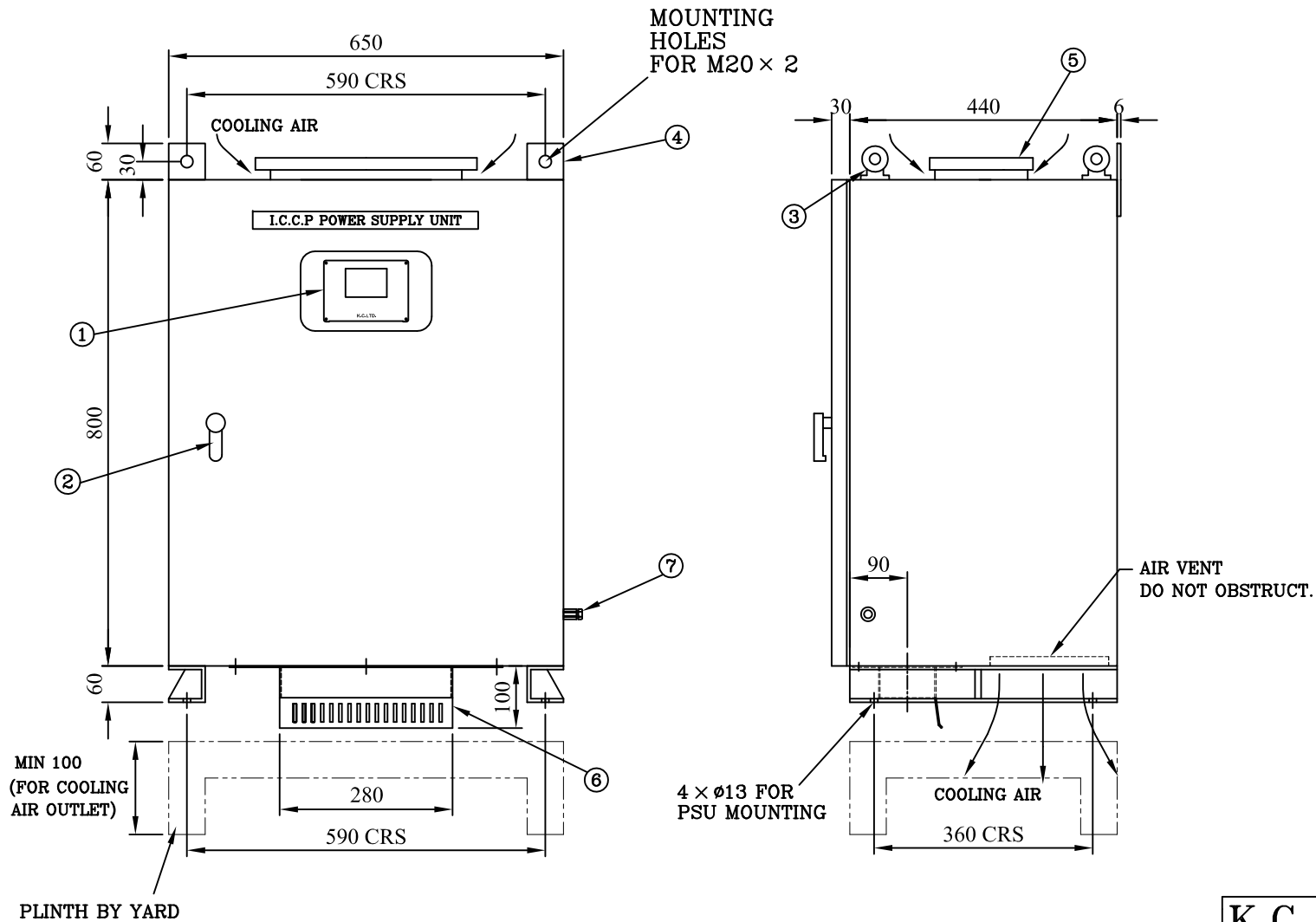




No	DESCRIPTION	MAT'L	Q'TY
1	REFERENCE ELECTRODE CELL	ZINC/RESIN	1
2	GASKET	SILICONE	1
3	WASHER	PVC	1
4	NUT (M12)	STAINLESS STEEL	1
5	CABLE GLAND	BRASS	1
6	COFFERDAM	STEEL	1
7	CABLE FIXING BOLT, WASHER	STEEL	1
8	COFFERDAM GASKET	RUBBER	1
9	COFFERDAM COVER	STEEL	1
10	INSPECTION PLUG (PF 1/2")	GAL.SS	1
11	BOLT, NUT & WASHER (M20)	HOT DIP GAL.SS	8
12	REF.CELL FIXING NUT & WASHER (M12)	STAINLESS STEEL	2

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TITLE EXPLODED DIAGRAM OF REFERENCE ELECTRODE CELL INSTALLATION			
REF.	DATE	SCALE	
	AUG.25,05	N.S	
DWN. SYH	CHD. SCO	APP. SHJ	DRG NO IREDA21

0	AUG.25,05	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		



NO	DESCRIPTION
1	TOUCH SCREEN COMPUTER CONTROLLER
2	DOOR LOCKER
3	LIFTING LUG
4	MOUNTING BAR
5	AIR VENT
6	CABLE COAMING PLATE
7	EARTHING BOLT

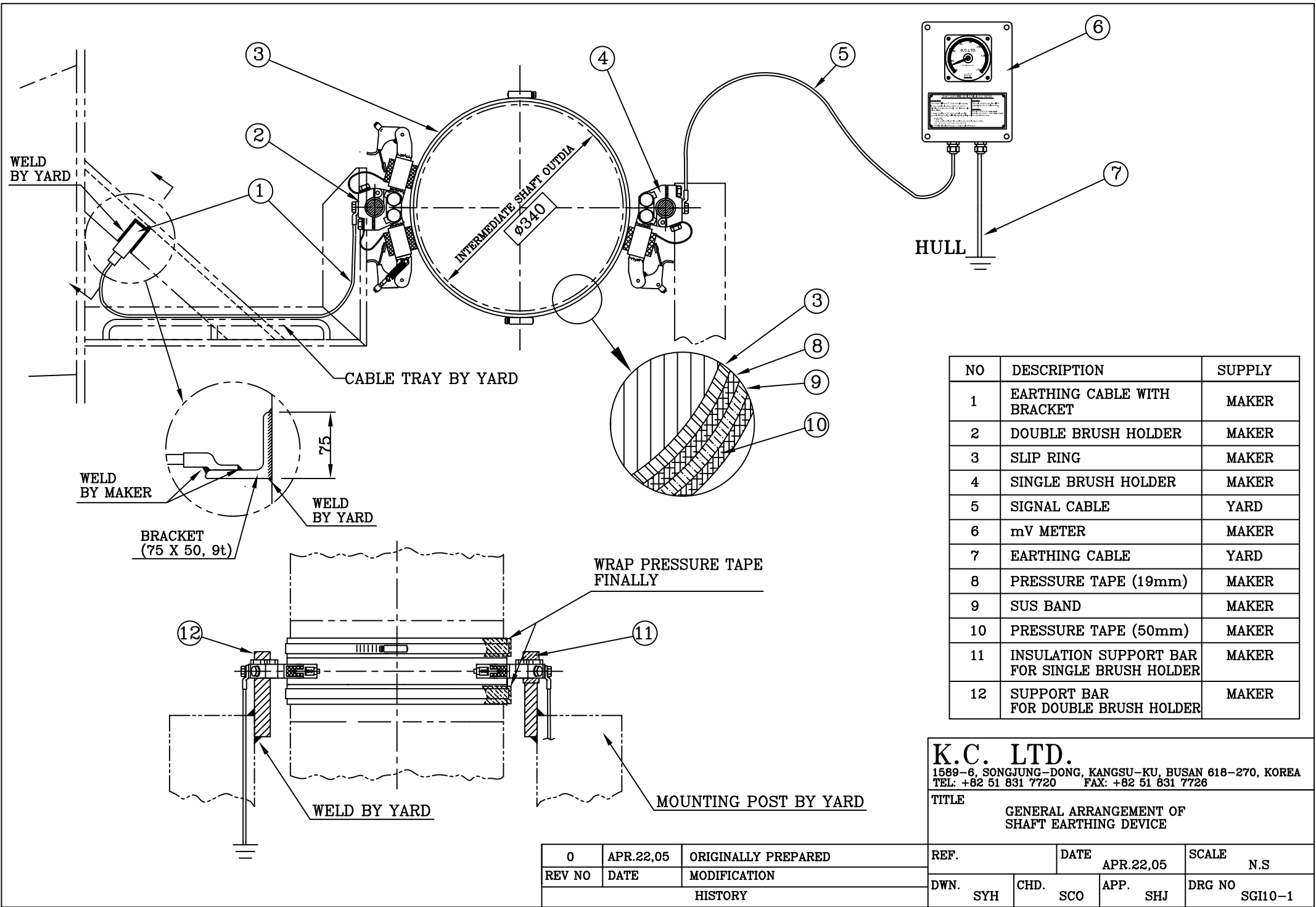
SPECIFICATION	
TYPE	KC1T 730A
PSU CAPA	300 AMP
POWER SOURCE	440V AC 60HZ/1PH
POWER CONSUMPTION	9 KW
MAXIMUM WEIGHT	210 KG
PAINTING COLOR	RAL 7032
ENCLOSURE SPEC	IP 44
RATED CURRENT	MAX 20.45 AMP

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TITLE			
POWER SUPPLY UNIT DETAILS			
REF.	DATE	SCALE	
	DEC.08,09	N.S	
DWN.	CHD.	APP.	DRG NO
SYH	SCO	SCO	IPSU7301PA

0	DEC.08,09	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		

# K.C. LTD.

SPECIFICATION & SCOPE FOR Shaft Grounding Device		
SHIPYARD		TAIZHOU MAPLE LEAF SHIPBUILDING CO.,LTD.
SHAFT OUT DIAMETER		Ø 340
TOTAL WEIGHT		APPROX. 11.0 kgs
NO OFF	PART NO	DESCRIPTION
1	KCS0044	MILLI-VOLT METER WITH CABLE GLANDS
1	KCS005	SILVER ALLOY SLIP-RING
1	KCS0032	SHAFT EARTHING DOUBLE BRUSH HOLDER
1	KCS0022	SHAFT MONITORING SINGLE BRUSH HOLDER
1	KCS009	BRUSH HOLDER SUPPORT BAR
1	KCS010	INSULATED BRUSH HOLDER SUPPORT BAR
3	KCS0014	HIGH DENSITY SILVER GRAPHITE BRUSH
1	KCS006	1.5m × 50mm <sup>2</sup> SHAFT EARTH CABLE
2	KCS011	STAINLESS STEEL BAND
1	KCS0151	PRESSURE TAPE (50mm)
1	KCS015	PRESSURE TAPE (19mm)



NO	DESCRIPTION	SUPPLY
1	EARTHING CABLE WITH BRACKET	MAKER
2	DOUBLE BRUSH HOLDER	MAKER
3	SLIP RING	MAKER
4	SINGLE BRUSH HOLDER	MAKER
5	SIGNAL CABLE	YARD
6	mV METER	MAKER
7	EARTHING CABLE	YARD
8	PRESSURE TAPE (19mm)	MAKER
9	SUS BAND	MAKER
10	PRESSURE TAPE (50mm)	MAKER
11	INSULATION SUPPORT BAR FOR SINGLE BRUSH HOLDER	MAKER
12	SUPPORT BAR FOR DOUBLE BRUSH HOLDER	MAKER

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1589-6, SONGJUNG-DONG, KANGSU-KU, BUSAN 618-270, KOREA  
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TITLE  
GENERAL ARRANGEMENT OF  
SHAFT EARTHING DEVICE

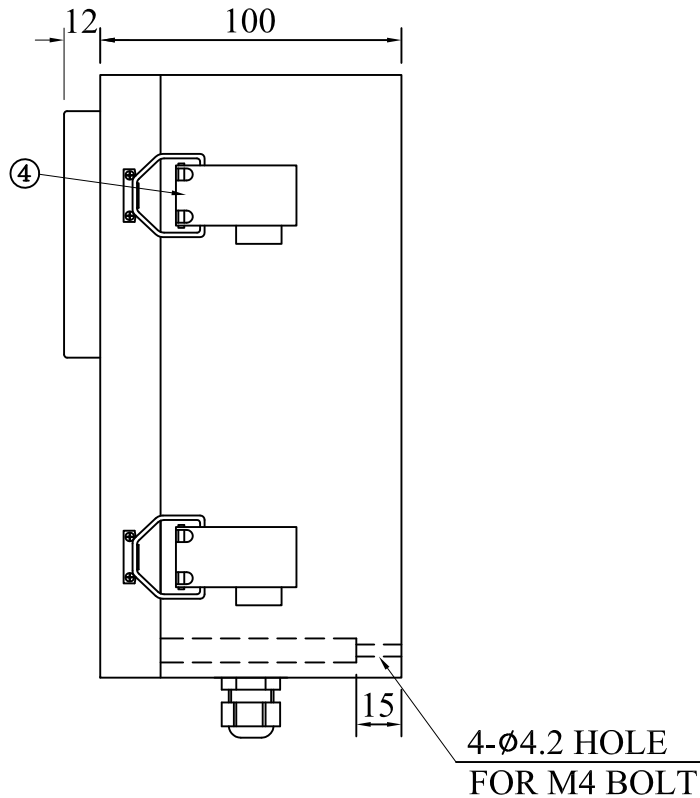
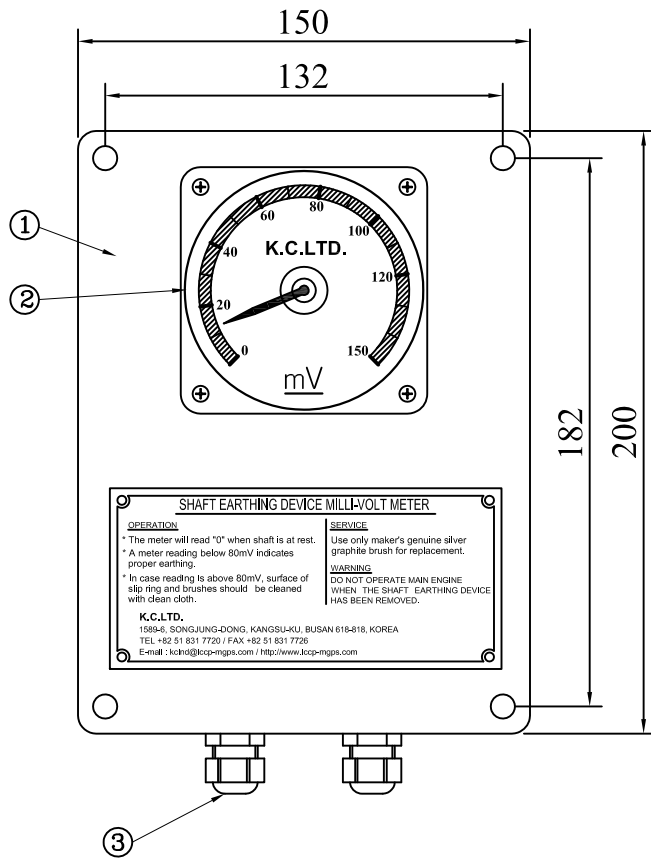
REF.      DATE  
APR.22,05

SCALE  
N.S

DWN.      CHD.      APP.  
SYH      SCO      SHJ

DRG NO  
SG110-1

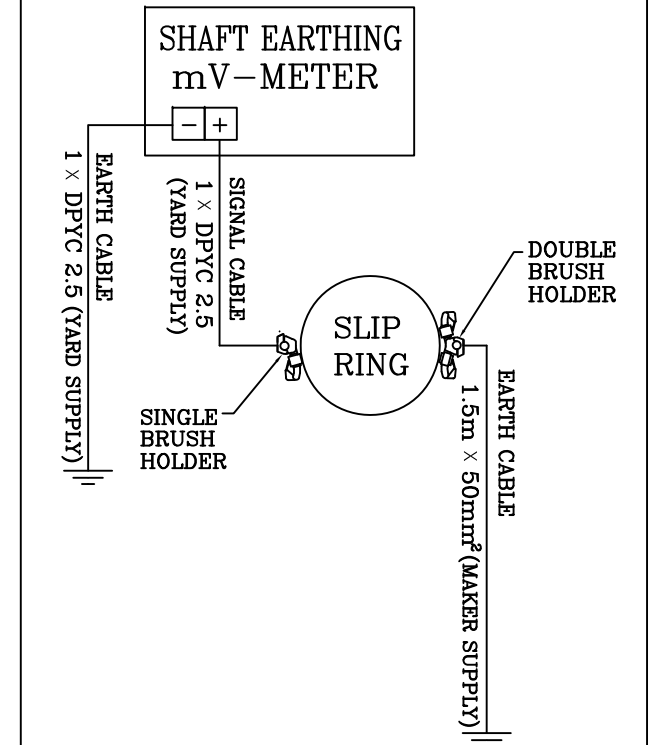
0	APR.22,05	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		



NO	DESCRIPTION
1	MV METER BODY
2	MV METER GAUGE 0~ 80 mV : GREEN COLOR 80~150 mV : RED COLOR
3	CABLE GLAND
4	DOOR LOCK

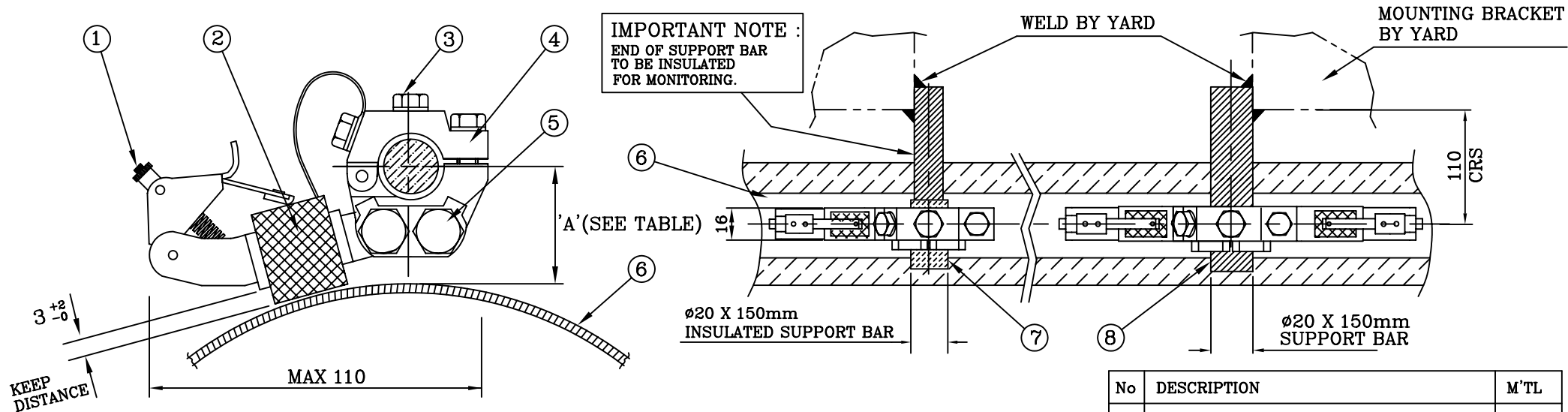
NOTE	
1. ENCLOSURE SPEC	I.P 44
2. WEIGHT	2 KGS

0	MAR.14.05	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		

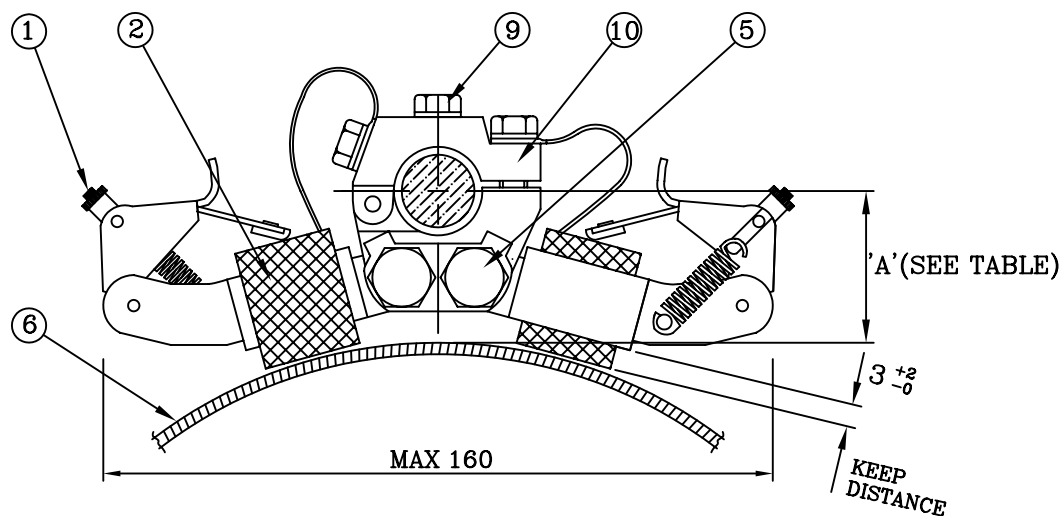


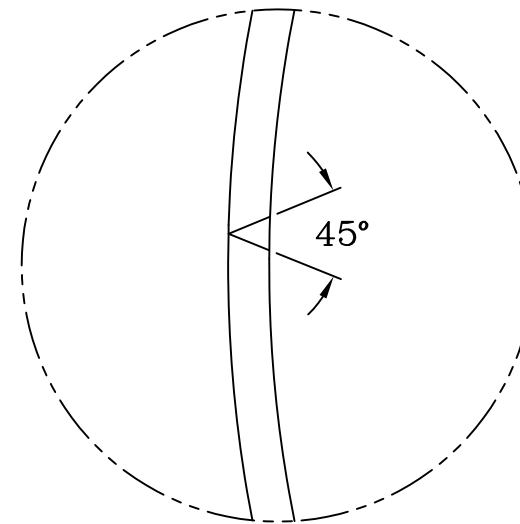
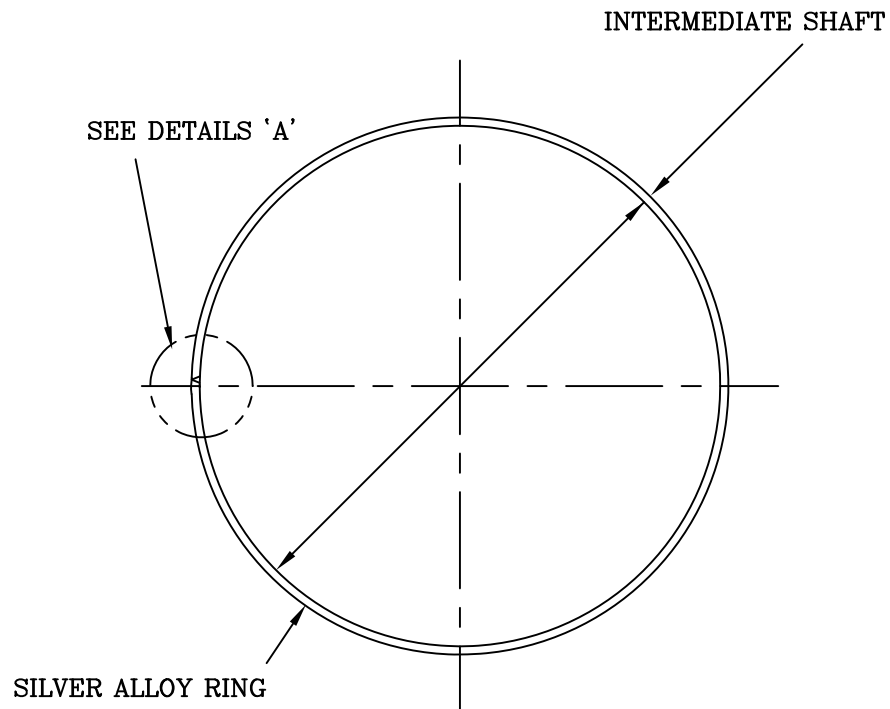
# SYSTEM WIRING & TERMINAL DETAILS

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TITLE SHAFT EARTHING MILLIVOLT METER			
REF.	DATE MAR.14.05	SCALE N.S	
DWN. SYH	CHD. SCO	APP. SHJ	DRG NO SSM04-1



SINGLE BRUSH HOLDER  
FOR MONITORING

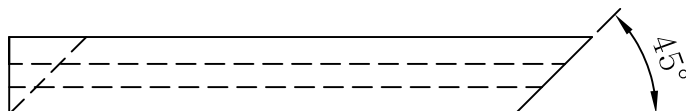




DETAILS OF 'A'

NOTES :

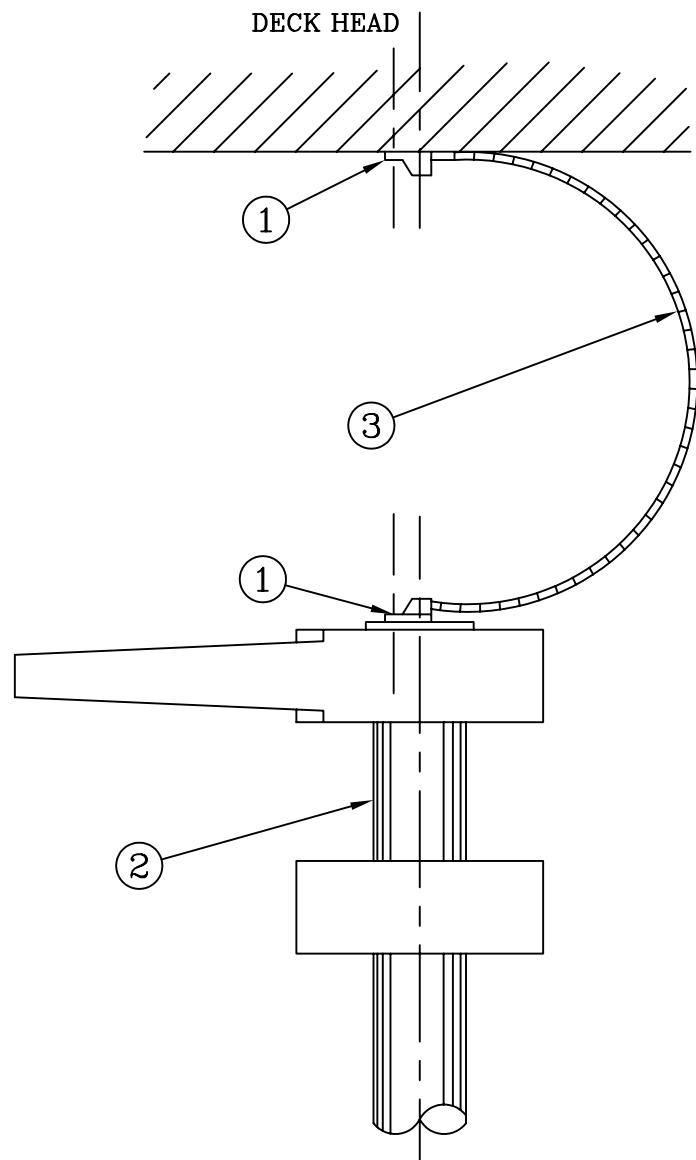
1. CLIENT TO BAND SLIP RING AND CUT WITH 45° CUT END.
2. ANY PROTRUSION AFTER BENDING FIRMLY TO BE RUBBED BY EMERY PAPER



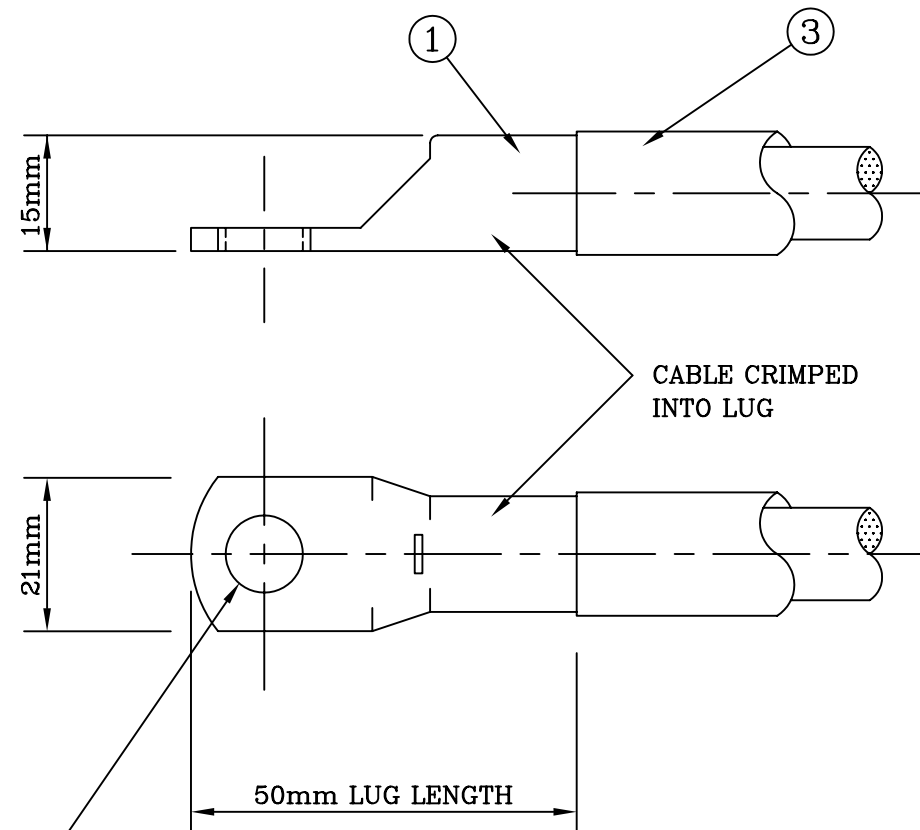
CUT OF SLIP RING

1	OCT.29,03	REVISED
0	JAN.15,03	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		

<b>K.C. LTD.</b> 1589-6, SONGJUNG-DONG, KANGSU-KU, BUSAN 618-270, KOREA TEL: +82 51 831 7720 FAX: +82 51 831 7726			
TITLE			
SHAFT SLIP RING			
REF.	DATE	SCALE	N.S
DWN. HYL	CHD. SCO	APP. SCO	DRG NO SSR05-1



### RUDDER STOCK BONDING ARRANGEMENT



Ø13 FOR M10 BOLT  
WELD OR BOLT LUG IN POSITION  
BY YARD

NO	DESCRIPTION
1	CABLE LUG
2	RUDDER STOCK
3	70mm <sup>2</sup> CORE CABLE x 2m

**K.C. LTD.**  
1589-6, SONGJUNG-DONG, KANGSU-KU, BUSAN 618-270, KOREA  
TEL: +82 51 831 7720 FAX: +82 51 831 7726

TITLE
GROUND ARRANGEMENT FOR RUDDER STOCK

0	JUL10,92	ORIGINALLY PREPARED	REF.		DATE JUL10,92		SCALE N.S	
REV NO	DATE	MODIFICATION	DWN.		CHD.		DRG NO	
HISTORY			HCK		SCO		RSC01	
					APP. SHJ			



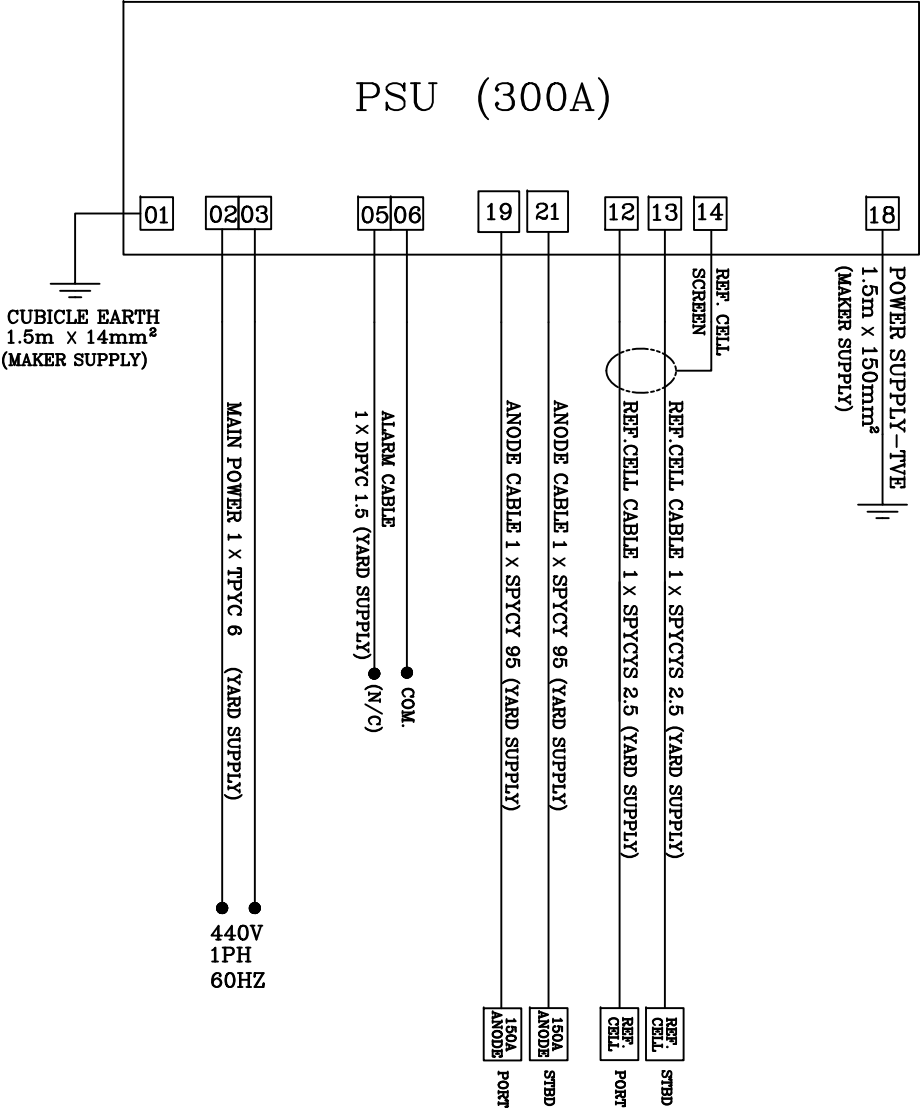
The diagram shows a central component labeled "300A POWER SUPPLY UNIT" represented by a rectangle with a diagonal line. It has four terminals. The top-left terminal is connected to a "REF.CELL" (represented by a small black circle) and is labeled "PORT". The top-right terminal is connected to a "150A ANODE" (represented by a large black circle). The bottom-left terminal is connected to a "REF.CELL" and is labeled "STBD". The bottom-right terminal is connected to a "150A ANODE".

1. DISTANCE BETWEEN ANODE EDGE AND REF.CELL TO BE MIN 8000mm.
2. REF.CELL TO BE MIN 3000mm AWAY FROM SEA CHESTS AND/OR ANY DISSIMILAR MT'L.
3. ANODES AND REF.CELLS SHOULD BE ALWAYS BELOW WATER LINE.
4. SHIPYARD TO CHECK POSITION OF ANODE AND REF. CELL AND CONFIRM TO MAKER WITH G/A.

0	JUN.05,02	ORIGINALLY PREPARED	REF.		DATE JUN.05,02		SCALE N.S	
REV NO	DATE	MODIFICATION	DWN.		CHD.	APP.	DRG NO	
HISTORY			HYL		SCO	SHJ	ISP04-1	

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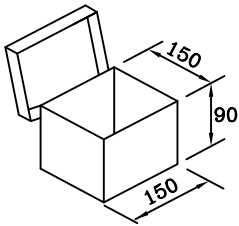
TITLE	SYSTEM POSITION DETAILS
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**NOTE**  
ENSURE THE VOLTAGE DROP IN ANY CABLES  
DOES NOT EXCEED 3 VOLTS.

K.C. LTD.				
1589-6, SONGJUNG-DONG, KANGSU-KU, BUSAN 618-270, KOREA				
TEL: +82 51 831 7720 FAX: +82 51 831 7726				
TITLE				
SYSTEM WIRING & TERMINAL DETAILS				
REF.		DATE		SCALE
		APR.30,04		N.S
DWN.	HYL	CHD.	SCO	DRG NO
			SHJ	ISWT02

0	APR.30,04	ORIGINALLY PREPARED
REV NO	DATE	MODIFICATION
HISTORY		

SHIP NAME / HULL No. : MLBC31800-039/040						
No	NAME	TYPE	PART No	SUPPLY		REMARK
				WORKING	SPARE	
1	ANODE FUSE	150A	IAF00150	2	1	
2	MAIN FUSE	50A	IPF00050	2	1	
3	TRANSFORMER CONTROL FUSE	1A	ITRCF001	2	1	
4	SPARE STORAGE BOX		ISPB0001		1	

			<b>K.C. LTD.</b> 1589-6, SONGJUNG-DONG, KANGSU-KU, BUSAN 618-270, KOREA TEL: +82 51 831 7720 FAX: +82 51 831 7726			
			<b>TITLE</b> SPARE PARTS LIST			
0	JUL.06,04	ORIGINALLY PREPARED	REF.	DATE	JUL.06,04	SCALE
REV NO	DATE	MODIFICATION	DWN.	CHD.	APP.	DRG NO
HISTORY			CHY	SHJ	SHJ	N.S ISPLST001